JUNE 1993

DOE/EA-0792

Nonnuclear Consolidation Environmental Assessment

Volume I

Nuclear Weapons Complex Reconfiguration Program

Department of Energy
Office of Defense Programs
Deputy Assistant Secretary for Weapons Complex Reconfiguration

June 1993

9597

U.S. DEPARTMENT OF ENERGY
PROPOSED FINDING OF NO SIGNIFICANT IMPACT
CONSOLIDATION OF THE NONNUCLEAR COMPONENT
WITHIN THE NUCLEAR WEAPONS COMPLEX

Published in Federal Register July 8, 1993

AGENCY: Department of Energy

ACTION: Proposed Finding of No Significant Impact

SUMMARY: The Department of Energy (DOE) issues this proposed Finding of No Significant Impact (FONSI) on its proposal to consolidate certain nonnuclear component manufacturing, surveillance, and storage functions of the Nation's Nuclear Weapons Complex (Complex). This proposed finding is based on the DOE "Nonnuclear Consolidation Environmental Assessment" (EA), DOE/EA-0792, June 1993, which analyzes the proposed consolidation of these nonnuclear functions that DOE performs in the Complex. The DOE sites involved in the nonnuclear consolidation proposal are the Kansas City Plant (KCP) in Kansas City, Missouri; Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico; the Mound Plant (Mound) in Miamisburg, Ohio; the Y-12 Plant in Oak Ridge, Tennessee; the Pinellas Plant (Pinellas) in Largo, Florida; the Rocky Flats Plant (RFP) in Golden, Colorado; Sandia National Laboratories, New Mexico (SNL/NM) in Albuquerque, New Mexico; and the Savannah River Site (SRS) near Aiken, South Carolina. DOE's proposed action is to consolidate certain nonnuclear manufacturing activities at KCP, relocate others to SRS, LANL, and SNL/NM, and close out the Complex missions at Mound and Pinellas, and Complex nonnuclear missions at RFP. The proposed action responds to Presidential initiatives, including the START II Treaty, to reduce the nation's nuclear weapons stockpile, and is expected to achieve more efficient and effective management of nonnuclear functions within the Complex, while also decreasing the long-term operating costs of this aspect of the Complex. The proposed action is part of DOE's larger proposal to reconfigure the entire Complex. The remainder of this reconfiguration proposal is being analyzed in the Nuclear Weapons Complex Reconfiguration Programmatic Environmental Impact Statement (PEIS).

Based on the analyses in the EA, DOE believes that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321 et seq. Therefore, DOE proposes to issue a Proposed FONSI pursuant to the Council on Environmental Quality regulations implementing NEPA (40 CFR Parts 1500-1508) and the DOE NEPA implementing regulations (10 CFR Part 1021). This Proposed FONSI and the supporting EA are being made available for public review and comment for a period of 30 days following the date of this notice. DOE will consider comments received in making a final determination on whether to issue a FONSI or to incorporate the analysis of proposed consolidation of the nonnuclear component of the Complex into the Reconfiguration PEIS.

INVITATION TO COMMENT: DOE invites the public, including states which host these DOE facilities and Indian tribes that might be affected by the proposed action, to comment on this proposed FONSI. Please direct any comments to Mr. Howard R. Canter at the address presented in the following section.

In accordance with 40 CFR 1501.4(a)(2)(i) and 10 CFR 1021.322(d), DOE is making this proposed FONSI available for public review for 30 days.

DOE has made the EA and related documents available to the public. Copies of the EA are available upon request at the address given below. DOE will also make public comments received on this proposed FONSI available to the public. The EA, Nonnuclear Consolidation Plan (DOE, September 1991), and other material pertaining to this proposal are available for public review at the DOE public reading rooms listed below.

California
U.S. Department of Energy
San Francisco Operations Office
1301 Clay Street, Room 700N
Oakland, California 94612
(510) 637-1762

Colorado
U.S. Department of Energy
Rocky Flats Public Reading Room
Front Range Community College
Library
3645 West 12th Avenue
Westminster, Colorado 80030
(303) 469-4435

Florida
U.S. Department of Energy
Public Reading Room
Largo Public Library
351 East Bay Drive
Largo, Florida 34640
(813) 587-6715

Idaho
U.S. Department of Energy
Idaho Operations Office
Public Reading Room
1776 Science Center Drive
Idaho Falls, Idaho 83402
(208) 526-9162

Nevada
U.S. Department of Energy
Nevada Operations Office
2753 South Highland Drive
Las Vegas, Nevada 89193
(702) 295-1274

Ohio
U.S. Department of Energy
Miamisburg Library
DOE Public Reading Room
35 South Fifth Street
Miamisburg, Ohio 45342
(513) 866-1071

South Carolina
U.S. Department of Energy Reading Rm
University of South Carolina
Aiken Campus
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3320

Tennessee
U.S. Department of Energy
Oak Ridge Operations Office
Freedom of Information Officer
200 Administration Road, Room G-209
Oak Ridge, Tennessee 37831
(615) 576-5765

Illinois
U.S. Department of Energy
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439
(708) 972-2010

Missouri
U.S. Department of Energy
Public Reading Room
Red Bridge Branch, Mid-Continent
Public Library
11140 Locust Street
Kansas City, Missouri 64137
(816) 942-1780

New Mexico-Albuquerque
U.S. Department of Energy
Public Reading Room
National Atomic Museum
20358 Wyoming SE
Albuquerque, New Mexico 87185
(505) 845-6670/4378

New Mexico-Los Alamos
Los Alamos National Laboratory
Community Reading Room
1450 Central Avenue
Suite 101
Los Alamos, New Mexico 87545
(505) 665-2127

Texas
U.S. Department of Energy
Lynn Library/Learning Center
Amarillo College
2201 South Washington Street
Amarillo, Texas 79109
(806) 371-5400

Washington
U.S. Department of Energy
Richland Operations Office
100 Sprout Road
Richland, Washington 99352
(509) 376-8583

District of Columbia
U.S. Department of Energy
Freedom of Information Reading Room
Forrestal Building, Room 1E-90
1000 Independence Avenue, SW
Washington, D.C. 20585
(202) 586-6020

For information on the availability of specific documents and hours of operation, please contact reading rooms at the telephone numbers provided.

DATES: Comments on the proposed FONSI should be postmarked by August 9, 1993, to ensure consideration. Comments postmarked after that date will be considered to the extent practicable.

ADDRESSES: Written comments on the proposed FONSI and requests for copies of the Nonnuclear Consolidation EA or the EA Executive Summary should be directed to:

Howard R. Canter
U. S. Department of Energy
Weapons Complex Reconfiguration Office
P.O. Box 3417
Alexandria, VA 22302

FOR FURTHER INFORMATION CONTACT: Requests for further information on the proposed project or the Nuclear Weapons Complex Reconfiguration Program should be sent to:

Howard R. Canter
U.S. Department of Energy
Weapons Complex Reconfiguration Office, DP-40
1000 Independence Avenue, SW.
Washington, D.C. 20585
(202) 586-1300

For general information on the DOE NEPA review process, contact:

Carol M. Borgstrom
U.S. Department of Energy
Office of NEPA Oversight (EH-25)
1000 Independence Avenue, SW.
Washington, D.C. 20585
(202) 586-4600 or (800) 472-2756.

SUPPLEMENTARY INFORMATION: On December 16, 1991, the then Secretary of Energy announced his decision to prepare an EA for the consolidation of nonnuclear functions of the Complex. The public notice regarding the Secretary's decision was published on January 27, 1992 (57 FR 3046). The nonnuclear consolidation proposal is based upon the DOE Nonnuclear Consolidation Plan (NCP), September 1991, as amended. The NCP also provided the basis for determining the consolidation alternatives analyzed in the EA. DOE determined that the proposal to consolidate nonnuclear facilities could be analyzed in an EA prior to completion of the Reconfiguration PEIS (see 40 CFR 1506.1(c)) because (1) there are significant benefits for the nation from nonnuclear consolidation, i.e., cost savings and preservation of technical competence, whether the rest of the Complex is reconfigured or not, and (2) decisions regarding nonnuclear consolidation will neither affect nor be affected by decisions to be made following the completion of the Reconfiguration PEIS.

A preapproval review copy of the EA was sent to affected states and Indian Tribes for comment in December 1992. Comments received during the review period were taken into account in preparing the final EA. Appendix G of the EA contains all comments received and DOE responses.

As required by the Energy and Water Development Appropriations Act, 1993 and the National Defense Authorization Act for Fiscal Year 1993, DOE also prepared and submitted to Congress the Nonnuclear Reconfiguration Cost Effectiveness Report (CER) on January 15, 1993. Each of three independent consultants, appointed by Energy Secretary Hazel R. O'Leary to review the CER and accompanying certifications, confirmed on May 25, 1993, that the proposed consolidation is cost effective and would not increase the technological, environmental, safety, or health risks associated with Departmental activities. Their review and conclusions did not result in any changes to the proposed nonnuclear consolidation proposal, and the Secretary made the decision to proceed with the Nonnuclear Consolidation process. If supported by the EA, a FONSI would allow DOE to accelerate the proposed consolidation of nonnuclear facilities in response to Presidential initiatives to reduce the Nation's nuclear weapons stockpile.

PROPOSED ACTION: DOE proposes to terminate the Complex missions at Mound and Pinellas, and Complex nonnuclear missions at RFP. The nonnuclear electrical and mechanical manufacturing functions would be consolidated at KCP. Existing research, development, and testing (RD&T) and prototype fabrication capabilities at LANL and SNL/NM would be augmented to provide a limited fabricating capability for future neutron generator work, high power detonators, beryllium technology, pit support functions, and other nonnuclear components now located at Mound, Pinellas, and RFP. These enhanced capabilities would be used to satisfy future weapons stockpile needs, if and when identified. Tritium-handling functions now performed at Mound and Pinellas would be consolidated with tritium functions now located at the Savannah River Site (SRS) and LANL, respectively. The capabilities transferred to KCP, SRS, LANL and SNL/NM would, for the most part,

be integrated into the existing plant facilities with appropriate plant modifications and renovations. The nonnuclear manufacturing workload would be downsized at all sites in response to Presidential initiatives, including START II, to reduce the nuclear weapons stockpile. The following specific actions are proposed:

- Mission Closeouts--Complex missions at Mound and Pinellas and the Complex nonnuclear missions at RFP would be terminated, and associated nonnuclear facilities turned over to the DOE Office of Environmental Restoration and Waste Management (EM) for cleanup and restoration.

- Electrical and Mechanical--The nonnuclear electrical and mechanical capabilities now at Mound, Pinellas, and RFP would be consolidated at KCP within existing facilities.

- Tritium-Handling--All tritium-handling capabilities now performed at Mound would be relocated to be with the tritium functions now performed at SRS. The neutron tube target loading for the current design of neutron generators, now performed at Pinellas, would be completed. Capability for future neutron tube target loading requirements would be provided within existing facilities at LANL.

- Detonators--The existing RD&T and prototyping capability at LANL would be enhanced to provide a limited manufacturing capability for high power detonators, now done at Mound. (The existing RD&T technology base for low-power explosives components would be maintained at SNL/NM; the existing capabilities at Mound to manufacture these components would no longer be needed.)

- Beryllium Technology and Pit Support--The existing technology base and prototyping capability at LANL would be enhanced to provide limited manufacturing capability for beryllium technology and pit support work now done at RFP.

- Neutron Generators, Cap Assemblies, and Batteries--Manufacture of the current design of neutron generators at Pinellas would be completed. The existing technology base for neutron generators would be maintained at SNL/NM. Existing RD&T and prototyping capability at SNL/NM would be augmented to provide a limited manufacturing capability for future advanced design neutron generators. Manufacturing capability for cap assemblies would be relocated from Pinellas to existing facilities at SNL/NM. The technology base now at Pinellas for the manufacture of thermal batteries would be transferred to existing facilities at SNL/NM; manufacture of the batteries would continue to be performed by the private sector. The assembly of lithium ambient batteries from commercially acquired lithium cells would be transferred to KCP.

- Special Products--The nuclear grade steels procurement and storage capability, safe secure trailer manufacturing capability, weapons trainer shop, and metrology services would be transferred from RFP to KCP. The calorimeter manufacturing capability would be relocated from Mound to existing facilities at LANL. The milliwatt heat source surveillance activities would be relocated from Mound to SNL/NM.

Purpose and Need. DOE has proposed to reconfigure the Complex to be smaller, less diverse, and less expensive to operate. The Complex must safely and reliably support whatever nuclear deterrent stockpile objectives are established

in the future by the President and funded by Congress. The Nation's nuclear weapons manufacturing requirements are not as great as they were in the past, and maintaining a large manufacturing infrastructure is not a productive use of national resources.

The purpose of nonnuclear consolidation is to manage better nonnuclear manufacturing activities within the Complex, and to decrease the long-term operating costs of the Complex. In addition, consolidation of the nonnuclear manufacturing activities would provide a means to maintain the specialized skill base needed to produce and test these components, as workload requirements decrease significantly.

The nonnuclear products and services of the Complex are needed to design and manufacture nuclear weapons and test individual components. DOE needs to maintain a nonnuclear capability in order to be able to manufacture, test, and monitor nuclear weapons.

ALTERNATIVES: In addition to the proposed action, the EA analyzed three alternatives in which electrical and mechanical manufacturing activities would be consolidated at sites other than KCP. The three alternative consolidation sites for electrical and mechanical manufacturing activities were Mound, Pinellas, and RFP. For each of these alternatives, the consolidation site for electrical and mechanical activities would retain all of its other nonnuclear manufacturing activities and receive additional electrical and mechanical activities from KCP and the other two mission closeout sites. The current nonnuclear manufacturing activities at KCP and the other two mission closeout sites would be terminated and remaining nonnuclear activities at these sites would be relocated to either SRS, LANL, or SNL/NM.

The EA analyzed the option of locating beryllium technology and pit support work, now done at RFP, at the Y-12 Plant in Oak Ridge, Tennessee instead of at LANL. Under the Y-12 option, the existing capability at Y-12 would be enhanced to accomplish this work. The proposed action does not include the Y-12 option.

No Action Alternative: The EA compared the impacts of the proposed action to those expected to occur if DOE did not consolidate these functions. Under this alternative, all sites included in the proposed action would retain their current weapons missions. Planned upgrades, renovations, repairs, and maintenance activities necessary to improve Complex compliance with all environment, safety, and health and environmental restoration standards would continue irrespective of future Complex configuration. DOE expects that under No Action many current facilities would be placed in an essentially standby mode due to a major reduction in nuclear weapons manufacturing requirements, with correspondingly reduced environmental impacts.

Considerations Common to All Alternatives: All alternatives were based on the same projected workload, which is substantially lower than requirements of the recent past. Planned upgrades, renovations, repairs, and maintenance activities necessary to enable DOE compliance with all environment, safety, and health and environmental restoration standards would continue at Complex facilities irrespective of the configuration of the Complex.

The nonnuclear consolidation proposal does not include components currently purchased from the private sector. Many nonnuclear weapons components are now manufactured and supplied by private companies. Private manufacture of certain components would continue under all alternatives. Where practical and cost effective, DOE may transfer manufacture of additional products to the private sector under existing procurement procedures. However, with recent reductions in the stockpile level, component manufacturing activities may be returned to the government from the private sector because the workload does not make it cost effective for these private suppliers to continue manufacturing such small quantities.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION: Based on the analysis of environmental impacts in the Nonnuclear Consolidation EA, DOE believes that the proposed action would not result in any significant environmental impacts.

Implementing the proposed action would involve changes and/or modifications to existing buildings at KCP, SRS, LANL, and SNL/NM. Relocated activities would be compatible with existing land use plans and policies. The peak construction workforce of fewer than 100 workers at each site would have negligible effects on area land use, housing, and social services. No significant impacts on ecological resources, geological resources, or soil are expected. Air quality and noise impacts from construction activities are expected to be negligible since most activities would occur within existing buildings. No new construction or activities associated with the proposed action would occur within identified base floodplains or wetlands that would require a floodplain/wetland assessment under 10 CFR 1022.12 (a). (The base floodplain is defined as the 100-year (1.0 percent) floodplain.) Currently, KCP is the only site potentially vulnerable to floods in the proposed consolidated nonnuclear complex. However, KCP will be protected from a 500-year flood event upon completion in December 1993 of a new levee. Construction of the levee is covered by an EA and FONSI prepared by the U.S. Army Corps of Engineers, *Environmental Assessment: Completion of Flood Protection Works, Bannister Road Federal Complex, Kansas City, Missouri* (September 1990). The Department adopted this EA (DOE/EA-0509) and issued a FONSI on September 18, 1991. No impacts are expected on archeological or historic sites on any of the sites proposed to receive relocated nonnuclear activities. Based on comments received from the EA pre-approval review process, there is no indication that the proposed action would have any adverse effects on any historic or archaeological resources at KCP, SRS, LANL, or SNL/NM.

During operation, minor increases in air emissions and noise are expected, but would not exceed applicable emissions standards and/or guidelines. Therefore, air quality and noise impacts would not be significant. Terminating the nonnuclear missions at Mound, Pinellas, and RFP would improve the local air quality near these sites, but not significantly. Increases in water usage would be less than 1 percent of current usage at KCP, SRS, and LANL, and less than 3 percent at SNL/NM. Adequate water supplies are available to accommodate the increase; therefore, no significant impacts on water resources are expected.

Socioeconomic and community service impacts at KCP, SRS, LANL, and SNL/NM are not expected to be significant. The proposed action would create approximately 1,095 jobs (425 direct and 670 indirect) at KCP at peak operations. Total in-migration would be approximately 558 persons. At SRS, approximately 103 jobs (45 direct

and 58 indirect) would be created. Total in-migration would be approximately 60 persons. At LANL, approximately 294 jobs (115 direct and 179 indirect) would be created. Total in-migration would be about 154 persons. At SNL/NM, approximately 940 jobs (385 direct and 555 indirect) would be created at peak operation. Total in-migration would be about 515 persons. The change in population during the time of peak operation would be less than 1 percent at all sites and the need for additional housing units would be negligible. Therefore, socioeconomic impacts are not significant.

These in-migration estimates do not take into account such factors as rehiring preference for displaced workers that may result from the workforce restructing plan developed for the site, as required by section 3161 of the National Defense Authorization Act for Fiscal Year 1993. Accordingly, these in-migration estimates represent the maximum expected at each site.

Adverse economic consequences will occur at Mound, Pinellas, and RFP due to the termination of nonnuclear missions at these sites. At Mound, approximately 2,846 jobs (1,070 direct and 1,776 indirect) would be lost. This reduction in jobs would not increase the unemployment rate in the year 2000 beyond the projected baseline level of 5.6 percent. Earnings in the Mound region-of-influence (those areas in which approximately 90 percent of current DOE and contractor employees reside) would be reduced by about $93.1 million, with related decrease in the total personal income of $119.3 million. The City of Miamisburg would lose an estimated $0.8 million in income tax revenue in the year 2000 as a result of the loss of direct employment at Mound. This loss represents a 10 percent loss in total income tax revenue, a 9 percent loss in General Fund revenue, and a loss of less than 4 percent in total actual revenues. The less than 1 percent change in population after weapons mission termination would create an estimated 600 additional vacant housing units. The additional vacant housing units represent less than a 1 percent increase in the Mound region-of-influence.

At Pinellas, approximately 3,038 jobs (1,050 direct and 1,988 indirect) would be lost. This reduction in jobs would not increase the unemployment rate in the year 2000 beyond the projected baseline level of 5.4 percent. Earnings in the Pinellas region-of-influence would be reduced by about $103.1 million, with a related decrease in the total personal income of $148.2 million. The less than 1 percent change in population after weapons mission termination would create an estimated 700 additional vacant housing units. The additional vacant housing units represent less than a 1 percent increase in the Pinellas region-of-influence.

At RFP, approximately 1,917 jobs (750 direct and 1,167 indirect) would be lost. This reduction in jobs would not increase the unemployment rate in the year 2000 beyond the projected baseline level of 5.6 percent. Earnings in the RFP region-of-influence would be reduced by about $68.5 million, with a related decrease in the total personal income of $82.2 million. The less than 1 percent change in population after nonnuclear weapon mission termination would create an estimated 400 additional vacant housing units. The additional vacant housing units represents less than a 1 percent increase in the local RFP area.

As a result of ongoing planning, DOE has revised the workforce estimates presented in the EA. Recently revised workforce figures for direct jobs are

slightly different than the workforce number used in the EA analysis and therefore the estimates of indirect jobs would also be slightly different. Additional estimated direct jobs have been revised to 330 at KCP (a decrease of 95), 125 at LANL (an increase of 10), 390 at SNL (an increase of 5), and 50 at SRS (an increase of 5).

The proposed fiscal year 1994 budget projects a reduction in expenditures at most DOE sites resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. The current estimate of direct jobs lost at sites with mission closeouts is 1,020 at Mound (a decrease of 50), 800 at Pinellas (a decrease of 250), and 715 at RFP (a decrease of 15). The estimated direct jobs reduction would also cause the estimated number of indirect jobs lost to be less than those used in the EA analysis. The revised workforce estimates do not affect any impact conclusions presented in the EA.

Nonnuclear manufacturing activities associated with the proposed action would increase hazardous waste volumes by less than 7 percent and would not have significant impacts on waste management at KCP, SRS, LANL, and SNL/NM. Anticipated increases in waste volumes at these sites are well within the existing treatment, storage, and disposal capabilities. Effluents and emissions due to waste management activities attributed to the proposed action would be negligible. Under the proposed action sanitary/industrial wastewater volumes are projected to increase at all sites, but not significantly. At KCP, SRS, and LANL, the increase is less than 1 percent over the current rate at these sites; at SNL/NM, the increase is less than 2 percent over the current rate. All sites have sufficient waste treatment, storage, and disposal capacity to handle the projected increases; therefore, no significant impacts are expected. At Mound, Pinellas, and RFP, nonnuclear production waste streams would be eliminated; however, this would not result in a significant impact.

No significant adverse impacts to the health of the public or workers is expected from implementation or operation activities associated with the proposed action at any of the sites. Hazard Indexes of less than 1.0 were calculated for onsite and at the site boundary at KCP, SRS, LANL, and SNL/NM. (The Hazard Index is a numerical indicator of the threshold between acceptable and unacceptable exposure levels of noncarcinogenic hazardous compounds. A Hazard Index value of 1.0 or less means that no adverse health effects are expected to occur.) The cancer risk to workers at KCP, SRS, LANL, and SNL/NM would be insignificant. The amount and types of chemicals associated with relocated activities would not add significantly to existing health conditions at these sites. Activities relocated to SNL/NM would result in annual cancer risks to workers of 6×10^{-6} due to the introduction of certain chemical solvents. The cancer risk to the public at SNL/NM was less than 10^{-6} annually. EPA accepts a two-level risk for carcinogens that depends upon the compound class and the hazard which it presents, so that risk levels of 10^{-5} and 10^{-6} are considered reasonable (55 FR 60848). Measures such as substituting less toxic solvents or modifying production procedures would be implemented to minimize the cancer risk to workers at SNL/NM. No significant radiological health effects are expected at LANL, SNL/NM, or SRS as a result of the proposed action. The annual dose increment associated with the increase in tritium emissions at LANL and SNL/NM would be less than 0.1 mrem and 0.022 mrem effective dose equivalent, respectively. At SRS, the annual dose increment would be less than 0.001 mrem effective dose equivalent. These doses would result in

an increased risk of less than 4.5×10^{-8} and 9.8×10^{-9} potential fatal cancers from 1 year of operation at LANL and SNL/NM, respectively, and 4.5×10^{-10} at SRS. The annual dose increment to workers at LANL, SNL/NM, and SRS would be less than 0.011 mrem. This dose would result in an incremental and cumulative increased risk of 4.9×10^{-9} and 1.3×10^{-7} potential fatal cancers, respectively, from 1 year of operation at these sites.

The accident profiles at each site would not change as a result of the proposed action. The probability or consequences of potential accidents would not increase appreciably at any of the sites since relocated functions involve activities and chemicals that are currently being performed at consolidation sites.

The proposed action would have no cumulative effects on the Complex, because the action represents a consolidation of existing activities and functions, rather than an initiation of new activities. In most instances, consolidation would reduce potential cumulative environmental impacts at all sites. Nonnuclear activities now located within aging facilities at donor sites would be transferred to sites with newly refurbished facilities. These facilities would be designed and constructed to incorporate DOE environment, safety, and health requirements on Complex reconfiguration and meet all applicable codes and standards. The facilities to which the nonnuclear activities would be transferred already contain virtually all of these operations, materials, and/or hazardous waste streams. Consolidation would also reduce the number of sites with activities generating these hazardous materials within the Complex.

Environmental Impacts of Alternatives: Environmental consequences discussed above at SRS, LANL, and SNL/NM under the proposed action would be the same or less under the Mound, Pinellas, and RFP alternatives and not significant. At the consolidation sites for each alternative (Mound, Pinellas, and RFP), substantial new construction would be required. If these alternatives were selected, additional site-specific NEPA documentation would be required.

PROPOSED DETERMINATION: Based on the information and analysis in the EA, DOE believes that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA, and that incorporation into the Reconfiguration PEIS is not required. DOE will make its final determination on whether to issue a FONSI or to incorporate into the PEIS after the 30-day public review period.

Issued in Washington, D.C. this 1st day of July, 1993.

--/signed/--
Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

Department of Energy
Washington, DC 20585

July 2, 1993

To Interested Parties:

In accordance with the procedures set forth in the National Environmental Policy Act of 1969 and implementing regulations, the Department of Energy has issued a proposed Finding of No Significant Impact (Finding) on its proposal to consolidate certain nonnuclear manufacturing functions of the Nation's nuclear weapons complex. The proposed Finding is based on the "Nonnuclear Consolidation Environmental Assessment", released in June 1993 (Document No. DOE/EA-0792).

The Department invites the public, including affected States and American Indian Tribes, to comment on the proposed Finding. The Department is making the proposed Finding available for public review for 30 days prior to making its final determination, and before taking any action on the proposal. The proposed Finding and the Environmental Assessment, Volumes I and II, are enclosed.

Comments on the proposed Finding may be forwarded to the following address within 30 days:

Mr. Howard R. Canter
Deputy Assistant Secretary
Office of Weapons Complex Reconfiguration
U.S. Department of Energy
P.O. Box 3417
Alexandria, VA 22302

Comments may also be faxed to (703) 931-9222. Comments received will be made available to the general public in the public reading rooms listed in the proposed Finding. Comments on the proposed Finding will be taken into account in making a final determination whether a Finding of No Significant Impact is supported by the Environmental Assessment.

Sincerely,

Everet H. Beckner
Acting Assistant Secretary
for Defense Programs

Enclosures

DOE/EA-0792

Nonnuclear Consolidation Environmental Assessment

Volume I

Nuclear Weapons Complex Reconfiguration Program

Department of Energy
Office of Defense Programs
Deputy Assistant Secretary for Weapons Complex Reconfiguration

June 1993

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ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

ADT	average daily traffic
AEC	Atomic Energy Commission
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
CAA	Clean Air Act, as amended
CDR	conceptual design report
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Complex	Nuclear Weapons Complex
CWA	Clean Water Act, as amended
D&D	decontamination and decommissioning
DNL	day-night sound levels
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DOT	Department of Transportation
DP	Defense Programs
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	DOE Office of Environmental Restoration & Waste Management
EPA	Environmental Protection Agency
ES&H	environment, safety, and health
FONSI	finding of no significant impact
FWS	U.S. Fish and Wildlife Service
HAP	hazardous air pollutants
HE	high explosive
HEPA	High Efficiency Particulate Air
HLW	high-level waste
HVAC	heating, ventilation, and air conditioning
INEL	Idaho National Engineering Laboratory
ISCST	Industrial Source Complex Short Term
KAFB	Kirtland Air Force Base, Albuquerque, NM
KCP	Kansas City Plant
LANL	Los Alamos National Laboratory
L_{eq}	equivalent sound level
LLNL	Lawrence Livermore National Laboratory
LLW	low-level waste
LOS	level of service
MCL	maximum contaminant level
MMES	Martin Marietta Energy Systems

MMI	Modified Mercalli Intensity
Mound	Mound Plant
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NCP	Nonnuclear Consolidation Plan
NEPA	National Environmental Policy Act of 1969, as amended
NERP	National Environmental Research Park
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NTS	Nevada Test Site
NWI	National Wetland Inventory
NWS	National Weather Service
OEL	occupational exposure limit
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
P. L.	Public Law
PEIS	Programmatic Environmental Impact Statement
PEL	permissible exposure limit
PHV	peak hour volume
Pinellas	Pinellas Plant
PSD	Prevention of Significant Deterioration
R&D	research and development
RAPCA	Regional Air Pollution Control Agency
RCRA	Resource Conservation and Recovery Act, as amended
RD&T	research, development, and testing
RFP	Rocky Flats Plant
ROD	record of decision
ROI	region-of-influence
RTF	Replacement Tritium Facility
RTG	Radioisotopic Thermoelectric Generator
SAR	Safety Analysis Report
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act, as amended
Secretary	Secretary of Energy
SHPO	State Historic Preservation Office
SNL	Sandia National Laboratories, New Mexico
SRS	Savannah River Site
START	Strategic Arms Reduction Talks
TA	Technical Area
TCLP	toxicity characteristic leaching procedure
TLV	Threshold Limit Value
TRU	transuranic

TSCA	Toxic Substances Control Act, as amended
TSP	total suspended particulates
TWA	time-weighted average
USAF	U.S. Air Force
VRM	Visual Resource Management
WSRC	Westinghouse Savannah River Company
Y-12	Y-12 Plant, Oak Ridge Reservation

CHEMICALS AND UNITS OF MEASURE

BGY	billion gallons per year
CCl_4	carbon tetrachloride
CO	carbon monoxide
CFC	chlorofluorocarbons
CFC-12	dichlorodifluoromethane
CFC-113	trichlorotrifluoroethane
dB	decibel
dBA	decibel A-weighted
DCE	1,2-dichloroethylene
ft^2	square feet
ft^3	cubic feet
ft^3/s	cubic feet per second
gal	gallon
GPD	gallons per day
gpm	gallons per minute
GPY	gallons per year
HCFC-22	chlorodifluoromethane
HMX	cyclotetramethylenetetranitramine, or 1,3,5,7-tetranitro-1,3,5,7-tetrazocine
hr	hour, hours
kg	kilogram
kV	kilovolt
kVA	kilovoltampere
kW	kilowatt
kWh	Kilowatt hour
lb	pound, pounds
lb/hr	pound per hour, pounds per hour
lb/yr	pound per year, pounds per year
mg	milligram (one-thousandth of a gram)
mg/L	milligram per liter
MGD	million gallons per day
MGY	million gallons per year
mrem	millirem
MVA	megavoltampere
MW	megawatt

MWh	megawatt hour
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
O_3	ozone
Pb	lead
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PETN	pentaerythritoltetranitrate
PM_{10}	particulate matter of aerodynamic diameter (diameter less than 10 micrometers)
ppb	parts per billion
ppm	parts per million
RDX	cyclotrimethylenetrinitramine
SO_2	sulfur dioxide
TATB	triaminotrinitrobenzene
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TNT	trinitrotoluene
TOC	total organic compounds
VOC	volatile organic compounds
yd^3	cubic yards
µg	microgram (one-millionth of a gram)
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
µm	micron (one-millionth of a meter)

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

Complex 21. The Department of Energy (DOE) is developing a proposal, known as Complex 21, to reconfigure the Nation's Nuclear Weapons Complex (Complex). The Complex is a set of interrelated facilities that design, manufacture, test, and maintain this country's nuclear weapons. The Complex also produces and/or recycles the nuclear materials used in building weapons and stores nuclear materials for future use. DOE also dismantles the weapons retired from the stockpile. In addition, DOE conducts surveillance and maintenance activities to ensure the reliability and safety of the stockpiled weapons throughout their operational life.

Many of the Complex facilities, constructed over the past 50 years, were sized to meet stockpile requirements substantially larger and more diverse than those expected in the future and were designed and built to environmental and safety standards very different from, and less stringent than, those of today. In view of improving international relationships, the Presidential initiatives of September 27, 1991 and January 20, 1992, and the Strategic Arms Reduction Talks II (START II) agreement of January 1993, the requirements for the number and types of nuclear weapons will substantially decrease from current stockpile levels. Additional changes are possible in the future which cannot be foreseen at this time. Therefore, the Complex must provide the flexibility to respond to emerging and future changes. To meet these challenges, the Secretary of Energy (Secretary) has proposed to reconfigure the present Complex. The future Complex that is the subject of DOE's proposal is called Complex 21. Complex 21 would be smaller, less diverse, and less expensive to operate than the Complex of today.

Nonnuclear Consolidation. The development of Complex 21 has been divided into two parts: (1) the consolidation of the nonnuclear manufacturing, storage, and surveillance functions of the Complex, which is the Proposed Action addressed in this Environmental Assessment (EA); and, (2) reconfiguration of the nuclear and the research, development, and testing (RD&T) elements of the Complex.

The nonnuclear component of the Complex manufactures nonnuclear parts of nuclear weapons and tests individual components. The nonnuclear consolidation proposal is designated as such because the vast number of activities to be transferred under the proposal are manufacturing activities associated with the nonnuclear components of nuclear weapons. Nonnuclear components include electronics, batteries, wiring, and firing systems. Although small amounts of tritium, a radioactive material, are involved with some of these components, transfer of tritium-handling activities from the Mound Plant (Mound) and the Pinellas Plant (Pinellas) is included as part of the proposal in order to achieve the greatest possible savings from such consolidation. In addition, leaving tritium operations at Pinellas would be technologically impractical because the neutron generators now being produced at Pinellas are substantially different from those under development at Sandia National Laboratories, New Mexico (SNL) that will be used to meet future stockpile requirements.

In contrast to high-volume industrial factories, the nonnuclear plants generally produce relatively small quantities of technologically sophisticated products which have a long shelf life. Certain limited-life

Complex 21 would be smaller, less diverse, and less expensive to operate than the Complex of today.

components are also produced. This type of production results in a large infrastructure with relatively high fixed costs, irrespective of the production rate.

The nonnuclear manufacturing storage, and surveillance activities discussed in this EA have been grouped into six different categories. These include:

- *Electrical/Mechanical.* This category includes the majority of the activities that will be moved to or remain at the proposed consolidation site and consists of 28 items from the Kansas City Plant (KCP), 5 each from Mound and Pinellas, and 1 from the Rocky Flats Plant (RFP).

- *Tritium-Handling.* This category includes four specific tritium-handling activities of which three are currently located at Mound and one is at Pinellas.

- *Detonators.* This category consists of the high-power detonator work that is currently at Mound.

- *Beryllium Technology and Pit Support.* These two items are currently located at RFP.

- *Neutron Generators, Cap Assemblies, and Batteries.* This category includes four specialized items, including two types of batteries, currently located at Pinellas.

- *Special Products.* This category consists of six unique products (four from RFP and two from Mound) that do not easily fall into any specific category.

The locations of sites involved in the nonnuclear consolidation proposal are illustrated in figure ES-1. The key element of the Proposed Action is consolidation of electrical and mechanical functions at KCP. The No Action alternative and alternatives for consolidating the majority of electrical and mechanical functions at Mound, Pinellas, and RFP were also investigated.

National Environmental Policy Act. The *National Environmental Policy Act* (NEPA) of 1969, as amended, requires Federal agencies to consider the environmental consequences of proposed projects and their alternatives before decisions are made. In complying with NEPA, DOE follows Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508) as well as DOE's own NEPA implementation regulations 57 FR 15122, April 24, 1992 to be codified at 10 CFR 1021.

The DOE approach for implementing NEPA requirements for the reconfiguration program has three phases. The first phase involves this EA, which addresses nonnuclear consolidation. The second phase is preparation of a Programmatic Environmental Impact Statement (PEIS), which addresses reconfiguration of nuclear and RD&T elements of the Complex. The third phase consists of preparation of site-specific EISs and/or EAs for the nuclear and RD&T reconfiguration.

If the analysis in this EA supports a final finding of no significant impact (FONSI), DOE plans to proceed with nonnuclear consolidation and incorporate the nonnuclear consolidation decisions into the Reconfiguration PEIS analysis as actions common to all alternatives. However, if any

- **This Environmental Assessment addresses consolidation of nonnuclear functions**
- **Programmatic Environmental Impact Statement will address reconfiguration of nuclear and research, development, and testing functions**

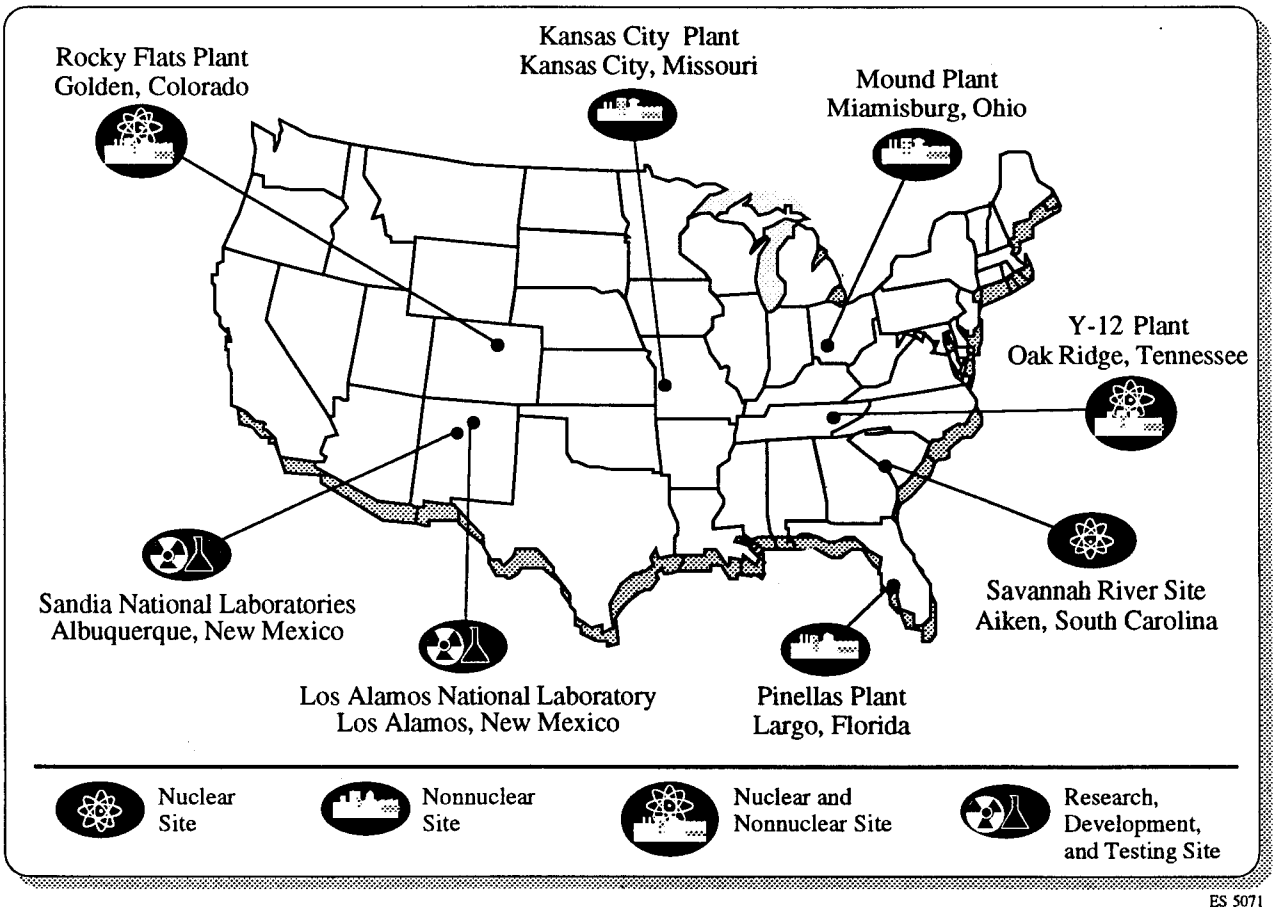

FIGURE ES–1.—***DOE Sites Involved in Nonnuclear Consolidation Proposal.***

significant environmental impacts due to the Proposed Action are identified during the public comment period on the proposed FONSI, then the assessment of environmental impacts for consolidating nonnuclear functions would be incorporated into the Reconfiguration PEIS. In this case, no actions would be taken to consolidate the nonnuclear manufacturing activities unless they were included in the Reconfiguration PEIS Record of Decision (ROD).

Time Frame of Proposed Action:

- **1993—Begin Consolidation**
- **1997—Full Operations in Place**
- **2000—Full Validation of All Operations**

Time Frame. If DOE issues a FONSI in mid-1993, building modifications and equipment installation would begin immediately and proceed through 1995. Operations of most functions at receiver sites would be phased in over a 3-year period beginning in late 1994, with full operations achieved around 1997. However, some validation activities could continue beyond this date; therefore, for the purposes of environmental analysis, the year 2000 has been assumed as the year of full validation of operations following consolidation. It is assumed that operations would continue until the middle of the 21st century.

Issue Identification. Issue identification for this EA was accomplished as part of the larger scoping process for the reconfiguration program. Scoping

Issue identification for Reconfiguration Program involved:

- **7-1/2 month comment period**
- **Meetings held near all sites**
- **432 comments on nonnuclear consolidation**

activities consisted of both internal DOE scoping and public scoping. Public meetings were conducted between March and August 1991 at 15 locations across the country to allow interested parties to speak and present related information. Meetings occurred in the vicinity of all sites that could be affected by nonnuclear consolidation. All comments received through public scoping were systematically organized and reviewed for consideration during the preparation of both the PEIS and this EA. An extensive summary of all comments received during the public scoping process was published in the *Implementation Plan for the Nuclear Weapons Complex Reconfiguration Programmatic Environmental Impact Statement*, February 1992.

During the public scoping process, DOE received comments from members of the public; from representatives of interest groups; and from Federal, state, and local officials. DOE received 432 comments specifically related to consolidation of nonnuclear functions. Comments covered a range of environmental and policy-related issues including environmental health, economic impacts of plant closures to local communities, worker and public health and safety, hazardous materials management, surface and groundwater contamination, population encroachment, and privatization of nonnuclear functions.

A review of the comments received was conducted to identify issues to be analyzed in this EA and, issues that are either not relevant or outside the scope of this EA. This review, along with internal DOE studies and the CEQ and DOE requirements for implementing NEPA requirements, establishes the scope of study.

Purpose of and Need for Nonnuclear Consolidation

Purpose. The purpose of nonnuclear consolidation is to effect better management of nonnuclear manufacturing activities within the Complex, and to decrease the long-term operating costs of this aspect of the Complex. In addition, consolidation would provide DOE with a mechanism to maintain the specialized skill base, and retain critical technologies necessary to produce and test the nonnuclear components.

Need. Consolidation of nonnuclear functions is necessary because it would scale future nonnuclear manufacturing activities to the foreseeable workload and reduce operating costs. To provide a sufficient workload for maintaining a well-trained and qualified workforce, functions that use similar technologies would be combined. Continued operation of the existing large Complex would require maintaining nonnuclear expertise at multiple sites with little or no workload, which is already resulting in a loss of technical skills. Consolidating similar nonnuclear manufacturing operations and collocating some nonnuclear manufacturing capabilities with similar RD&T capabilities at the national laboratories would serve as mechanisms to maintain or enhance critical skills.

Proposed Action minimizes:

- **Environmental, safety, and health risks**
- **Technical risks**
- **Consolidation costs**
- **Consolidation time**

PROPOSED ACTION AND ALTERNATIVES

In the Nonnuclear Consolidation Plan (NCP) with addendum of September 1991, DOE considered all sites that currently perform nonnuclear manufacturing functions as candidates for the consolidated nonnuclear mission: KCP, Mound, Pinellas, RFP, the Oak Ridge Y-12 Plant (Y-12), and the Pantex Plant (Pantex). DOE assessed nonnuclear manufacturing functions in three groups:

- Candidates for transfer to a primary consolidation site.
- Candidates for transfer to other sites.
- Candidates for privatization.

Key Elements of Proposed Action:

- **Close out Complex missions at Mound and Pinellas, and the weapons Complex nonnuclear missions at Rocky Flats Plant**
- **Consolidate electrical and mechanical functions at Kansas City Plant**
- **Transfer other functions or technology bases to three or four other DOE sites**

Each of the 6 potential consolidation sites was rated using 10 performance measures within 4 categories (table ES-1) that involved environment, safety and health (ES&H) risks; technical risks; consolidation costs; and consolidation time. Through this analysis, KCP ranked first in each of the 4 categories, and was selected as the preferred consolidation site (i.e., the Proposed Action). Pinellas ranked second in 2 categories; Mound ranked second in 1 category; and Pinellas, Mound, and RFP tied for second in 1 of the 4 categories. Y-12 and Pantex ranked last in all 4 categories.

As a result of the analysis in the NCP, Y-12 and Pantex have been eliminated from further study as primary consolidation sites. Mound, Pinellas, and RFP have been retained for analysis in this EA, along with No Action, as alternatives to the proposed consolidation at KCP.

Figure ES-2 illustrates the Proposed Action, and table ES-2 provides a comparison of Proposed Action and the three alternatives. The Proposed Action and alternatives are discussed in more detail below.

TABLE ES–1.—*Proposed Action and Alternatives*

Categories	Performance Measures
Minimization of ES&H Risks	New Hazardous Chemicals Additional Hazardous Operations New Regulated Waste Streams
Minimization of Technical Risks	New Parts to Manufacture New Parts to Procure Jobs to Transfer Availability of Technical Personnel
Minimization of Cost	Capital Cost Operating Cost
Minimization of Time	Payback Time

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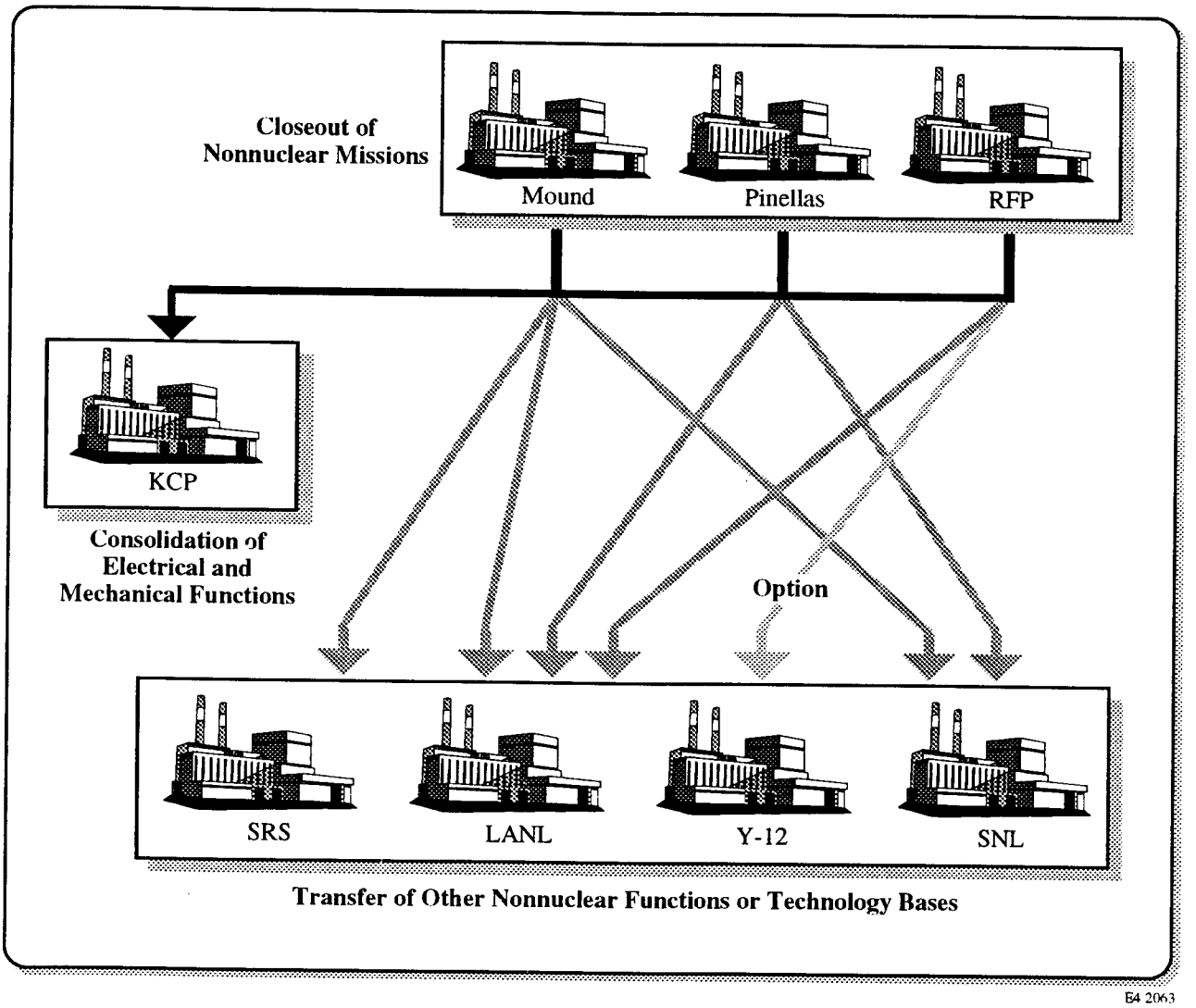

FIGURE ES–2.—*Proposed Action–Schematic Transfer of Nonnuclear Functions.*

Kansas City Plant Consolidation. DOE proposes to terminate the Complex missions at Mound and Pinellas, and the nonnuclear manufacturing mission at RFP. Enhanced RD&T and prototype fabrication capability at the laboratories would be provided to replace certain weapon production capabilities now located at Mound, Pinellas, and RFP. The remaining nonnuclear manufacturing functions would be consolidated at KCP, and the weapons manufacturing workload currently at KCP would be reduced.

The Proposed Action would result in: the consolidation of the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at KCP; tritium-handling capabilities at Savannah River Site (SRS) and Los Alamos National Laboratory (LANL); high power detonator capabilities at LANL; and beryllium technology and pit support functions at LANL or, as an option, at Y-12. The existing RD&T and prototyping capability at SNL, would be augmented to provide the necessary fabrication capability for future neutron generators, cap assemblies, and other nonnuclear components.

Mound Plant Alternative. The Complex missions at KCP and Pinellas, and the Complex nonnuclear manufacturing mission at RFP would be terminated. Mound would retain all of its existing nonnuclear manufacturing capabilities and receive additional

TABLE ES–2.—*Proposed Action and Alternatives*

Nonnuclear Manufacturing Functions to be Moved	Alternatives				
	No Action	Proposed Action	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative
Electrical/Mechanical	KCP, Mound, Pinellas, RFP	KCP	Mound	Pinellas	RFP
Tritium Handling at Mound	Mound	SRS	Mound	SRS	SRS
Tritium Handling at Pinellas	Pinellas	LANL	LANL	Pinellas	LANL
Detonators	Mound	LANL	Mound	LANL	LANL
Beryllium Technology and Pit Support	RFP	LANL (Option Y-12)	LANL	LANL	RFP
Neutron Generators, Cap Assemblies, and Batteries	Pinellas	SNL and KCP (LAMB)	SNL and Mound (LAMB)	Pinellas	SNL and RFP (LAMB)
Special Products at RFP	RFP	KCP	Mound	Pinellas	RFP
Special Products at Mound	Mound	LANL (Calorimeters) and SNL (MWHS)	Mound	LANL (Calorimeters) and SNL (MWHS)	LANL (Calorimeters) and SNL (MWHS)

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Notes: LAMB Lithium Ambient Batteries
MWHS Milliwatt Heat Source Surveillance

nonnuclear manufacturing capabilities from the other sites.

The Mound alternative would result in the consolidation of: the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at Mound; Pinellas' tritium-handling capabilities with similar functions at LANL; and beryllium technology and pit support functions at LANL. The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future neutron generators, cap assemblies, and other nonnuclear components.

Pinellas Plant Alternative. The Complex missions at KCP and Mound, and the Complex nonnuclear mission at RFP would be terminated. Pinellas would retain all of its existing nonnuclear manufacturing capabilities and receive additional nonnuclear manufacturing capabilities from the other sites.

The Pinellas alternative would result in the consolidation of: the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at Pinellas; Mound tritium-handling capabilities with similar functions at SRS; high power detonators at LANL; and beryllium technology and pit support functions at LANL. The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for other nonnuclear components.

Rocky Flats Plant Alternative. The Complex missions at KCP, Mound, and Pinellas would be terminated. RFP would retain all of its existing nonnuclear manufacturing capabilities and receive additional nonnuclear manufacturing capabilities from the other sites.

The RFP alternative would result in the consolidation of: the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at RFP; tritium-handling capabilities at SRS and LANL; and high-power detonator capability at LANL. The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future neutron generator work, cap assemblies, and other nonnuclear components.

No Action. Under No Action, the consolidation of nonnuclear functions would not occur. Planned upgrades, renovations, repairs, and maintenance activities necessary to improve Complex compliance with all environment, safety and health (ES&H) and environmental restoration standards would continue irrespective of future Complex configurations. Mound, Pinellas, and RFP would retain their current nonnuclear manufacturing missions.

Alternatives Eliminated from Further Study. As previously stated, alternatives for consolidation at Y-12 and Pantex were examined in the NCP, but eliminated from further evaluation. In addition, alternatives that would: consolidate nonnuclear manufacturing activities at any two of the current three dedicated nonnuclear plants (i.e., Mound and Pinellas; KCP and Mound; or KCP and Pinellas); consolidate such activities at a nuclear site or a national laboratory; or, consolidate all tritium maintenance, processing, and storage activities presently performed at Mound and SRS at Mound instead of SRS were also considered during the course of preparing this EA but were eliminated from further study.

The Two-Site Nonnuclear Consolidation Study, with addendum, released in December 1992, estimated and compared the annual operating and long-term costs for the two-site alternatives with the Kansas City consolidation alternative addressed in the NCP. With regard to long-term cost comparisons, the Two-Site Study supports the conclusion that the preferred alternative of consolidating most nonnuclear manufacturing activities at Kansas City would save between 1 1/2 billion dollars and several billion dollars in life-cycle costs over the two-site consolidation alternatives examined. This conclusion alone renders all of the two-site options unreasonable. Therefore, they have been eliminated from further analysis in this EA.

In addition, as explained in the addendum to the Two-Site Study, one of the results of the START II agreement has been to reduce further the cost effectiveness and increase the technical risks involved in retaining neutron generator production at Pinellas. Thus, the KCP-Pinellas two-site consolidation option (which was the least costly of the two-site options evaluated in the study) has become even less attractive compared to single-site consolidation at KCP.

Further, as a result of recent workload and budget reductions, the Complex has been forced to significantly reduce personnel levels, jeopardizing technical competence in many areas. Consolidating similar activities at a single site will ensure sufficient work to support a core workforce of technical and production personnel. This will enable utilization and retention of key skills and technical capabilities needed to maintain the enduring stockpile. Consolidation at two sites will provide substantially less assurance that this programmatic objective will be achieved.

The environmental impacts of alternatives for consolidating nonnuclear manufacturing activities at a national laboratory or at a nuclear site (other than RFP) are not evaluated in this EA, because the technical risk, cost and time to consolidate render these alternatives unreasonable. As described above, the NCP considered the alternative of consolidating nonnuclear manufacturing activities at RFP, Pantex

and Y-12, all nuclear sites. For the reasons discussed, neither Y-12 or Pantex represents a reasonable alternative for such consolidation.

Although the laboratories have experience with many of these technologies, and have designed the components and subsystems to be produced, they do not have recent practical experience manufacturing production quantities of many of these components and subsystems. Thus, the technical risk involved in consolidating all activities at the laboratories would be significantly greater than for the other alternatives considered in this EA. In addition, given the large number of technologies to be transferred, the transfer cost (including construction of new facilities) and time involved before such a transfer could be effected would render this alternative unreasonable. This is particularly true in view of the need for near-term consolidation to prevent the loss of technical competence in the Complex.

A number of tritium-handling functions are currently performed at Mound and SRS. DOE has assessed the comparative costs and long-term cost savings of consolidating these functions at either one of the two sites in the Tritium Consolidation Comparison Study: Cost Analysis, December 1992. It was estimated that consolidation of tritium-handling functions at Mound would involve life-cycle costs nearly 2 billion dollars greater than consolidation at SRS. As a result, DOE has concluded that Mound is an unreasonable location for such consolidation. In addition, DOE believes that it would not be prudent to place additional large tritium inventories in a densely populated urban area such as that surrounding Mound. This is especially so when there exists the alternative of consolidating this material at SRS, a large site which is not near a heavily populated area.

ENVIRONMENTAL CONSEQUENCES

Proposed Action. DOE has identified no significant environmental impacts associated with the proposal to consolidate nonnuclear activities at the KCP. The conclusions of the environmental analyses are as follows:

Environmental Consequences:

- **Proposed Action has no significant environmental impacts**
- **Other consolidation alternatives require substantial new construction and additional NEPA documentation**
- **No Action alternative does not have significant environmental impacts, but does not meet national security requirements**

- *Land Use.* No additional undisturbed land would be required to implement the project. At KCP, SRS, LANL, and SNL, changes and modifications to existing buildings would be compatible with existing land use plans and policies.

- *Air Quality and Acoustics.* The same sites would experience short-term increases in air emissions and noise during building renovations. During operation, minor increases in air emissions and noise would not exceed applicable air quality standards or guidelines. At Mound, Pinellas, and RFP, local air quality and noise improvements could occur due to the close out of weapons complex missions at these facilities.

- *Water Resources.* No disturbance of wetlands, floodplains, or surface water features would occur at any sites. Increased water usage would not exceed available supplies at any of the sites. At KCP, SRS, and LANL, increases in water usage would be less than 1 percent

of current usage. At SNL the increase would be less than 4 percent. Water use would decrease due to mission close outs at Mound, Pinellas, and RFP.

- *Geology and Soils.* No significant impacts to geologic resources or soils would occur at any sites.

- *Biotic Resources.* No permanent disturbance of any biotic resources is anticipated from building renovations or operations at any site. No adverse impacts to threatened and endangered species or wetlands are expected since no undeveloped land would be required at Proposed Action sites.

- *Cultural Resources.* No adverse effects to NRHP-eligible prehistoric or historic resources at KCP, SRS, LANL, or SNL are expected. There would be no adverse effect on important Native American resources at LANL and SNL.

- *Socioeconomics.* Changes to socioeconomics and community services at KCP, SRS, LANL, and SNL are expected to be minor. Approximately 425 jobs would be created at KCP; 45 at SRS; 115 at LANL; and 385 at SNL. Adverse economic consequences would occur at Mound, Pinellas, and RFP due to the closeout of Complex missions activities at these facilities. Approximately 1,070 direct jobs would be lost at Mound, 1,050 direct jobs at Pinellas, and 750 direct jobs at RFP. As a result of ongoing planning and the proposed Fiscal Year 1994 budget projections, DOE has revised its workforce numbers. These revisions are slightly different than the original numbers used for analysis. The revised estimates do not affect any of the conclusions based on the analysis of the original workforce numbers.

- *Waste Management.* Nonnuclear manufacturing activities associated with the Proposed Action would have minor waste management effects at KCP, SRS, LANL, and SNL. Only small increases in hazardous waste volumes (less than 7 percent) would occur. Sanitary/industrial wastewater effluent would increase less than 2 percent. Solid nonhazardous waste volumes would increase by 1 percent or less at KCP, SRS, and SNL, and by approximately 3 percent at LANL. At Mound, Pinellas, and RFP, nonnuclear production waste streams would be eliminated.

- *Human Health.* No significant adverse human health effects to workers and the public due to radiological or chemical exposure are expected from implementation or operations activities associated with the Proposed Action at any of the sites. Activities relocated to SNL would result in an annual excess cancer risk to workers due to the introduction of small amounts of chemical solvents, but these risks would be within acceptable guidelines. Mitigation measures to minimize these risks such as substituting less toxic solvents or modifying the production processes would be implemented. The frequency and consequences of potential accidents would not increase appreciably at any of the sites.

Alternatives. If either the Mound, Pinellas, or RFP alternatives were selected, substantial new construction would be required. For these alternatives, additional site-specific NEPA documentation would be required.

No Action. The No Action alternative would not result in any significant adverse environmental impacts. However, the No Action alternative would not satisfy the DOE need to size the future nonnuclear manufacturing functions to the foreseeable workload, reduce operating costs, and provide adequate expertise to satisfy the future work assignments.

ENVIRONMENTAL PERMITS AND REGULATIONS

Federal regulations have been established to protect the environment and to control the handling, emission, discharge, and disposal of waste substances. At the Federal level, these environmental regulations are promulgated and enforced primarily by the Environmental Protection Agency (EPA). Compliance with these national requirements must be met by all Federal agencies whether they are enforced directly by the Federal government or the enforcement is delegated to the states. Many environmental requirements are enforced through review, approval, and permitting programs that control the release of pollutants or minimize other impacts on the environment. This EA provides an extensive list of permitting and other regulatory requirements that would be observed at each site involved in nonnuclear consolidation.

CHAPTER 1

CHAPTER 1: INTRODUCTION

Chapter One describes the Department of Energy's proposal to reconfigure the Nation's Nuclear Weapons Complex and the nonnuclear consolidation element of that proposal addressed in this document. The strategy for complying with the National Environmental Policy Act, other related actions, and time periods considered in the analysis also are described. Chapter One includes discussions of the background of the program, the issue identification process used to define the scope of the study, and the specific alternatives that are analyzed. The chapter concludes with reviews of the methods of analysis and the organization of the document.

1.1 THE RECONFIGURATION PROPOSAL: COMPLEX 21

The Department of Energy (DOE) is developing a proposal, known as Complex 21, to reconfigure the Nation's Nuclear Weapons Complex (Complex). The Complex is a set of interrelated facilities that design, manufacture, test, and maintain this country's nuclear weapons stockpile and dismantle the weapons retired from that stockpile. The Complex also produces and recycles the nuclear materials used in building nuclear weapons, stores materials for future use, and conducts surveillance and maintenance activities to ensure the reliability and safety of the stockpiled weapons throughout their operational life.

Congress, in the *Atomic Energy Act* of 1954, declared, as a matter of national policy, that the development, use, and control of atomic energy shall be directed so as to:

- Make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security.

- Promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise.

In that law, Congress assigned the nuclear weapons manufacturing and stockpile sustainment role to the Atomic Energy Commission (AEC). Today, that role resides with DOE. The Complex designs, builds, tests, maintains, and dismantles the weapons that constitute the Nation's stockpile, as directed by the President and approved by Congress. The Complex also conducts surveillance and maintenance activities to ensure the reliability and safety of the stockpiled weapons throughout their operational life. The size of the nuclear weapons stockpile is determined on a year-to-year basis through a joint recommendation by the Secretaries of Defense and Energy for approval by the President.

The Complex is administered by the DOE Office of Defense Programs (DP) through its Albuquerque, Nevada, Oak Ridge, Rocky Flats, San Francisco, and Savannah River Field Offices, and consists of government-owned, contractor-operated facilities located at 11 sites around the country. The size, location, and functions of the 11 DOE sites that make up the current Complex are illustrated in figure 1.1-1. The functions shown are the nuclear, nonnuclear, and research, development, and testing (RD&T) roles that these sites have carried out in the recent past. Figure 1.1-1 also shows two sites that were formerly part of the weapons complex: Hanford Site and the Idaho National Engineering Laboratory (INEL).

Many of the facilities, constructed over the past 50 years, were sized to meet stockpile requirements

Hanford Site (Hanford)

- 360,000 acres near Richland, Washington (established 1942)
- Formerly used for reactor production of plutonium and chemical processing of DOE spent fuel and irradiated targets to recover enriched uranium and plutonium. Will be considered as a potential addition to the Complex.

Idaho National Engineering Laboratory (INEL)

- 570,000 acres near Idaho Falls, Idaho (established 1949).
- Formerly used for chemical processing of naval reactor spent fuel and DOE-owned research reactor fuels to recover enriched uranium for use as naval and production reactor fuel. Will be considered as a potential addition to the Complex.

Rocky Flats Plant (RFP)

- 6,500 acres between Denver and Boulder, Colorado (established 1952).
- Fabricates finished plutonium parts for nuclear weapons and performs plutonium recycling and recovery.
- Fabricates nonnuclear components from beryllium, stainless steel, and depleted uranium.

Kansas City Plant (KCP)

- 141 acres in Kansas City, Missouri (established 1949).
- Produces electromechanical, electronic, rubber, plastic, and metallurgical components for arming, fuzing, and firing systems; nuclear safety components; and use control components. Performs surveillance and evaluation of components; and designs and produces customized electronic test equipment.

Mound Plant (Mound)

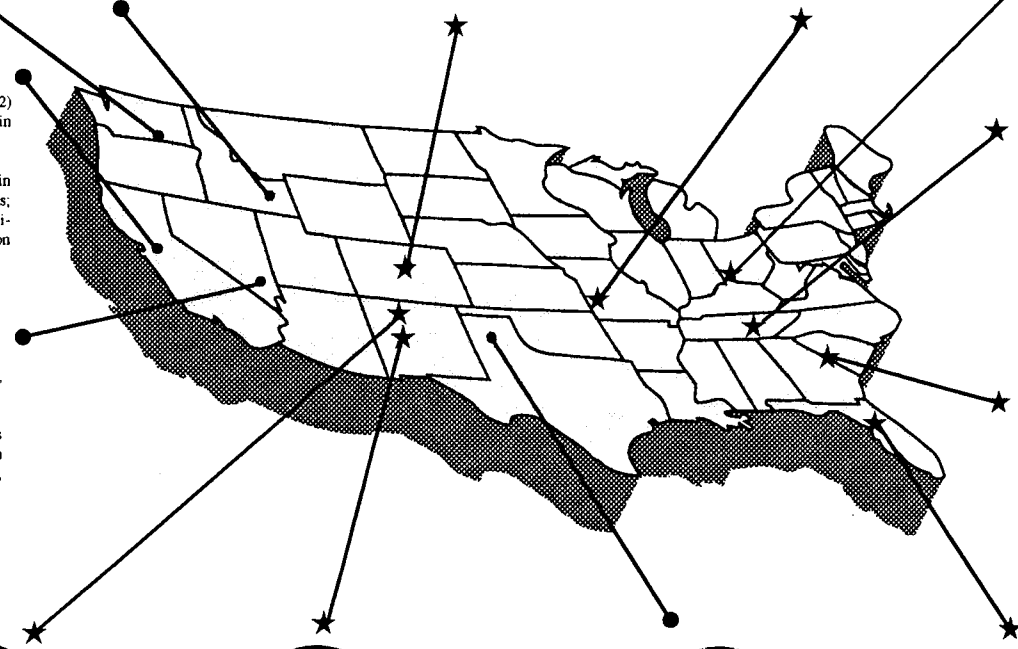
- 306 acres in Miamisburg, Ohio (established 1948).
- Isotope separation and sales. Tritium process development.
- Produces detonators, pyrotechnic devices, explosively actuated timers and firesets, radioisotopic heat source piece parts, mechanical assemblies, flat cable products, and gas transfer systems; conducts stockpile surveillance testing on explosive components and gas transfer systems; and recovers tritium from some retired weapons.

Lawrence Livermore National Laboratory (LLNL)

- 821 acres in Livermore, California (established 1952) plus 7,000 acres in Alameda and San Joaquin Counties.
- Performs nuclear weapons RD&T; basic research in experimental, theoretical, and computational physics; earth and life sciences; chemistry; nuclear engineering, and seismic research that supports verification of nuclear testing treaties.

Nevada Test Site (NTS)

- 882,300 acres, 65 miles northwest of Las Vegas, Nevada (established 1951).
- Conducts underground testing of nuclear weapons and evaluation of the effects of nuclear weapons on military communications systems, electronics, satellites, sensors, and other materials.



Oak Ridge Y-12 Plant (Y-12)

- Located on the 35,300-acre Oak Ridge Reservation near Oak Ridge, Tennessee (established 1942).
- Processes depleted uranium and highly enriched uranium, and fabricates uranium components.
- Produces lithium compounds and parts, precision machining, and specialty subassembly of structural components.

Savannah River Site (SRS)

- 192,000 acres near Aiken, South Carolina (established 1953).
- Formerly produced plutonium: produces tritium and other nuclear materials, chemically processes DOE spent fuel and irradiated targets to recover enriched uranium, plutonium, and tritium; and performs purification and loading of tritium reservoirs.

LEGEND

- Nuclear Elements
- Nonnuclear Elements
- RD&T Functions
- Nuclear and Nonnuclear Site
- ★ Sites Involved in Nonnuclear Consolidation Proposal

Los Alamos National Laboratory (LANL)

- 27,500 acres at Los Alamos, New Mexico (established 1943).
- Performs nuclear weapons RD&T; basic research in experimental, theoretical, and computational physics; earth and life sciences; chemistry; nuclear engineering; and research for arms control verification.

Sandia National Laboratories (SNL)

- 8,300 acres near Albuquerque, New Mexico (established 1948), with major facilities at Livermore, California, and Tonopah Test Range, Nevada.
- Performs design and engineering of nonnuclear components for nuclear weapons systems, ordnance engineering, research for arms control verification, and field and laboratory testing.

Pantex Plant (Pantex)

- 10,600 acres near Amarillo, Texas (established 1951).
- Assembles and disassembles nuclear weapons components; performs weapons repair, modification, and disposal; and conducts stockpile evaluation and testing.
- Fabricates high explosive components and assembles high explosives and nonnuclear components.

Pinellas Plant (Pinellas)

- 100 acres in Largo, Florida (established 1957).
- Produces neutron generators, thermal batteries, specialty capacitors, lightning arrestor connectors, frequency devices, magnetic components, and neutron detectors.

FIGURE 1.1–1.—*Current Nuclear Weapons Complex Sites.*

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substantially larger and more diverse than those expected in the future, and were designed and built to standards very different from, and less stringent than, those of today. In view of improving international relationships, the Presidential initiatives of September 27, 1991 and January 20, 1992, and the Strategic Arms Reduction Talks II (START II) agreement of January 1993, the requirements for the number and types of nuclear weapons will substantially decrease from current stockpile levels. Additional changes are possible in the future which cannot be foreseen at this time. Therefore, the Complex must provide the flexibility to respond to emerging and future changes. To meet these challenges, the Secretary of Energy (Secretary) has proposed to reconfigure the present Complex.

Complex 21 would be smaller, less diverse, and less expensive to operate than the Complex of today. The goal of Complex 21 would be to safely and reliably support whatever nuclear weapons objectives are set by the President and funded by Congress. As stockpile requirements decrease, fewer weapons would be built, which in turn means less manufacturing capacity would be needed. Accordingly, the thrust would be to maintain key capabilities in Complex 21 that, if lost, would cause significant and rapid degradation of the overall Complex effectiveness. DOE would continue to purchase some weapons components from the private sector (privatization) where it would be cost effective. However, with recent reductions in the stockpile level, the opposite has been occurring, i.e., component manufacturing activities are being returned to the government from the private sector because the workload does not make it cost-effective for these private suppliers to continue manufacturing such small quantities.

Complex 21 would employ state-of-the-art technology and, to the extent practical, facilities flexible enough to accommodate fluctuations in capacity. The number and size of waste streams would be kept to a minimum and would fully comply with environmental laws and regulations. New facilities would be constructed and existing facilities would either be phased out or upgraded to comply with all applicable Federal, state, and local laws, regulations, and orders. Complex 21 would be fully operational early in the 21st century and would sustain the Nation's nuclear deterrent through the middle of that century.

The development of Complex 21 has been divided into two parts: (1) the consolidation of the nonnuclear component; and, (2) the reconfiguration of the nuclear and RD&T components. The following sections summarize the nonnuclear consolidation component and describe DOE's strategy for meeting the requirements of the *National Environmental Policy Act* of 1969, as amended (NEPA).

1.2 NONNUCLEAR CONSOLIDATION

The nonnuclear consolidation proposal is part of the Secretary's larger proposal to downsize the entire Complex. Key elements of this proposal are: termination of weapons complex activities at the Mound Plant (Mound) in Miamisburg, OH, the Pinellas Plant (Pinellas) in Largo, FL, and nonnuclear manufacturing activities at the Rocky Flats Plant (RFP) near Golden, CO; consolidation of the majority of electrical and mechanical functions at the Kansas City Plant (KCP) in Kansas City, MO; and transfer of other functions or technology bases to Los Alamos National Laboratory (LANL) in Los Alamos, NM, Sandia National Laboratories (SNL) in Albuquerque, NM, and the Savannah River Site (SRS) near Aiken, SC. The Y-12 Plant (Y-12) near Oak Ridge, TN is an option for a small part of the proposal. Proposed construction activities would be limited almost exclusively to renovation of existing facilities at consolidation sites. The environmental impacts associated with the No Action alternative and alternatives for consolidating the majority of electrical and mechanical functions at Mound, Pinellas, and RFP are also evaluated in this EA.

The products and services produced by the nonnuclear element of the Complex are used to

manufacture nuclear weapons and test individual components. The components of a nuclear weapon and basic design features are shown in figure 1.1-2.

The nonnuclear consolidation proposal is designated as such because the vast number of activities to be transferred under the proposal are manufacturing activities associated with the nonnuclear components of nuclear weapons. Nonnuclear components include electronics, batteries, wiring, and firing systems. Although small amounts of tritium, a radioactive material, are involved with some of these components, transfer of tritium-handling activities from Mound and Pinellas is included as part of this proposal in order to achieve the greatest possible savings from such consolidation. To achieve these maximum benefits from the consolidation proposal, all overhead costs from Complex activities at Mound and Pinellas must be eliminated. Leaving small amounts of tritium at these sites (compared to amounts already at the proposed receiver sites) would require the continued expenditure of substantial overhead costs associated with Complex functions. In addition, leaving tritium operations at Pinellas would be technologically impractical because the neutron generators now being produced at Pinellas are substantially different from those under development at SNL that will be used to meet future stockpile requirements.

In contrast to high-volume factories, the nonnuclear plants generally produce relatively small quantities of technologically sophisticated products that have a long shelf life. Certain limited-life components are also produced. This results in a large infrastructure with relatively high fixed costs, irrespective of the production rate.

1.3 National Environmental Policy Act Considerations

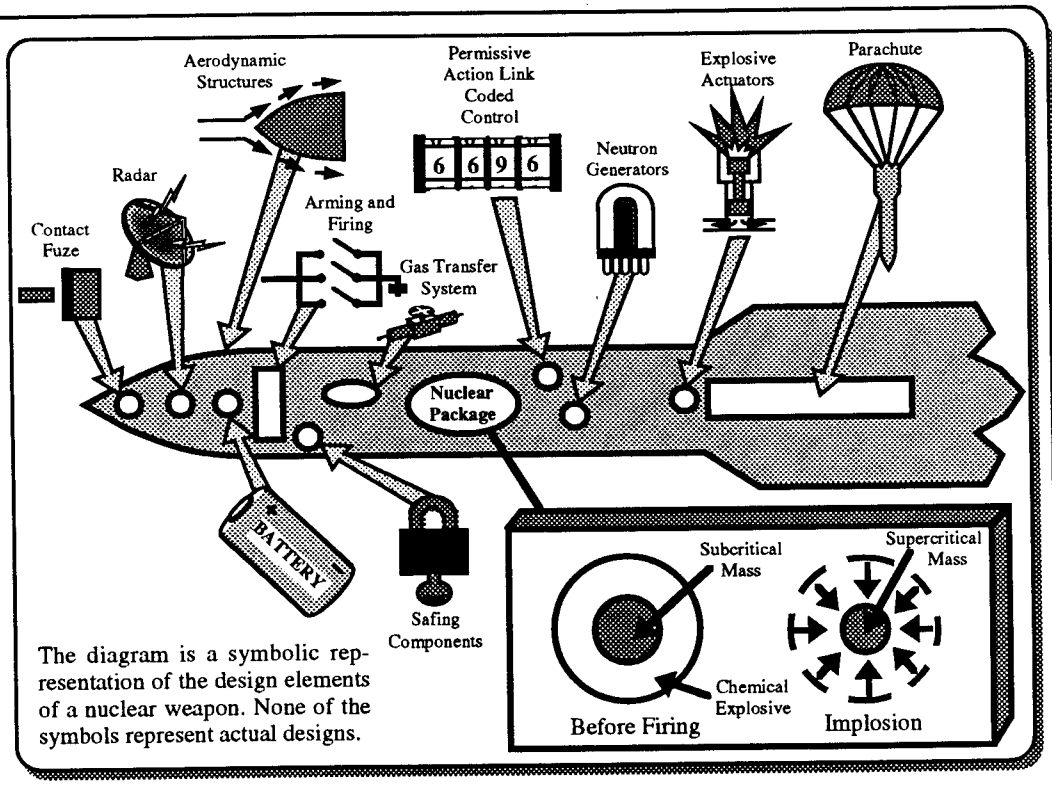
NEPA requires a Federal agency to include environmental considerations in its decision-making process. The Council on Environmental Quality (CEQ) regulations (40 CFR 1500) require Federal agencies to consider the environmental consequences of an overall program before subsequent projects or activities are implemented. To comply with NEPA, DOE must follow its own implementing regulations 57 FR 15122, April 24, 1992 to be codified at 10 CFR 1021 as well as the CEQ regulations.

The DOE approach to implementing NEPA requirements for the reconfiguration program has three phases. The first phase involves this Environmental Assessment (EA), to determine if nonnuclear consolidation can be completed without significant environmental impact. The second phase is preparation of a Programmatic Environmental Impact Statement (PEIS), which addresses reconfiguration of nuclear and RD&T functions of the Complex. The third phase consists of preparation of site-specific Environmental Impact Statements (EIS) and EAs for the nuclear and RD&T reconfiguration. These documents will support construction-level decisions that result from the Record of Decision (ROD) associated with the PEIS. If the EA for nonnuclear consolidation does not support a finding of no significant impact (FONSI), the first two phases will be combined.

DOE's phased NEPA approach is derived from CEQ regulations that encourage tiering of environmental documents to eliminate repetitive discussions of the same issues and to focus on the actual issues ready for decision at each level of environmental review (40 CFR 1502.20). Tiering allows agencies to proceed from a program, plan, or policy EIS to a site-specific statement or analysis.

Recent Presidential initiatives to reduce the nuclear weapons stockpile and the START II Treaty have provided an opportunity to accelerate nonnuclear consolidation without affecting national defense or the remainder of the reconfiguration program. To help achieve early decisions, DOE has decided to conduct an environmental analysis of nonnuclear consolidation separate from the programmatic review of the remainder of the Complex. DOE believes that the NEPA review of the nonnuclear

Nuclear explosions are produced by initiating and sustaining nuclear chain reactions in highly compressed material which can undergo both fission and fusion reactions. Modern strategic, and most tactical, nuclear weapons use a nuclear package with two assemblies: the primary assembly, which is used as the initial source of energy, and the secondary assembly, which provides additional explosive energy release. The primary assembly contains a central core, called the "pit," which is surrounded by a layer of high explosive. The "pit" is typically composed of plutonium-239 and/or highly enriched uranium (HEU), and other materials. HEU contains large fractions of the isotope uranium-235.



The diagram is a symbolic representation of the design elements of a nuclear weapon. None of the symbols represent actual designs.

Primary Detonation

The primary nuclear explosion is initiated by detonating the layer of chemical high explosive that surrounds the "pit" which in turn drives the pit material into a compressed mass at the center of the primary assembly. This implosion process is illustrated in the inset of the diagram.

Boosting

In order to achieve higher explosive yields from primaries with relatively small quantities of pit material, a technique called "boosting" is used. Boosting is accomplished by injecting a mixture of tritium (T) and deuterium (D) gas into the pit. The deuterium and tritium are stored in high-pressure reservoirs until the gas transfer system is initiated. The implosion of the pit along with the onset of the fissioning process heats the D-T mixture to the point that the D-T atoms undergo fusion. The fusion reaction produces large quantities of very high energy neutrons which flow through the compressed pit material and produce additional fission reactions.

Secondary Activation

The energy released by the primary explosion activates the secondary assembly. The secondary assembly is composed of lithium deuteride and other materials. As the secondary implodes, the lithium, in the isotopic form lithium-6, is converted to tritium by neutron interactions, and the tritium product in turn undergoes fusion with the deuterium to create the thermonuclear explosion.

Nonnuclear Components

Nonnuclear components include contact fuzes, radar components, aerodynamic structures, arming and firing systems, gas transfer systems, permissive action link coded controls, neutron generators, explosive actuators, safing components, batteries, and parachutes.

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FIGURE 1.1–2.—*Nuclear Weapons Design.*

consolidation proposal can and should be separated from the PEIS, because: (1) nonnuclear consolidation has benefits independent of the rest of the reconfiguration proposal; and (2) nonnuclear consolidation decisions would neither affect, nor be affected by, the reconfiguration decisions that will be made after the PEIS is published. In this regard, important benefits of accelerating nonnuclear consolidation would be an earlier and greater cost saving as well as preservation of technical competence within the Complex (DOE, 1991f).

Accordingly, the environmental consequences of the nonnuclear consolidation aspects of Complex 21 have been analyzed in this EA prior to completion of the PEIS. Proceeding with nonnuclear consolidation will require programmatic decisions about where nonnuclear functions would occur as well as project level decisions regarding nonnuclear consolidation. The costs associated with implementing nonnuclear consolidation, although a factor in the decision process, are utilized in this EA only to determine the reasonableness of alternatives for evaluation. DOE is evaluating costs through a separate process, the results of which are described in the *Cost Effectiveness Report* (DOE, 1993a).

Decontamination costs for facilities that are already contaminated are not included as part of the cost of reconfiguration. Decontamination costs are considered to be a liability (or mortgage) incurred at the time contamination is introduced into a facility. The majority of identified decontamination expenses would begin to be incurred by DOE on approximately the same schedule irrespective of whether plant operations continue or are permanently shut down. DOE plans to begin significant environmental restoration at sites along with continued operations: hence, the majority of decontamination costs should not be associated with costs of relocation of nonnuclear activities. The only exception would be facilities that are not yet contaminated, but would become contaminated as a result of reconfiguration. No facilities were so identified in this study. The Replacement Tritium Facility (RTF) at SRS has not yet been contaminated but is projected to be utilized in two of the alternatives considered.

If the EA analysis supports a final FONSI, DOE plans to proceed with nonnuclear consolidation and incorporate the nonnuclear consolidation decisions into the PEIS analysis. However, if any significant environmental impacts resulting from the Proposed Action are identified during the public comment period on the proposed FONSI, then the assessment of environmental impacts for consolidating nonnuclear functions would be incorporated into the PEIS. In this case, no actions would be taken to consolidate the nonnuclear manufacturing activities unless they were included in the PEIS ROD.

Nonnuclear consolidation could involve consolidating certain nonnuclear functions at Y-12 and SRS in facilities that could possibly be phased out during the larger reconfiguration program. The scope of these nonnuclear functions would be very small compared to existing missions at Y-12 and SRS. If the PEIS ROD results in the phaseout or transfer of the Y-12 or SRS DP missions, then the nonnuclear activities discussed in this EA would be included in that subsequent relocation. The cost savings gained by accelerating nonnuclear consolidation would be much greater than the costs of relocating these missions again should host facilities be closed as part of the larger reconfiguration program (DOE, 1991f). DOE has not identified any future reconfiguration decisions that would be limited by nonnuclear consolidation.

A project plan will be prepared to provide a framework for proceeding with any final decisions on nonnuclear consolidation. The project plan will include an overall master plan, plus plans for activity transfer and privatization, facility modifications, human resources, and decontamination and decommissioning (D&D) transitions.

1.4 RELATED ACTIONS

The *Nuclear Weapons Complex Reconfiguration Programmatic Environmental Impact Statement Implementation Plan* (PEIS Implementation Plan) (DOE, 1992d) discussed several DOE actions and associated NEPA activities that have some relationship to both the PEIS and this EA. Of primary importance among these is the PEIS currently being prepared by the DOE Office of Environmental Restoration and Waste Management (EM).

On January 12, 1990, the Secretary decided that DOE would prepare two PEISs: one on reconfiguration and one on DOE's EM program. The EM PEIS will analyze alternative strategies and policies for conducting DOE's EM program, which not only includes the environmentally responsible management and restoration of nuclear facility sites, but also the protection of worker and public health and safety through the safe disposal of radioactive, hazardous, and mixed (i.e., radioactive and hazardous) wastes. The environmental analysis will support DOE decisions on how to manage processes or facilities for treatment, storage, or disposal of radioactive, hazardous, or mixed wastes; approaches to be used to remediate contaminated sites; treatment technology application or development; land use; and technology and policy considerations for D&D of DOE facilities at the end of their useful lives. A Notice of Intent (NOI) to prepare the EM PEIS was published in the *Federal Register* on October 22, 1990 (55 FR 42633). The results of the scoping process, as well as public comments on a draft EM PEIS Implementation Plan (DOE, 1992a), will be documented in the final EM PEIS Implementation Plan, along with a discussion of alternatives to be evaluated.

The DOE decision to conduct separate NEPA analyses for the reconfiguration and EM programs was based on the separate sets of decisions that each program must address. Among other things, the reconfiguration program will help determine those sites that will carry out the nuclear weapons mission in the long term. The EM program, on the other hand, is directed at alternative strategies and policies for conducting DOE-wide EM waste management and environmental restoration activities. The volume of wastes to be generated by future operation of the Complex is a relatively small portion of the waste to be considered in the EM PEIS. The volume associated with nonnuclear activities is even smaller.

For a short time after generation, DP wastes are managed by the generating facility, while longer-term management of wastes is performed under the auspices of EM. The DP mission provides for the management of wastes, including finding means to minimize waste generation, until DOE either disposes of the wastes or places them in long-term storage. Consequently, this EA provides waste management assessments based on the projected waste types and waste volumes resulting from the implementation and operation of the Proposed Action and alternatives; the waste treatment, storage, and disposal facilities required to manage these wastes; the current waste types and waste volumes generated; and, the existing and planned treatment, storage, and disposal facilities.

1.5 TIME PERIOD CONSIDERED IN ANALYSIS

If DOE issues a final determination of a FONSI in mid-1993, building modifications and equipment installation would begin immediately and proceed through 1995. Operations of most functions at receiver sites would be phased in over a 3-year period beginning in late 1994, with full operations achieved around 1997. However, some validation activities could continue beyond this date; therefore, for the purposes of environmental analysis, the year 2000 has been assumed as the year of peak operations. It was also assumed that the useful life of the facilities would allow operations to continue until the middle of the 21st century.

1.6 BACKGROUND

The proposal for Complex 21, including consolidation of nonnuclear activities, has been in

development for several years. This section presents a summary of the plans and reports completed to develop the nonnuclear consolidation proposal, and details the foundation on which the nonnuclear proposal is based. Section 1.6.1 summarizes the background of Complex reconfiguration beginning with the direction from Congress to complete a study and plan for modernization of the Complex through the preparation of the Nonnuclear Consolidation Plan (NCP). Section 1.6.2 describes the basis for nonnuclear consolidation as presented in the NCP and the modifications that have been made due to changing world events and additional detailed studies. The resulting revised basis for nonnuclear consolidation is then described. This is the basis for the activities that make up the nonnuclear consolidation proposal which is assessed in the EA.

1.6.1 Summary of Reconfiguration Planning

Recognizing that a comprehensive approach was needed to address current problems of the Complex, Congress directed, in the *National Defense Authorization Act for Fiscal Years 1988/1989* (P.L. 100-180), that a study be conducted and a plan be prepared for modernizing the Complex, taking into account the overall size, productive capacity, technology base, and investment strategy necessary to support long-term security objectives. The product of that study, entitled the *Nuclear Weapons Complex Modernization Report* (Modernization Report) (DOE, 1989), was submitted to Congress on January 12, 1989. It called for extensive modernization of facilities over a 15- to 20-year period. The report also called for a major environmental restoration and waste management program.

Fundamental changes in DOE policy direction and in the structure of international political and military forces raised questions about the continued validity of assumptions underlying the Modernization Report and the adequacy of proposed solutions for the more serious problems of the Complex. Consequently, in September 1989, former Secretary Watkins ordered the establishment of a Modernization Review Committee to reexamine the modernization issue. The committee was directed to review the assumptions and recommendations of the original Modernization Report; assess the capacity and capability requirements of the Complex; and review the processes by which immediate and future requirements for maintaining, updating, and cleaning up the Complex are developed.

In August 1990, the Secretary reviewed the progress of the study and issued additional guidance focusing the analysis on the realities of the emerging international security environment. This ensured flexibility to accommodate the likely range of deterrent contingencies and emphasized the objective of achieving a Complex that is smaller, less diverse, and less expensive to operate than the current Complex. Subsequently, the Modernization Review Committee was redesignated the Complex Reconfiguration Committee. The Committee's product, the *Nuclear Weapons Complex Reconfiguration Study* (Reconfiguration Study) (DOE, 1991e), was published in February 1991 and replaced the January 1989 Modernization Report.

The Reconfiguration Study presented an overview of problems within the Complex; outlined a vision of the future Complex, including potential configurations and transitional activities; and described a process for a future Secretarial decision on whether and how to reconfigure the Complex. In preparing the Reconfiguration Study, the Complex Reconfiguration Committee focused on six major areas: stockpile sizing criteria; environment, safety and health (ES&H); Complex configuration; management structure; capital asset management; and the PEIS. Separate study teams, formed for each major area, produced analyses and recommendations. The PEIS Study Team developed a NEPA strategy for reconfiguration, including investigation of the scope and proposed content of the PEIS and any subsequent project-specific EISs. This effort was coordinated with other DOE projects

and activities that involve NEPA documentation pertinent to reconfiguration to avoid potential duplications and future conflicts.

To assist with the reconfiguration planning process, DOE chartered several internal panels and work groups. Of primary importance to this EA were the activities of the Privatization Planning Panel and the NCP Work Group.

The Privatization Planning Panel was chartered in June 1990 to evaluate nonnuclear functions and identify those functions that could be provided more cost-effectively through the private sector. The panel completed the first phase of its activities and prepared a report describing the privatization potential of DOE's nonnuclear products and manufacturing processes used in the Complex (DOE, 1991b). This document includes a list of processes and products that are candidates for privatization, and reports on the associated costs, benefits, and risks. The panel concluded that most of the activities that could be accomplished more economically by the private sector had already been privatized. Consequently, large-scale privatization was considered inappropriate in the absence of other consolidation decisions. Upon completion of this phase, DOE formed the NCP Work Group to develop a plan for consolidation of nonnuclear functions.

1.6.2 Basis for Nonnuclear Consolidation

At the height of the "Cold War" in the 1960's and 1970's, the Complex was required to support a very large stockpile of weapons to meet nuclear deterrence requirements set forth in the annual Nuclear Weapons Stockpile Memorandum signed by the President. To support such a large number of weapons, in turn, required large facilities, utilizing multiple production lines and employing workers on multiple shifts to: keep up with the required new weapons manufacturing rate; perform surveillance on and repair or replace weapons components as necessary to maintain the stockpile; and retire the weapons and components that were being replaced. Thus, the capacity of these large facilities was fully utilized to meet the then-current requirements.

In the mid-to-late 1980's, the United States and the former Soviet Union reached agreement on the START I and Intermediate Nuclear Force Treaties, which contained substantial cuts in the nuclear forces of both sides. Then, with the fall of Communist governments in Eastern Europe and the breakup of the former Soviet Union, the tensions of the Cold War eased and United States and Russian leaders began to talk seriously about further significant cuts in the nuclear weapons stockpiles of each side. As a result of these events, Complex facilities in general, and nonnuclear manufacturing facilities in particular, were required to produce far fewer weapons components. This, in turn, resulted in a change from three-shift-per-day operations, which fully utilized the capacity of several production lines, to single-shift operations, which in some instances did not even fully utilize the capacity of a single production line.

It was against this background that the reconfiguration planning described in section 1.6.1 was completed, and the NCP Work Group was chartered to develop a plan with recommendations for consolidation of the nonnuclear manufacturing facilities at a single site as a first step in making the Complex smaller, less diverse, and less expensive to operate. The team began its effort in April 1991 and completed the NCP in September 1991 (DOE, 1991f). During the course of preparing its recommendations, the team identified the basic capabilities and technologies required to manufacture the great variety of nonnuclear components necessary to build the weapons that are part of the enduring nuclear weapons stockpile. These capabilities also support the Stockpile Evaluation Program, the periodic replacement of limited-life components, and the repair or replacement of weapons components or subsystems as needed to maintain and upgrade stockpile reliability, safety, and security.

At the time that the NCP was prepared, there were ten different types of nuclear weapons that were

projected to remain in the enduring stockpile, and the production rate for each manufacturing facility was based upon the workload defined in the then-current Production and Planning Directive 91-0. A Production and Planning Directive is a document derived from the President's Nuclear Weapons Stockpile Memorandum that authorizes the production and retirement of nuclear warheads and components. In this regard, the workload content can vary significantly from one weapon type to another due to the complexity of the design and whether it is a warhead or a bomb. Production and Planning Directive 91-0, which was the basis for the NCP analysis, involved a workload that was substantially below the requirements of the recent past and did not fully utilize the space or personnel available in the nonnuclear manufacturing facilities.

At the time the NCP was written, 182 separate technology base capabilities were required at the primary consolidation site to maintain the ten weapons types in the stockpile at the time. Three million square feet of floor space were required to accommodate these capabilities. Technology base capabilities are comprised of the minimum necessary facilities, equipment, and skills to manufacture each weapon type in the stockpile, regardless of the specific number of individual weapons required. Thus, for example, a specific number of base capabilities is required for a particular weapons system. Many capabilities are common to more than one weapons type. However, if the production rate is low, the annual capacity of the facility to produce components on a single-shift basis may be much higher than the number of units the facility is actually required to build. When this situation occurs, it is said that the space and personnel requirements for the facility are "capability-driven" rather than "capacity-driven." Once the production rate drops below the single-shift capacity of the facility, further reductions in production requirements have very little effect on required floorspace and personnel. This is exactly the situation that existed in the Complex when the NCP was prepared.

Of the 182 required technology base capabilities, 165 of these were already located at the Kansas City facility. The other 17 would be transferred from Mound, Pinellas, and RFP to KCP if the preferred alternative were selected (DOE, 1993a). The NCP team estimated a post-consolidation workforce requirement at the primary consolidation site of approximately 6,000 workers. After an analysis of six different candidate sites for consolidation against the performance measures described in section 1.8 of this EA, the team's recommendation was that KCP represented the best consolidation alternative for the necessary technology base capabilities. This conclusion was reached primarily because no new construction was necessary and far fewer component/technology transfers were required for the KCP alternative, making the cost to consolidate, payback time, and technical risk substantially lower than at any of the other sites considered.

Following the completion of the NCP, the President announced unilateral arms reduction initiatives in September 1991 and in his January 1992 State of the Union address. These two initiatives resulted in significant reductions in the Nation's nuclear weapons stockpile, including a reduction of weapons systems in the stockpile from ten to six. Subsequent to these announcements, DOE prepared an addendum to the NCP to address the impact of these reductions in the stockpile on the conclusions in the NCP. Significantly, despite a 52-percent reduction in the production rate assumed in the NCP, total floor space requirements were reduced by only 5 percent (to approximately 2.9 million square feet), and only 3 of the 182 required technology base capabilities were rendered unnecessary as a result of the President's initiatives. [The complete current list of separate technology base capabilities required to maintain the six weapons systems in the enduring stockpile can be found in appendix C of the *Cost Effectiveness Report*] (DOE, 1993a). This is because, as described previously, the NCP had already been based upon a workload that resulted in the facilities being capability-driven rather than

capacity-driven. Therefore, the further reductions announced by the President had only a very minor impact on the number of base capabilities and amount of manufacturing floorspace required.

With regard to personnel requirements, the addendum to the NCP indicated that the minimum required personnel level based upon lower production rates than those assumed in the NCP was 5,000 people, a 17-percent reduction from the level in the NCP.

Subsequent to the March 1992 publication of the NCP and the addendum, the nonnuclear consolidation proposal was further refined through the preparation of Conceptual Design Reports (CDR) for the sites that would be receiving relocated technology base capabilities if the consolidation proposal were adopted. After the CDR process was begun, the Bush/Yeltsin arms reduction agreement was signed in June 1992. This agreement became the basis for the recent START II Treaty signed by the two leaders in January 1993. START II will result in yet another significant reduction in the nuclear weapons stockpiles of both nations. As a result, there are certain components for which there will be few, if any, production requirements at all for a number of years following consolidation, e.g. neutron generators and high-power detonators. Nevertheless, as described below, the preferred alternative was modified to preserve these capabilities at the weapons laboratories, where the components are designed and prototyped and small quantities currently made for research and development purposes. Further, it was determined that certain components, for which there were little or no near-term production requirements, could be placed at SNL and private suppliers would be developed if and when new production requirements became identified.

The CDRs prepared for the receiver sites take into account the impact of START II on floorspace and equipment requirements, and on required personnel levels. Because START II represented yet another reduction in the production rate required for the consolidated facilities, the workload will be even further below the annual single-shift capacity of the facilities. However, because the number of weapons types in the stockpile remained at six, the number of technology base capabilities has also remained at 179. Therefore, START II has had only a very minor effect on the floorspace, equipment, and personnel requirements. Specifically, floorspace requirements for the primary consolidation site have been reduced only from approximately 2.9 million square feet to approximately 2.8 million. Workforce requirements for the primary consolidation site have been reduced from 5,000 to approximately 4,700.

The above floorspace and workforce numbers represent the minimum requirements regardless of which site is considered as the primary consolidation site. This is based upon the fact that, taking START II into account, the foreseeable requirements for nonnuclear manufacturing, stockpile evaluation, limited-life component periodic replacements, and repair and replacement of components and subsystems in the enduring stockpile will continue to require 179 technology base capabilities. This EA uses these requirements as the basis for analysis of each alternative. However, it is important to note that, given the already low production level that was the basis for the NCP, the analyses and conclusions in this EA are insensitive to, and do not depend upon, whether NCP or post-START II work levels are assumed.

The Proposed Action presented in this document differs somewhat from the Proposed Action published in the *Federal Register* of January 27, 1992. The changes resulted from an evaluation of options that emerged as the impact of future workload reductions became better defined and the advantages of utilizing the existing RD&T technology base and prototyping capabilities of the national laboratories became apparent. The Proposed Action changes, and the reasons for them, are as follows:

- Performing neutron tube target loading in existing tritium facilities at LANL, instead of the RTF at SRS, could be

effected at a lower cost and would provide for the retention of critical skills in the RD&T technology base.

- Fabrication of high-power detonators in the existing prototyping facility at LANL, instead of developing production capability at the Pantex Plant, could be accomplished at lower cost due to no new construction and would ensure the retention of critical skills.

- Enhancing the existing beryllium technology and pit support capability at LANL has been added as the preferred action, due to potentially lower costs and the benefits of utilizing the existing RD&T technology base. As an option, the existing capability at Y-12 instead of at LANL would be enhanced for this purpose.

- The functions of cap assembly manufacture, thermal battery technology base, and milliwatt heat source surveillance activities have been added to the technology base at SNL. Calorimeter fabrication has been added to the existing technology base at LANL. These would reduce costs and capture the capabilities of the existing technology base for those items.

1.7 Issue Identification Process

Issue identification for this EA was accomplished as part of the larger scoping process for the reconfiguration program. Scoping activities consisted of both internal DOE scoping and public scoping. Internal DOE scoping began with expert working groups that produced the studies that led to the Modernization Report and continued through the Reconfiguration Study. Upon publication of the completed Reconfiguration Study, DOE published an NOI in the *Federal Register* (56 FR 5590) on February 11, 1991, to prepare the PEIS. The NOI, which was reproduced in the PEIS Implementation Plan (DOE, 1992d), marked the beginning of the public scoping phase, which ran through September 30, 1991.

Public meetings were conducted at 15 locations across the country (figure 1.7-1) to allow interested parties to speak and present information. Meetings occurred in the vicinity of all sites that could be affected by nonnuclear consolidation. All comments received through public scoping were systematically organized and reviewed for consideration during the preparation of both the PEIS and this EA. (A comment is defined as a single statement or point of discussion concerning a specific topic raised by an individual.) An extensive summary of all comments received during the public scoping process was published in the Implementation Plan (DOE, 1992d).

During the public scoping process, DOE received a total of 36,984 comments from 16,542 members of the public; representatives of interest groups; and Federal, state, and local officials. Most of the comments (98 percent) were provided by citizens or individuals affiliated with or representing more than 50 interest groups. Of the total comments received, 4,869 were spoken and recorded at public scoping meetings and 32,115 were written and submitted at scoping meetings or received by mail. The total number of comments includes 28,838 comments received via 19 different types of preprinted postcards, form letters, or petition campaigns involving a total of 13,401 participants.

DOE received a total of 432 comments specifically related to consolidation of nonnuclear functions. Comments covered a range of environmental and policy-related issues including environmental health, economic impacts of plant closures on local communities, worker and public health and safety, hazardous materials management, surface and groundwater contamination, population encroachment, and privatization of nonnuclear functions. A review of the comments received was conducted to identify issues to be analyzed in this

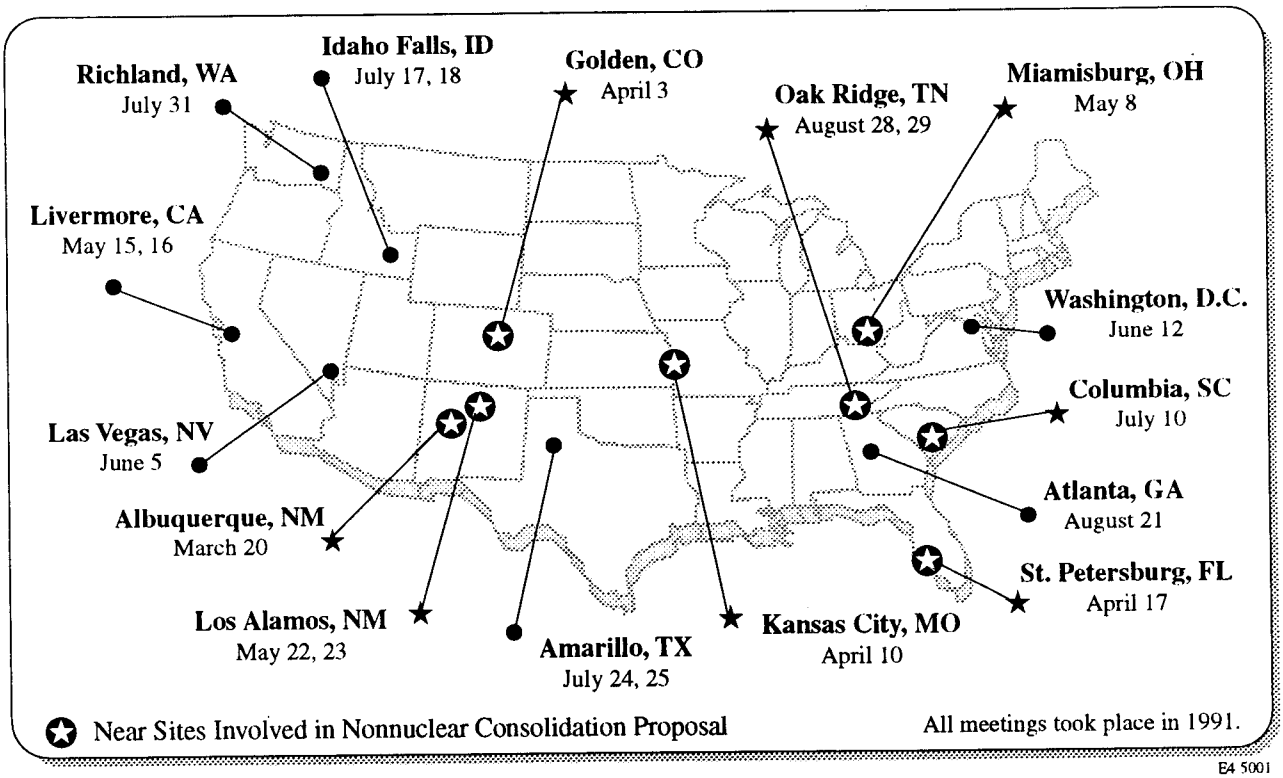

FIGURE 1.7–1.—*Scoping Meeting Locations and Dates.*

EA and issues that are either not relevant or outside the scope of this EA. This review, along with internal DOE studies and the CEQ and DOE requirements for implementing NEPA, established the scope of study.

The following issues are addressed in this EA through analyses for each potentially affected site:

- Land resources
- Air quality and acoustics
- Water resources
- Geology and soils
- Biotic resources
- Cultural resources
- Socioeconomics
- Waste management
- Human health

In addition to analyses conducted for each site, this EA also provides an overview of D&D requirements and discusses intersite transportation issues. However, D&D is not part of this Proposed Action. At such time as there is a specific proposal to decontaminate and decommission surplus facilities which may be closed out, separate NEPA documentation would be required.

1.8 NONNUCLEAR CONSOLIDATION ALTERNATIVES

In developing nonnuclear consolidation alternatives, the NCP considered all sites that currently perform nonnuclear manufacturing functions as candidates for the consolidated nonnuclear mission: KCP, Mound, Pinellas, RFP, Y-12, and the Pantex Plant

(Pantex) near Amarillo, TX. The NCP assessed nonnuclear manufacturing functions in three groups:

- Candidates for transfer to a primary consolidation site (30 functions currently at KCP, 4 at Mound, 9 at Pinellas, and 3 at RFP).
- Candidates for transfer to other sites (7 functions currently at Mound, 3 at Pinellas, and 1 at RFP).
- Candidates for privatization (14 functions currently at KCP, 6 at Mound, 2 at Pinellas, 5 at RFP, and 1 at Y-12).

Each of the 6 potential consolidation sites was rated using 10 performance measures within 4 categories as shown in table 1.8-1. Through this analysis, KCP ranked first in each of the 4 categories and was selected as the preferred consolidation site (i.e., the Proposed Action). Pinellas ranked second in 2 categories; Mound in 1 category; and Pinellas, Mound, and RFP tied for second in 1 of the 4 categories. Y-12 and Pantex ranked last in all four categories.

Y-12 and Pantex have since been eliminated from further study as primary consolidation sites. Mound, Pinellas, and RFP have been retained for analysis in this EA, along with No Action, as alternatives to the proposed consolidation at KCP.

As described in section 1.6.2, the workload requirements have decreased since the NCP was prepared. Therefore, the alternatives evaluated in this EA vary somewhat from those presented in the NCP. The basic mission changes that would occur with the Proposed Action and alternatives are illustrated in figures 1.8-1 and 1.8-2, respectively. Complete descriptions of the Proposed Action and its alternatives, including the No Action alternative, are provided in chapter 3.

Many nonnuclear weapons components are manufactured and supplied by the private sector. Efforts to privatize certain activities now performed at Complex plants would continue with the Proposed Action and alternatives. Where practical and cost-effective, DOE may transfer the manufacture of some additional selected products to the private sector under existing procurement procedures. Several items now manufactured at Mound, Pinellas, and KCP will be included in DOE's Manufacturing Development Engineering Program and would be candidates for privatization rather than consolidation. The Manufacturing Development Engineering concept would allow weapons components to be manufactured by a private vendor with existing manufacturing capabilities. The DOE weapons

TABLE 1.8–1.—*Nonnuclear Consolidation Plan Performance Measures*

Categories	Performance Measures
Minimization of ES&H Risks	New Hazardous Chemicals Additional Hazardous Operations New Regulated Waste Streams
Minimization of Technical Risks	New Parts to Manufacture New Parts to Procure Jobs to Transfer Availability of Technical Personnel
Minimization of Cost	Capital Cost Operating Cost
Minimization of Time	Payback Time

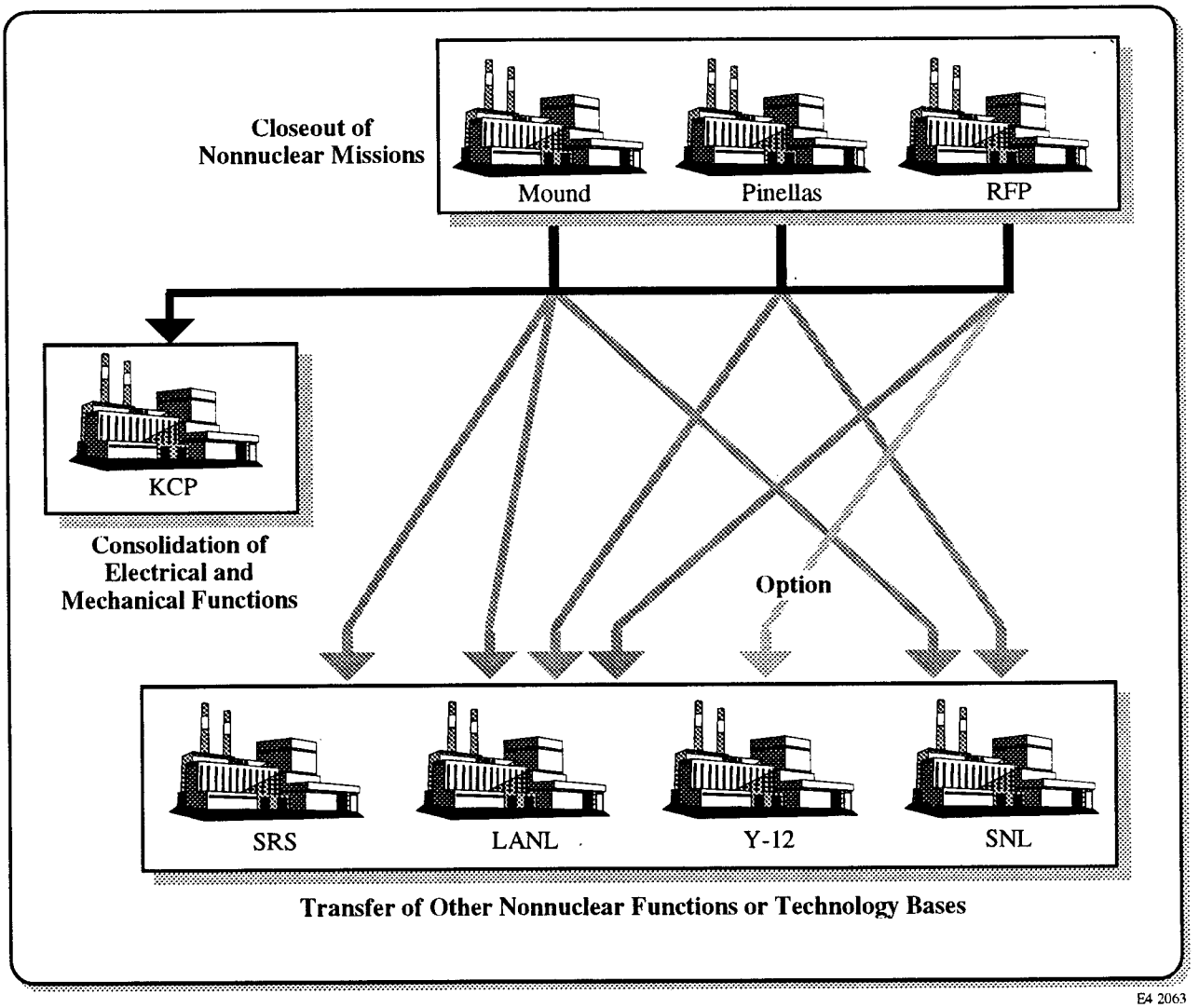

FIGURE 1.8–1.—*Proposed Action–Schematic Transfer of Nonnuclear Function.*

design laboratories would provide backup technology support and limited prototyping capabilities as needed.

The nonnuclear consolidation proposal does not include components currently manufactured by the private sector or those that will be privatized under the Manufacturing Development Engineering Program. In addition, certain nonnuclear manufacturing functions involving depleted uranium, currently performed at RFP, are scheduled to be phased out prior to 1995 and are not included. Nonnuclear functions currently at Y-12 and Pantex are also not included in this consolidation proposal because they are integral to other nuclear functions performed at these sites. Consolidation of these functions will be assessed in the PEIS as part of the larger reconfiguration program. Environmental restoration activities, other investigation and cleanup programs, and facility D&D activities conducted at nonnuclear consolidation sites under the DOE are not part of this proposal and are therefore not discussed in detail in this EA.

In addition to the NCP, DOE conducted a separate study (DOE, 1992b) to assess two-site consolidation alternatives. Because this alternative would not meet program objectives of reducing long-term costs and preserving technical competence that could be achieved by a single consolidation site, no further analysis has been performed in this EA. DOE also considered but eliminated, because of cost and

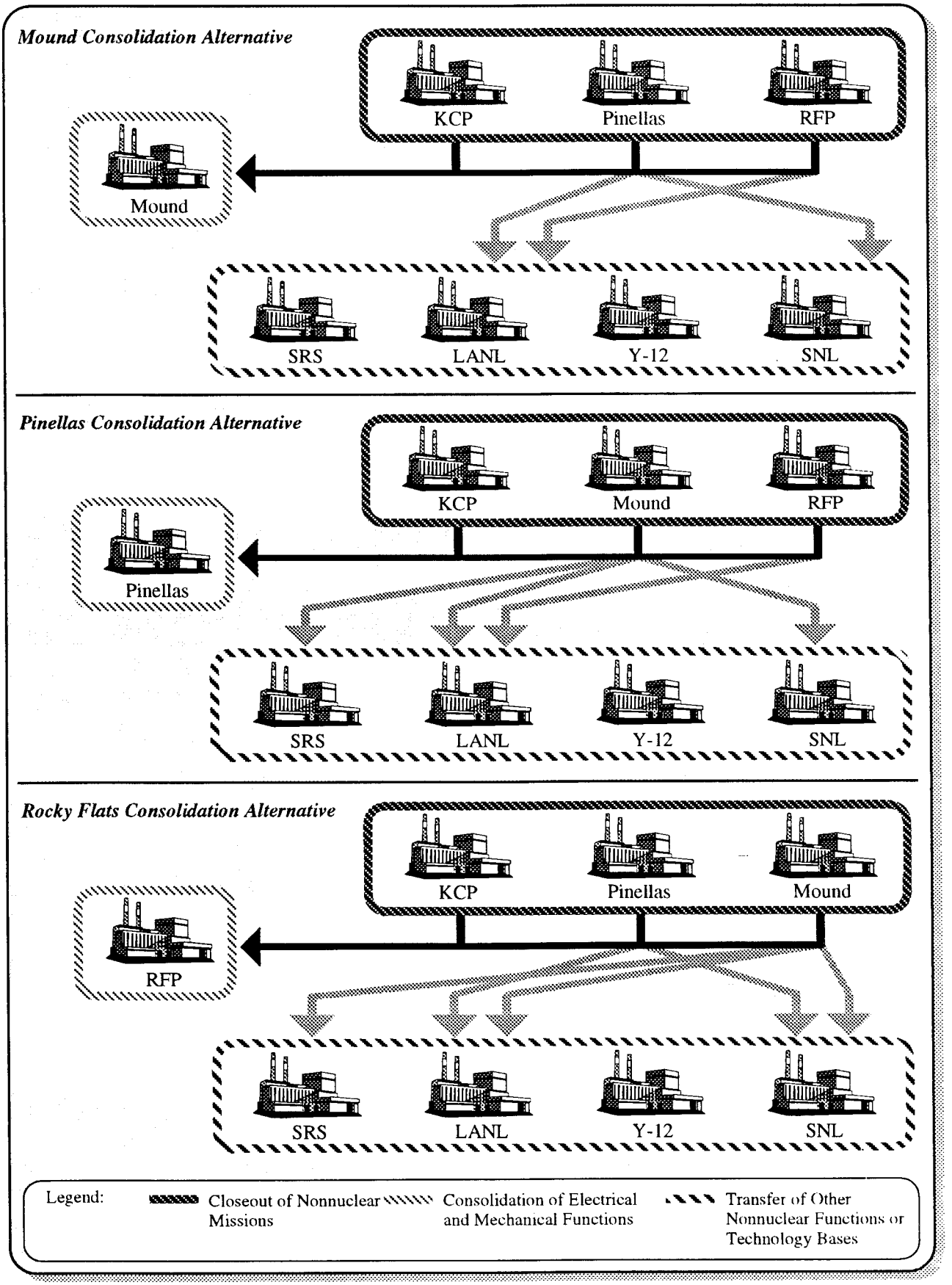

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FIGURE 1.8–2.—*Comparison of Alternatives for Nonnuclear Consolidation.*

proximity to a large population, an alternative to consolidate most tritium processing activities at Mound instead of SRS. Additional information about these alternatives is presented in chapter 3, section 3.1.4.

1.9 METHOD OF ANALYSIS

The study methodology used in this EA builds upon environmental analyses conducted for each of the potentially affected DOE sites. The affected environment is described for each environmental resource that may be disturbed by nonnuclear consolidation activities. The geographic study area evaluated is consistent with the requirements of each resource. In all cases, the area is large enough to include possible direct and indirect impacts of consolidation activities. For each environmental resource, the study area depends upon the nature of the resource and how it may be affected by the project.

The existing environmental conditions are described for each of the affected sites and their study area. However, the characterization of the affected environment is not limited to existing conditions. Rather, the environmental baseline includes reasonably foreseeable changes that would be expected with the No Action alternative. The basis for static or changing environmental conditions during the baseline period is discussed. For example, certain functions may go into standby mode under No Action as a result of reduced workloads. In this case, the environmental effects of existing operations would decrease for some resource areas such as air quality and water resources.

For all Proposed Action sites, the level of analytical detail provided in this EA is sufficient to support site-specific decisions. The descriptions are no longer than necessary to understand the effects of the alternatives on the environment (40 CFR 1502.15). To avoid repetition, those effects that are the same under multiple alternatives are discussed once and subsequently referenced.

For each site, the environmental consequences of the proposed consolidation actions (figures 1.8-1 and 1.8-2) were evaluated. Potential environmental consequences of nonnuclear consolidation were evaluated by first analyzing No Action conditions and then assessing environmental effects associated with the alternatives. Environmental consequences at consolidation and closeout sites could be driven by key aspects of the alternatives during either the implementation or operation phases, such as the following:

- Land area disturbances.
- Resource requirements, including water and construction materials.
- Project employment.
- Air emissions, wastewater effluent, and other waste streams.
- Process technologies and possible associated accidents that could have environmental effects.

For each site, parameters associated with these impact drivers were analyzed to represent the effects of the functions that could be located there.

1.10 ORGANIZATION OF THE EA

This EA is divided into two volumes: Volume I contains the Executive Summary and EA. The Executive Summary summarizes the Nonnuclear Consolidation Proposal and alternatives, and the Proposed Action impacts on the environment. The EA, which in part relies on the more detailed information presented in the appendixes, discusses the Nonnuclear Consolidation Proposal, the alternatives, and the existing conditions and impacts of the Proposed Action and alternatives. The EA Executive Summary is also available as a separate publication.

Volume II contains the Nonnuclear Consolidation EA technical and support appendixes. These appendixes provide technical support for the analysis in Volume I and also responses to Federal agencies, states, and Native American comments received during the review period of the Preapproval Review Copy of the EA in December 1992.

This EA has been prepared in accordance with CEQ regulations 40 CFR 1501.4(b) and 1508.9(a) and the DOE NEPA regulations 57 FR 15122, April 24, 1992, to be codified at 10 CFR 1021. The organization of the remainder of this document is as follows:

- Chapter 2 describes the purpose of and need for the nonnuclear consolidation proposal.

- Chapter 3 describes the Proposed Action and consolidation alternatives and includes a summary of consolidation alternatives and current operations at existing sites.

- Chapter 4 discusses the affected environment at each site and the environmental consequences of the Proposed Action and alternatives. The analysis of the Proposed Action includes the effects of closing out the Complex manufacturing mission at Mound and Pinellas and the nonnuclear missions at RFP. This chapter also includes an analysis of the Mound, Pinellas and RFP consolidation site alternatives. A discussion of intersite transportation and a brief discussion of considerations related to D&D are presented at the end of the chapter.

- Chapter 5 presents environmental compliance and permit requirements associated with the nonnuclear consolidation proposal.

The remainder of this document includes a list of cited references, a glossary, a list of individuals who prepared the EA, and the persons and agencies consulted. The citations that appear in parentheses throughout the document correspond to the reference list on page R-1. These citations refer to the documents that provided information for this EA.

CHAPTER 2

CHAPTER 2: PURPOSE AND NEED

Chapter Two presents the purpose of and need for consolidation of the nonnuclear functions of the Nation's Nuclear Weapons Complex.

2.1 PURPOSE OF AND NEED FOR RECONFIGURATION

The Department of Energy (DOE) has proposed to reconfigure the Nuclear Weapons Complex (Complex) to be smaller, less diverse, and less expensive to operate than the Complex of today. The Complex must be able to safely and reliably support whatever nuclear deterrent stockpile objectives are established in the future by the President and Congress.

Reconfiguration is needed because the Nation's nuclear weapons requirements are not as great as in the past, and maintaining the existing large, outdated infrastructure is not an effective use of national resources. The need for reconfiguration is driven by the smaller weapons stockpile sizes anticipated for the foreseeable future; the need to replace oversized, aging, or obsolete facilities; and the long-term savings to be achieved by terminating the Complex mission at sites where feasible.

With the DOE proposal to reduce the size of the Complex and produce fewer weapons comes the need to ensure that the Complex maintains a core of skilled, knowledgeable people and appropriate facilities. Technical competency—the ability to replicate and improve upon our national experience to design, produce, and maintain reliable nuclear devices—enables the U.S. to safely dismantle nuclear weapons; provide effective surveillance of weapons remaining in the stockpile; understand the weapons systems of other countries; and meet future design, testing, and production needs. The Nation has accumulated a storehouse of knowledge during the past 50 years regarding the physics of nuclear energy; the design, operation, and testing of nuclear weapons; the safe and reliable manufacture of weapons; the potential hazards associated with nuclear materials and their manufacturing processes and waste products; and the amelioration of these hazards. For the most part, that expertise rests within the Complex. Reconfiguration provides a means to ensure that this technical competency is maintained well into the next century.

Recent Presidential initiatives to reduce the number and types of nuclear weapons in the national weapons stockpile and the Strategic Arms Reduction Talks (START) II Treaty have resulted in a reduction in the number of weapon types in the stockpile, and a cessation of new weapons production. This means that there will be substantially reduced weapons workload requirements for the foreseeable future. Significant reductions in staffing at Complex facilities have already occurred and will continue, regardless of whether DOE proceeds with non-nuclear consolidation. Activities at some facilities might, within the next few years, be candidates for termination even without nonnuclear consolidation because there will be no production requirement for certain components for a number of years.

The production capabilities of Complex 21 facilities, including nonnuclear manufacturing, will be based upon future production rates and the requirement to maintain specific capabilities. Future weapons production rates have been developed by DOE and the Department of Defense (DOD), and approved by the Nuclear Weapons Council. At the low work-load levels envisioned for Complex 21, the basic capability required for stockpile maintenance and new production would provide a capacity larger than

required to meet the desired production rates. Therefore, plant size and workforce would be based on the technology base capabilities required in the Complex as discussed in section 1.6.2. The environmental analyses presented in this document were based on full use of these technology base capabilities.

2.2 GUIDING PRINCIPLES

The Secretary of Energy (Secretary) has directed that certain principles be used to guide the reconfiguration of the Complex (DOE, 1991d). These principles are to:

- Emphasize compliance with laws, regulations, and accepted practices regarding protection of the environment, health, and safety of the public and the Complex workers, and security.
- Safely and reliably maintain the weapons stockpile directed by the President and funded by the Congress.
- Minimize the costs associated with the weapons stockpile.
- Minimize the number of weapons production sites and the size of individual sites.
- Maximize transfer of nonnuclear materials production activities to the private sector, to the extent economically justified.
- Maintain redundancy in key capabilities that, if lost, could significantly and rapidly degrade the effectiveness of the Complex.
- Emphasize the use of modular construction to promote minimum environment, safety, and health (ES&H) impacts and maximum flexibility to increase Complex capacity should a requirement arise.
- Identify sites that may be transferred to the Office of Environmental Restoration & Waste Management (EM) for eventual decommissioning, or converted to inactive standby status, while ensuring flexibility to respond to potential arms control breakouts.
- Maintain the capability to decommission the large number of weapons expected to be retired during stockpile downsizing or replacement.

2.3 PURPOSE OF AND NEED FOR NONNUCLEAR CONSOLIDATION

Nonnuclear consolidation is a subproposal of the larger reconfiguration proposal. As such, nonnuclear consolidation would serve the same purpose and be triggered by the same need as the reconfiguration proposal. More specifically, the purpose of nonnuclear consolidation is to effect better management of nonnuclear manufacturing activities within the Complex, and to decrease the long-term operating costs of this aspect of the Complex. In addition, consolidation would provide DOE with a mechanism to maintain the specialized skills base necessary to produce and test the nonnuclear components.

DOE proposes to accomplish this consolidation by closing out the Complex activities at two plants, Mound and Pinellas, together with certain nonnuclear work at the Rocky Flats Plant (RFP). The nonnuclear electrical and mechanical manufacturing functions would be consolidated at one site, the Kansas City Plant (KCP), and some specialized manufacturing activities would be combined with similar activities at other facilities within the Complex. The existing research, development, and testing (RD&T) and prototype

fabrication capability at two of the national laboratories would be enhanced to provide certain weapons fabrication capabilities now located at Mound, Pinellas, and RFP. The current weapons manufacturing workload would be downsized to meet lower workload projections. The government-owned, contractor-operated Complex facilities at Mound and Pinellas and the nonnuclear facilities at RFP would be turned over to DOE EM for cleanup, restoration, or decontamination and decommissioning (D&D) as appropriate. As stated in chapter 1, the latter activities are not part of this proposal, but will be the subject of separate *National Environmental Policy Act* (NEPA) documentation when specific proposals for those activities are made.

Consolidating nonnuclear facilities at the preferred alternative site will accomplish three objectives: (1) it will size the nonnuclear manufacturing facilities to meet the requirements of the foreseeable workload; (2) it will combine functions that use similar technologies to provide a sufficient workload for maintaining a well-trained and qualified workforce; and, (3) it will reduce operating costs to achieve a near-term savings well in excess of $100 million a year and long-term savings in excess of one-quarter of a billion dollars annually (DOE, 1993a). Maintaining the existing large Complex would require maintaining similar nonnuclear expertise at multiple sites with little or no workload, which is already beginning to result in atrophy and attrition of technical skills and increased costs. Consolidating similar nonnuclear manufacturing operations could serve as a mechanism to maintain the skills and preserve the competencies of the workforce. Similarly, where workload projects are very low, collocating some nonnuclear manufacturing capabilities with similar RD&T capabilities at the national laboratories would serve as a mechanism to maintain or sharpen skills of the workforce.

2.4 Need for Nonnuclear Capabilities

The products and services of the Complex are needed to design and manufacture nuclear weapons and test individual components. The Complex needs to maintain a nonnuclear capability in order to be able to manufacture the nonnuclear components of nuclear weapons, and to test and monitor other components.

A typical nuclear device contains approximately 6,000 individual components. Of these, approximately 300 are considered "nuclear components." These nuclear components include the primary and secondary systems of a nuclear device and directly related subsystems. They are made of special nuclear materials (isotopes of uranium and plutonium) and other materials (such as beryllium, lithium salts, and high explosives). The remaining components are the nonnuclear components, some of which contain small amounts of tritium. Delivery systems for a nuclear device, such as the shell of a missile, are manufactured by DOD and its contractors and are not part of the proposal considered in this Environmental Assessment (EA).

The Complex has already attained a high degree of privatization. Most of the activities that could be accomplished more economically by the private sector are already being procured. The nonnuclear consolidation proposal does not include components currently manufactured by the private sector. The remainder of the nonnuclear components are manufactured in the government-owned, contractor-operated manufacturing facilities that make up the nonnuclear element of the Complex. Consolidating these manufacturing activities makes up the proposal analyzed in this EA. Where practical and cost effective, DOE may transfer the manufacture of some additional selected products to the private sector under existing procurement procedures; however, the nonnuclear consolidation proposal does not include any such speculative transfers since further privatization would likely be inhibited by the low manufacturing workload that is anticipated in the future.

The Complex also produces products at Mound for programs under the direction of other organizations within DOE. Those products utilized by the Complex, such as calorimeters, have been included in this EA regardless of the organization responsible for production. Those products that are not utilized for weapons manufacture, such as Radioisotopic Thermoelectric Generators and isotope separation and sales, are not part of this proposal. The removal of the weapons production mission from Mound will not necessarily result in a requirement to transfer manufacture of products sponsored by non-Defense Programs organizations to other sites since a support infrastructure would remain as DOE continues ongoing cleanup activities and D&D at these sites.

CHAPTER 3

CHAPTER 3: PROPOSED ACTION AND ALTERNATIVES

Chapter Three provides a detailed description of the Proposed Action and alternatives for consolidating nonnuclear functions of the Nation's Nuclear Weapons Complex. The chapter begins with a summary of consolidation alternatives: the Proposed Action–consolidation at the Kansas City Plant; other consolidation alternatives; No Action; and alternatives considered but eliminated from further analysis. Discussions of current operations at each potentially affected site follow, along with detailed descriptions of the Proposed Action and other consolidation alternatives.

3.1 SUMMARY OF CONSOLIDATION ALTERNATIVES

The alternatives considered reasonable for consolidating the nonnuclear manufacturing capabilities of the Nuclear Weapons Complex (Complex) were introduced in section 1.8 and are summarized in this section. As shown in table 3.1-1, these alternatives include the Proposed Action—consolidation of nonnuclear functions at the Kansas City Plant (KCP); the alternatives for consolidation at either the Mound Plant (Mound), the Pinellas Plant (Pinellas), or the Rocky Flats Plants (RFP); and No Action—retain existing missions at current sites. Alternatives considered but eliminated from further analysis are also discussed.

3.1.1 Proposed Action—Kansas City Plant Consolidation

The Department of Energy (DOE) proposes to close out the weapons manufacturing missions at Mound and Pinellas, and the nonnuclear manufacturing mission at RFP. These activities would be relocated to KCP, Los Alamos National Laboratory (LANL), and Sandia National Laboratories, New Mexico (SNL) as described below. Enhanced research, development, and testing (RD&T) and prototype fabrication capability at the laboratories would be provided to replace certain weapon production capabilities now located at Mound, Pinellas, and RFP. The remaining nonnuclear manufacturing functions would be consolidated at KCP, and the weapons manufacturing workload currently at KCP would be reduced.

The Proposed Action would result in: the consolidation of the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at KCP; tritium-handling capabilities at the Savannah River Site (SRS) and LANL; detonator capabilities at LANL; and beryllium technology and pit support functions at LANL or, as an option, at the Y-12 Plant (Y-12). The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future neutron generator work, cap assemblies, and other nonnuclear components. Detailed explanations of all functions associated with nonnuclear consolidation are provided in section 3.2 within the existing site descriptions.

The following actions are proposed:

- *Mission Closeouts*—The Complex missions at Mound and Pinellas and the nonnuclear Complex mission at RFP would be terminated.

- *Electrical/Mechanical*—The nonnuclear electrical/mechanical capabilities now at Mound, Pinellas, and RFP would be consolidated at KCP. KCP currently has manufacturing capabilities similar to those proposed for transfer and has adequate space in its existing facilities to accept them.

TABLE 3.1–1.—*Proposed Alternatives for Nonnuclear Manufacturing Consolidation Environmental Assessment*

Nonnuclear Manufacturing Functions to be Moved	Alternatives				
	No Action	Proposed Action	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative
Electrical/Mechanical	KCP, Mound, Pinellas, RFP	KCP	Mound	Pinellas	RFP
Tritium Handling at Mound	Mound	SRS	Mound	SRS	SRS
Tritium Handling at Pinellas	Pinellas	LANL	LANL	Pinellas	LANL
Detonators	Mound	LANL	Mound	LANL	LANL
Beryllium Technology and Pit Support	RFP	LANL (Option Y-12)	LANL	LANL	RFP
Neutron Generators, Cap Assemblies, and Batteries	Pinellas	SNL and KCP (LAMB)	SNL and Mound (LAMB)	Pinellas	SNL and RFP (LAMB)
Special Products at RFP	RFP	KCP	Mound	Pinellas	RFP
Special Products at Mound	Mound	LANL (Calorimeters) and SNL (MWHS)	Mound	LANL (Calorimeters) and SNL (MWHS)	LANL (Calorimeters) and SNL (MWHS)

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LAMB Lithium Ambient Batteries
MWHS Milliwatt Heat Source Surveillance

- *Tritium Handling*—All tritium-handling capabilities now performed at Mound would be relocated to SRS and collocated with the tritium functions now performed there. The neutron tube target loading for the current design of neutron generators, now performed at Pinellas, would be completed and capability for future requirements would be provided at existing facilities at LANL.

- *Detonators*—The existing RD&T and prototyping capability at LANL would be enhanced to provide a limited manufacturing capability for high-power detonators, now done at Mound. (The existing RD&T technology base for low-power explosives components would be maintained at SNL; the existing capability at Mound to manufacture these components is no longer needed. This is the same as the No Action alternative.)

- *Beryllium Technology and Pit Support*—The existing technology base and prototyping capability at LANL would be enhanced to provide limited manufacturing capability for beryllium technology and pit support work now done at RFP. As an option, the existing

capability at Y-12 instead of at LANL would be enhanced for this purpose.

- *Neutron Generators, Cap Assemblies, and Batteries*—Manufacture of the current design of neutron generators at Pinellas would be completed. The existing technology base for neutron generators would be maintained at SNL. Existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future advanced design neutron generators. Manufacturing capability for cap assemblies would be relocated from Pinellas to existing facilities at SNL. The technology base now housed at Pinellas involved in the manufacture of thermal batteries would be transferred to existing facilities at SNL; manufacture of the batteries would continue to be performed by the private sector. The assembly of lithium ambient batteries from commercially acquired lithium cells would be transferred to KCP.

- *Special Products*—The nuclear grade steels procurement and storage capability, safe secure trailer manufacturing capability, weapons trainer shop, and metrology services would be transferred from RFP to KCP. The calorimeter manufacturing capability and milliwatt heat source surveillance activities would be relocated from Mound to existing facilities at LANL and SNL, respectively.

If the Proposed Action were implemented, Mound and Pinellas would no longer have a DOE weapons mission, and the facilities used to house Defense Programs (DP) mission activities at these locations would be turned over to the DOE Office of Environmental Restoration & Waste Management (EM) for decontamination and decommissioning (D&D) or restoration, if appropriate, as discussed in section 4.4. The DP nonnuclear mission at RFP would also be terminated, and associated nonnuclear facilities turned over to EM for disposition. The capabilities transferred to KCP, SRS, LANL, Y-12, and SNL would, for the most part, be integrated into the existing plant facilities with appropriate plant modifications and renovations.

3.1.2 Other Consolidation Alternatives

Other alternatives considered in this Environmental Assessment (EA) include the consolidation of nonnuclear manufacturing activities at Mound, Pinellas, or RFP. Consolidation of the nonnuclear functions at any of these sites would differ from the Proposed Action in that the consolidation site would retain all of its existing nonnuclear manufacturing capabilities and would receive additional nonnuclear manufacturing capabilities from the other sites. The specific actions associated with each of the three consolidation alternatives are discussed in the following paragraphs and shown in table 3.1-1.

3.1.2.1 *Mound Plant Alternative*

The following actions would take place if Mound were the consolidation site:

- *Electrical/Mechanical*—The nonnuclear electrical/mechanical manufacturing functions performed at KCP would be consolidated with those of Pinellas and RFP at Mound. Construction of new facilities at Mound to accommodate these additional functions would be required. KCP, Pinellas, and the nonnuclear facilities at RFP would be turned over to EM for disposition.

- *Tritium Handling*—The tritium-handling capabilities at Pinellas would be relocated to LANL and collocated with similar functions there. Tritium-

handling functions at Mound would not be transferred.

- *Detonators*—The high-power detonator capabilities at Mound would remain and would not be moved to LANL.

- *Beryllium Technology and Pit Support*—Same as the Proposed Action except that there is no option to transfer these activities to Y-12.

- *Neutron Generators, Cap Assemblies, and Batteries*—No change from the Proposed Action except for lithium ambient batteries, which would be transferred to Mound instead of to KCP.

- *Special Products*—The nuclear grade steels, safe secure trailers, weapons trainer shop, and metrology capabilities from RFP would be transferred to Mound instead of to KCP. The calorimeter manufacturing capabilities and milliwatt heat source surveillance activities would stay at Mound instead of being relocated to LANL and SNL.

3.1.2.2 *Pinellas Plant Alternative*

The following actions would take place if Pinellas were the consolidation site:

- *Electrical/Mechanical*—The nonnuclear electrical/mechanical manufacturing functions performed at KCP would be consolidated with those of Mound and RFP at Pinellas. Construction of new facilities at Pinellas to accommodate these additional functions would be required. KCP, Mound, and the nonnuclear facilities at RFP would be turned over to EM for disposition.

- *Tritium Handling*—The tritium-handling capabilities at Mound would be relocated to SRS and collocated with similar functions there. Tritium-handling functions at Pinellas would not be transferred.

- *Detonators*—No change from the Proposed Action.

- *Beryllium Technology and Pit Support*—Same as the Proposed Action except that there is no option to transfer these activities to Y-12.

- *Neutron Generators, Cap Assemblies, and Batteries*—These capabilities would remain at Pinellas and would not be relocated to SNL or KCP.

- *Special Products*—The nuclear grade steels, safe secure trailers, weapons trainer shop, and metrology capabilities from RFP would be transferred to Pinellas instead of to KCP. The calorimeter manufacturing capabilities and milliwatt heat source surveillance activities at Mound would be relocated to existing facilities at LANL and SNL, respectively.

3.1.2.3 *Rocky Flats Plant Alternative*

The following actions would take place if RFP were the consolidation site:

- *Electrical/Mechanical*—The nonnuclear electrical/mechanical manufacturing functions performed at KCP would be consolidated with those of Pinellas and Mound at RFP. Construction of new facilities at RFP to accommodate many of these additional functions would be required. KCP,

Pinellas, and Mound would be turned over to EM for disposition.

- *Tritium Handling*—No change from the Proposed Action.

- *Detonators*—No change from the Proposed Action.

- *Beryllium Technology and Pit Support*—The beryllium technology and pit support capabilities located at RFP would remain and would not be moved to LANL.

- *Neutron Generators, Cap Assemblies, and Batteries*—No change from the Proposed Action except for lithium ambient batteries, which would be transferred to RFP instead of to KCP.

- *Special Products*—The nuclear grade steels, safe secure trailers, weapons trainer shop, and metrology capabilities would remain at RFP. The calorimeter manufacturing capabilities and milliwatt heat source surveillance activities at Mound would be relocated to existing facilities at LANL and SNL, respectively.

3.1.3 No Action

Under No Action, the consolidation of nonnuclear functions would not occur. Planned upgrades, renovations, repairs, and maintenance activities necessary to improve Complex compliance with all environment, safety, and health (ES&H) and environmental restoration standards would continue irrespective of future Complex configuration. Mound, Pinellas, and RFP would retain their current nonnuclear manufacturing missions. However, because the projected workload would be substantially lower than requirements in the recent past (due to Presidential initiatives to downsize the weapons stockpile), many current facilities would be maintained in a standby mode due to lack of work. The existing missions at each site are described in detail in section 3.2.

Many nonnuclear weapons components are manufactured and supplied by the private sector. The nonnuclear consolidation proposal does not include components currently manufactured by the private sector. Where practical and cost effective, DOE may transfer the manufacture of some additional products to the private sector under existing procurement procedures.

Privatization of certain components would continue under all alternatives and is not analyzed in this EA. Certain new privatization actions would be taken under the Manufacturing Development Engineering concept being developed by SNL.

In the Manufacturing Development Engineering concept, SNL, as the laboratory responsible for the design of nonnuclear parts or components, would work directly with private sector production plants. This means that SNL would be responsible for identifying and developing private suppliers and maintaining technology transfer programs for nonnuclear components. SNL would take on increased involvement in process design and manufacturing engineering in addition to its traditional research, development, and design activities. SNL would also provide a backup fabrication capability in the event that the product could no longer be provided commercially. The Manufacturing Development Engineering concept has recently become much more attractive due to the latest workload reductions resulting from the President's stockpile reduction initiative of June 1992. This initiative has made the nonnuclear fabrication capacity requirements small enough so that backup capacity can be adequately provided in the laboratory development area rather than by maintaining a dedicated backup area at a government-owned, contractor-operated weapons production plant.

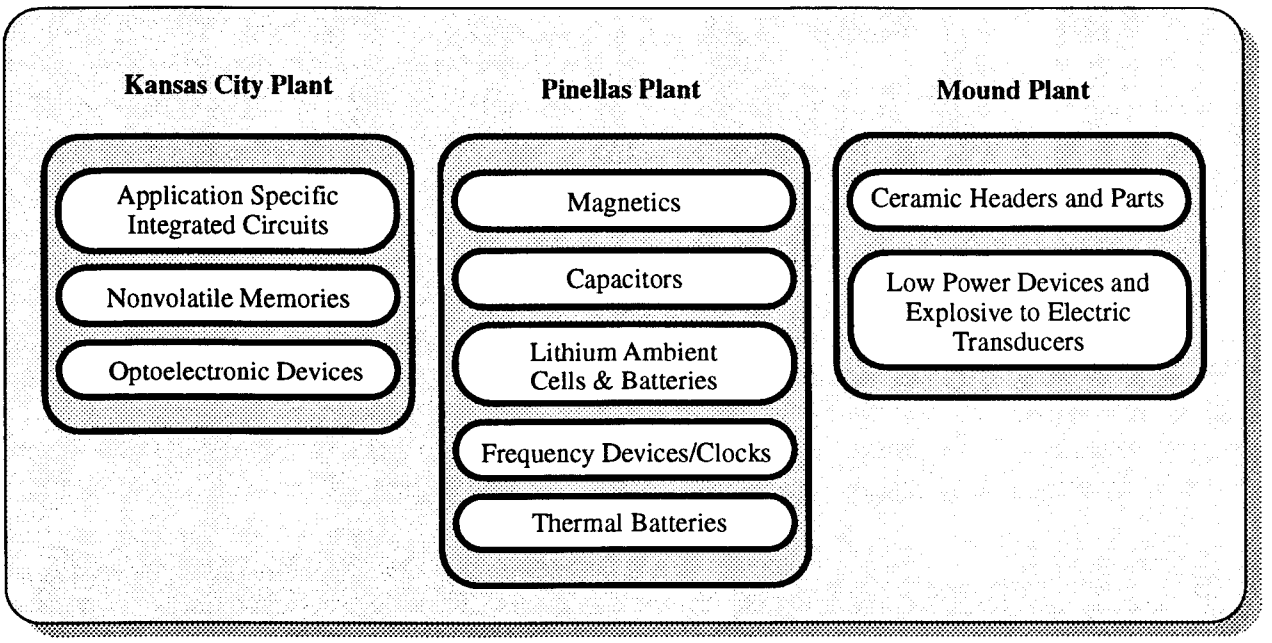

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FIGURE 3.1.3–1.—*Components Designated for Privatization via Manufacturing Development Engineering.*

Several of the items being considered for privatization may be included in the Manufacturing Development Engineering program and would be privatized rather than consolidated. Activities now ongoing at KCP, Pinellas, and Mound that would be privatized through Manufacturing Development Engineering are listed in figure 3.1.3-1. No Action workforces at these sites would be further reduced if additional activities are added to the Manufacturing Development Engineering program.

3.1.4 Alternatives Considered But Eliminated From Further Analysis

The alternatives analyzed in this EA are based on the conclusions in the Nuclear Consolidation Plan (NCP). DOE considered a number of additional alternatives for nonnuclear consolidation, but eliminated them from further consideration because they are unreasonable from the standpoint of cost, technical risk, and time to implement. DOE considered and rejected as unreasonable alternatives that would: consolidate nonnuclear electrical/mechanical manufacturing functions at other sites (Y-12 and Pantex) previously evaluated in the NCP; consolidate nonnuclear electrical/mechanical manufacturing functions at any two of the current three dedicated nonnuclear plants (i.e., consolidation at Mound and Pinellas; KCP and Mound; or KCP and Pinellas); consolidate all nonnuclear manufacturing functions at a Complex nuclear site (other than those evaluated in the NCP) or at a national laboratory; and consolidate all tritium maintenance, processing, and storage activities currently performed at both Mound and SRS at Mound instead of at SRS.

In addition to the KCP, RFP, Mound, and Pinellas consolidation alternatives analyzed in this EA, the NCP also examined the alternatives of consolidation at Y-12 and Pantex. These sites conduct both nuclear and nonnuclear activities associated with the Complex. Y-12 and Pantex were evaluated based upon the same four categories and ten performance measures used to evaluate the other sites (see section 1.8). Based upon these performance measures, the overall ranking of these two sites as potential candidates for consolidation of nonnuclear manufacturing activities was well below any of the

other sites examined in the NCP. This is because, for the performance measures evaluated, consolidation at either Y-12 or Pantex posed substantially greater technical risks, involved substantially greater consolidation cost, and resulted in substantially longer payback times than the other alternatives. Therefore, consolidation at either site would not meet the programmatic objectives of nonnuclear consolidation and are considered to be unreasonable alternatives.

To augment the evaluation of the single-site options discussed in the NCP, DOE prepared a Two-Site Nonnuclear Consolidation Study (Two-Site Study) (DOE, 1992b) to evaluate the option of consolidating nonnuclear electrical/mechanical functions at combinations of two sites. The two-site combinations considered were selected from the three dedicated nonnuclear manufacturing facilities. Thus, the site combinations evaluated were Mound and Pinellas, KCP and Mound, and KCP and Pinellas.

The annual operating and long-term costs for each of these combinations were compared with the costs of consolidating at KCP alone. Like the NCP, the Two-Site Study acknowledged that some individual manufacturing activities might be located at a site other than the primary consolidation sites (e.g., neutron generators at SNL).

In conducting the two-site cost comparisons, the study utilized not only the data from the NCP, but also more recent conceptual design report (CDR) data prepared to support nonnuclear consolidation activities. The Two-Site Study was completed in August 1992. In December 1992, an Addendum to the Two-Site Study was prepared to consider whether the revisions to the preferred alternative resulting from the Bush-Yeltsin arms reduction agreement (Strategic Arms Reduction Talks (START II)), which are discussed in this EA, affect the conclusions in the study. DOE concluded in the Addendum that the Bush-Yeltsin agreement makes the case for consolidation at KCP even more compelling.

DOE has determined that the two-site consolidation alternatives are unreasonable because of long-term costs and the difficulty in preserving technical competence in necessary technologies if single-site consolidation is not implemented. The Two-Site Study and its Addendum support the conclusion that consolidating most nonnuclear manufacturing activities at KCP would save from 1-1/2 billion to several billion dollars in life-cycle costs when compared to the two-site consolidation alternatives evaluated.

In addition to costs, an additional concern involves the preservation of specialized technical competence within the Complex in a time of shrinking workloads. National security considerations dictate that DOE maintain the capabilities necessary to ensure the viability of the enduring stockpile, even if no new weapons requirements are foreseen. These capabilities are needed to support the Stockpile Evaluation Program, limited life component exchanges, and the repair or replacement of weapons components to maintain and upgrade stockpile reliability, safety, and security. Experience has shown that even with no new weapons requirements, these activities must be maintained to deal with unanticipated design, production, or aging defects in stockpiled weapons requiring production of replacement components and subsystems.

Because the current and projected workload is substantially lower than that of recent years, technical competence is difficult to maintain because workers do not have the opportunity to apply their knowledge and skills to either components with which they have experience or components which require similar skills. This critical technical competence is already beginning to be lost, and the ability of the Complex to support, evaluate, and manufacture weapons is beginning to degrade. Low workload levels and resultant budget reductions have caused significant losses of skilled personnel and this reduced workload is dispersed in plants configured for large-scale production at previous "Cold War" levels, resulting in the loss of opportunities to exercise critical skills by the remaining workforce.

Consolidating like activities at a single site will ensure sufficient work to support a core work force of technical and production personnel, enabling utilization and retention of key skills and technical capabilities needed to maintain the enduring stockpile. Consolidation at two sites would provide substantially less assurance that this programmatic objective would be achieved.

In addition, as the Addendum to the Two-Site Study explains, the Bush-Yeltsin arms reduction agreement has reduced even further the cost effectiveness involved in retaining neutron generator production at Pinellas, while increasing the technical risks. Thus, the KCP-Pinellas two-site consolidation option (which was the least costly of the two-site options evaluated in the study) has become even less attractive compared to single-site consolidation at KCP.

DOE has determined that, other than the sites considered in this EA, no other Complex sites would be reasonable for consolidating nonnuclear manufacturing activities. In order to maintain the viability of the enduring nuclear weapons stockpile, 179 discrete technologies are required, involving the manufacture of thousands of parts at the selected consolidation site. Of these, 162 technologies are already in use at KCP. Therefore, were consolidation to take place at KCP, very few technologies would have to be transferred from other sites. The technical risk, cost, and time to consolidate at a site where no nonnuclear manufacturing activities are now undertaken renders other site alternatives unreasonable.

The NCP also considered the alternative of consolidating nonnuclear manufacturing activities at each Complex site where nonnuclear manufacturing activities now occur, including RFP, Pantex, and Y-12, all of which are predominantly nuclear sites. For the reasons discussed above, neither Pantex nor Y-12 represents a reasonable alternative for consolidation of these activities. Consolidation at DOE nuclear sites other than Pantex or Y-12 would be subject to even greater technical risk, cost, and time-related obstacles, especially because consolidation at these sites (e.g., Idaho, Hanford, SRS) would require all nonnuclear manufacturing activities to be transferred. In addition, these sites have little or no experience in any of the technologies required for nonnuclear manufacturing activities.

Although the weapons laboratories (LANL, Lawrence Livermore National Laboratory (LLNL) and SNL) have experience with many of the nonnuclear manufacturing technologies and have designed the components and subsystems to be produced, they do not have recent practical experience manufacturing production quantities of most components and subsystems. In a few cases, DOE has determined that certain selected technologies can best be preserved at LANL or SNL as part of the Proposed Action (e.g., neutron generators and high-power detonators, for which there will be a long hiatus in production requirements due to workload reductions). However, the same reasoning does not hold true for the thousands of other parts that would have to be manufactured or procured if all nonnuclear manufacturing activities were consolidated at a laboratory. Manufacturing capability for these parts would have to be maintained on a continual basis to endure the viability of the enduring stockpile. This would require the transfer of a large number of technologies and the establishment of a base of experienced, trained, and skilled personnel where no such base now exists. Thus, the technical risk involved in consolidating at a laboratory would be significantly greater than for the other alternatives considered in the EA. In addition, given the large number of technologies to be transferred, the transfer cost (including construction of new facilities) would be much greater than consolidation at one of the sites analyzed in this EA. Transferring a large number of technologies and constructing new facilities would take more time, which would increase technical risk, particularly in view of the need for near-term consolidation to support the enduring stockpile and mitigate the loss of technical competence within the Complex. Consequently, DOE has determined that

consolidation of all nonnuclear manufacturing activities at one of the weapons laboratories is an unreasonable alternative.

DOE has also assessed the comparative costs of consolidation at either Mound or SRS of tritium maintenance, processing, and storage activities now performed at these sites. These activities collectively involve hundreds of millions of curies of tritium. The cost study (DOE, 1992c) concluded that the life-cycle costs of consolidating such work at Mound would be nearly $2 billion greater than life-cycle consolidation costs at SRS.

In addition, DOE has assessed the comparative radiological risk to the public from consolidating the tritium activities discussed above at either Mound or SRS (DOE, 1992g). The assessment was based on a study of the quantitative risks of consolidated tritium activities for both normal operations and accident conditions. For both normal and accident conditions, the conclusion of the assessment is that the radiological risk to the population at either site from consolidated activities is very low.

Based on the conclusion of the cost study cited above, DOE has concluded that consolidation at Mound constitutes an unreasonable alternative for such consolidation. In addition, notwithstanding the low risk involved, DOE believes that it is not prudent to place hundreds of millions of additional curies of tritium in a densely populated urban area such as that surrounding Mound, especially when there exists the alternative of consolidating this material at SRS, a large site located away from a comparably densely populated area.

3.2 Current Operations at Existing Sites

This section discusses the current operations at each of the eight sites that could potentially be affected by the Proposed Action and alternatives. For each site, a brief description of the site and its location is presented. Discussions of each site's missions, facility/process description, waste management activities, and utility and resource requirements follow. Included under the facility/process description at each site is a discussion of safety and accident history. The activities conducted at each site involve unique applications of industrial processes utilizing hazardous, explosive, and, at some sites radioactive, materials. Both design and operating precautions are employed to reduce the probabilities of accidents and to mitigate the consequences of those which might occur. In developing the safety and accident sections, documents from each of the sites were reviewed for information on accidental releases of chemical or radioactive materials. The documents include "Unusual Occurrence Reports," "Annual Environmental Reports," and other sources providing accidental release information. Due to lower production levels, the time period of the review for the safety and accident sections (1986-1990) was chosen as being more representative of maximum future activity levels at the various sites. The results of these reviews are summarized for each site in subsequent sections.

3.2.1 Kansas City Plant

KCP is situated on approximately 141 acres of the 300-acre Bannister Federal Complex located within incorporated city limits 12 miles south of the downtown center of Kansas City, MO (figure 3.2.1-1). Of this area, 121 acres are allocated to DOE and 20 acres are on loan from the General Services Administration. The plant shares the Bannister Federal Complex site with other Federal agencies: the General Services Administration, the Department of Defense Finance and Accounting Service, the Federal Aviation Administration, the National Archives and Records Center, and the Internal Revenue Service, among others (KC ASAC, 1991a).

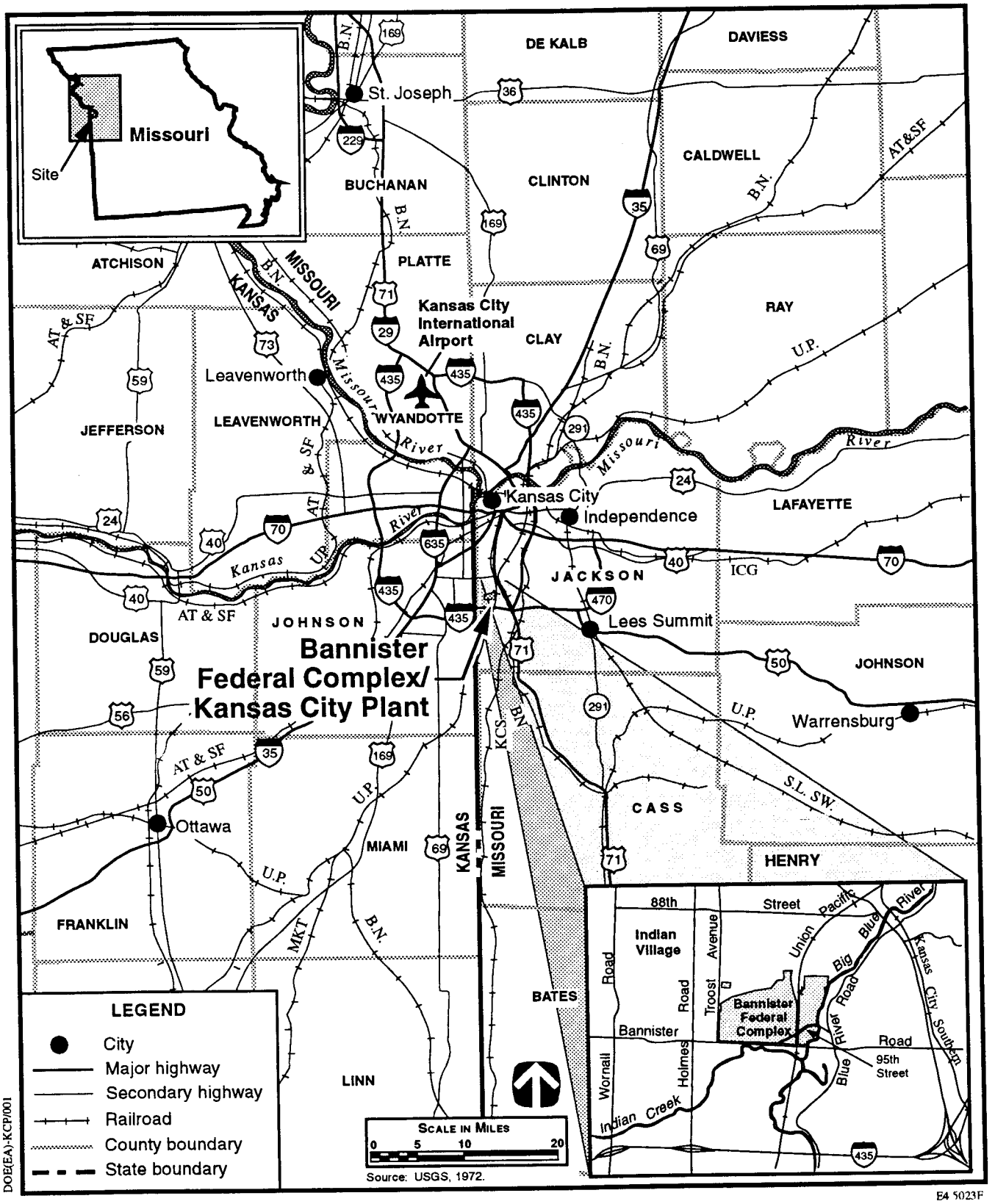

FIGURE 3.2.1–1.—*Bannister Federal Complex/Kansas City Plant, Missouri, and Region.*

3.2.1.1 *Kansas City Plant Missions*

KCP is a government-owned, contractor-operated facility that produces and procures nonnuclear electrical, electronic, electromechanical, mechanical, plastic, and nonfissionable metal components for the DOE nuclear weapons program. Work is performed under a management and operating contract between AlliedSignal, Inc., and DOE (KC ASAC, 1991b).

KCP's primary missions are:

- Fabrication, assembly, and procurement of:
  - Electrical and electronic components.
  - Electromechanical and precision mechanisms.
  - Rubber and plastics; foams and honeycomb components.
  - Handling equipment and shipping containers.
  - Telemetry equipment.
- Performance of:
  - Product acceptance and field test equipment.
  - Surveillance activities to ensure reliability of nuclear stockpile.
  - Pollution prevention.
  - Waste management.
  - Maintenance of process capability program.
- Metal structures and general machining.
- Development and production engineering.

3.2.1.2 *Facility/Process Description*

KCP includes approximately 3.2 million square feet (ft^2) of various building space. The majority of this space is contained within four main buildings (figure 3.2.1-2).

The weapons-related operations at KCP covered by this EA are all electrical, mechanical, and plastic products. The specific manufacturing activities are presented in table 3.2.1-1. A more detailed discussion is presented in appendix A, section A.1.

KCP does not process special nuclear materials but does have a health physics program consistent with industrial radiography and electronic manufacturing.

The production workload at KCP has been declining over the past few years, and several reductions in the workforce have occurred. The workforce at the plant in September 1992 consisted of 4,473 employees (DOE, 1993c).

Effluents and Emissions. Operations at KCP discharge water containing trace amounts of unregulated naturally occurring radionuclide laboratory reagents. Pretreated industrial process wastewater and untreated sanitary wastewater are discharged to the Kansas City, MO, wastewater treatment plant. Wastewater effluent from current operations at KCP is discussed in section 4.1.1.3.

Operations at KCP result in the release of trace amounts of tritium resulting from broken tritium exit signs and gap tubes. KCP has multiple volatile organic compound (VOC) and fugitive sources from degreasing, cleaning, and surface-coating operations. KCP's four boilers are the primary sources of criteria air pollutants. Major hazardous air pollutant sources include the metal-plating facility, metal degreasing, wastewater treatment, and boiler operations. The concentrations of criteria and hazardous air pollutants (HAP) from current operations at KCP are discussed in section 4.1.1.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.1.

Safety and Accidents. The review of historical information at KCP indicated that during the period 1986-1990, three accidental releases occurred that resulted in hazardous material reaching offsite locations. However, these incidents resulted in no significant adverse impact. In 1987, about 10 to 15

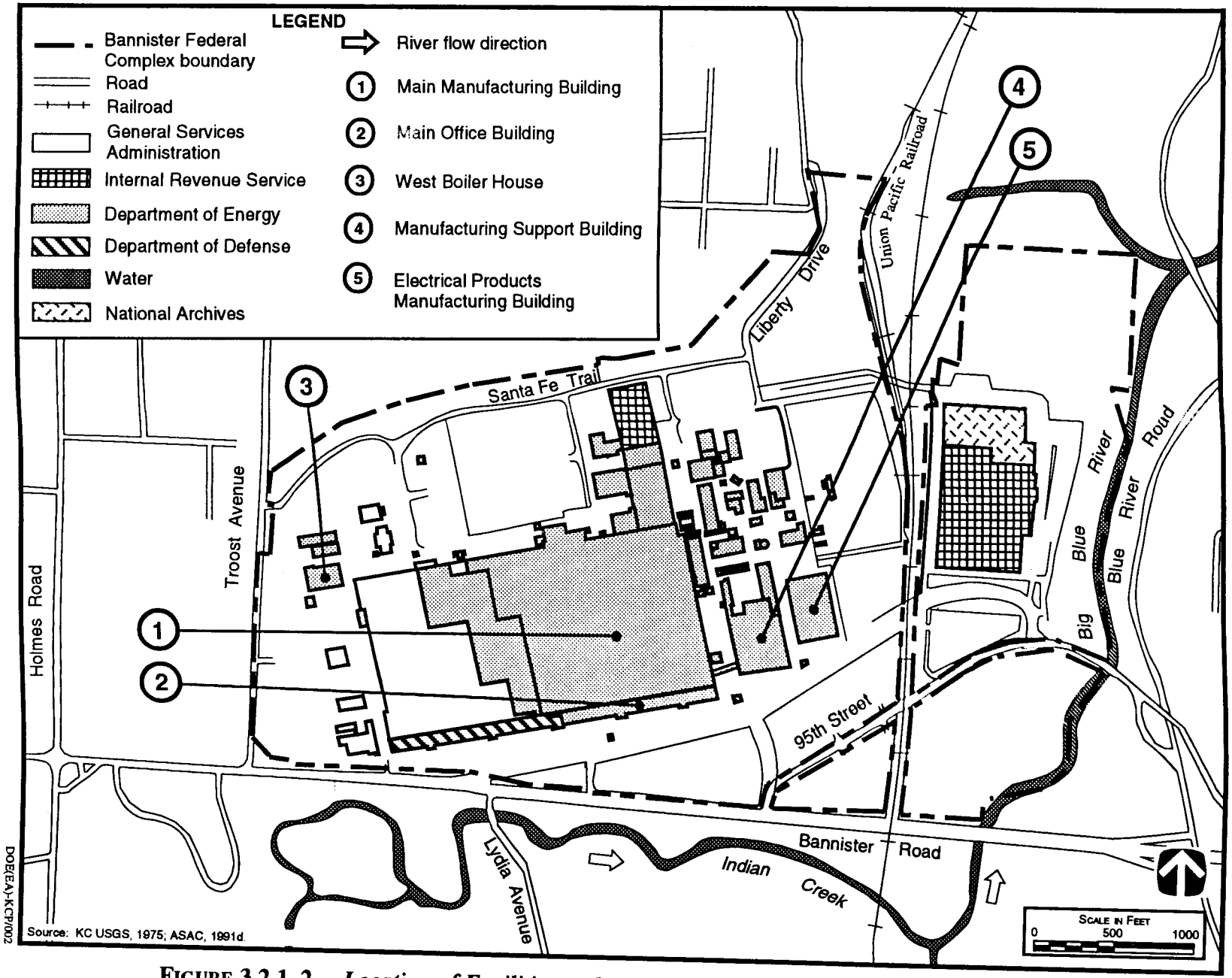

FIGURE 3.2.1–2.—*Location of Facilities at the Bannister Federal Complex/Kansas City Plant.*

TABLE 3.2.1–1.—*Kansas City Plant: Nonnuclear Manufacturing Activities Considered for Consolidation* [Page 1 of 2]

Electrical/Mechanical Products	
Squib Valve Assembly	Manufacture of valve bodies for pyrotechnically-driven (explosively activated) devices.
Hybrid Microcircuit Assembly	Assembly of hybrid microcircuits resistor/conductor networks for radars, programmers, timers and firesets.
Hybrid Microcircuit Assembly for Joint Test Assemblies	Assembly of hybrid microcircuit networks interconnected with active (transistors and integrated circuits) and passive (resistors and capacitors) components for Joint Test Assemblies which are weapons with the nuclear components removed so that they can be tested in their intended delivery mode.
Microminiature Electrical Assembly	Manufacture of hybrid microcircuits that perform multiple electronic functions in weapons systems such as switches, radars, programmers, firesets, clocks, and telemetry.
Telemetry Assembly	Manufacture of telemetry assemblies and neutron detectors for Joint Test Assemblies, and test component firing systems that provide data on warhead performance in flight tests and high energy transfer systems for use in underground testing at the Nevada Test Site (NTS).
Radar Assembly	Manufacture of radars used in weapons fuzing systems for bombs and warheads.
Timers, Programmers, & Trajectory Sensing Signal Generators	Manufacture of electronic assemblies which accept environmental data, verify correctness of that data, and produce predetermined and sequenced output functions for the weapon.
Test Equipment Design & Fabrication	Manufacture of test equipment capable of performing electrical and mechanical test equipment design and fabrication.
Cellular Silicone & Filled Elastomers	Manufacture of cellular silicone pads that are used to cushion components.
Foam Molding	Manufacture of structural urethane foam component supports.
Syntactic Foam Molding & Plastic Machining	Manufacture of foam supports which are capable of withstanding higher operating temperatures than conventional foam molding supports.
Laminates & Desiccants	Manufacture of desiccant powders and resins used to provide a dry environment in sealed nuclear assemblies, and the production of plastic laminates.
Noncryptographic Coded Switch Assembly	Manufacture of electronic devices that permit the controlled use of nuclear weapons upon proper authorization and to prevent unauthorized use under all conditions.
Strong Link Switch Assembly	Manufacture of complex electromechanical safety devices used in all modern weapons programs.
Fire Set Assembly	Manufacture of high voltage circuitry firing systems capable of supplying the energy required to initiate a weapon system.
Composite Structures	Manufacture of fiber reinforced composite assemblies.
Stockpile Support	Evaluation of components and subsystems removed from stockpile for reuse, systems testing, or component cycle testing.

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TABLE 3.2.1–1.—*Kansas City Plant: Nonnuclear Manufacturing Activities Considered for Consolidation*—Continued [Page 2 of 2]

Electrical/Mechanical Products	
Category F Permissive Action Link Electronics Assembly	Manufacture of electronic assemblies that are part of the weapon's nuclear surety (safety, security, and survivability) system.
Special Products - Special Electronics Assembly	Electronic products requiring special area exclusion.
Cryptographic-Coded Switch Assembly	Assembly of Permissive Action Link Switch Adapters, an electronic device designed to provide an "electrical block" to the arming switch of the weapon.
T-Gear Containing Cryptographic Keying Material	Manufacture of keying material used to code and recode Permissive Action Link devices in weapons. The presence of these codes prevents unauthorized access to weapons.
MK 5 Arming, Fuzing, and Firing Set Assembly	Manufacture of arming, fuzing, and firing set assemblies.
B83 Weapon Subassembly	Assembly of electronic and mechanical structures into a case structure that provides distance, timing, velocity sensing, velocity control, and electrical power for weapon assemblies.
Machining Technology	Activity providing a variety of traditional and non-traditional metal removing processes.
Other Mechanical Technology	Activity providing support for mechanical product manufacturing.
Plastics Technology	Manufacture of a wide range of polyurethane foam components, epoxy encapsulants, and modified commercial products for the Complex.
Electrical/Electronic Fabrication & Assembly Technology	Manufacture of printed wiring assemblies which are used in weapon timers, programmers, trajectory sensing devices, and various other electrical/electronic components.
Secondary Support Areas	Activity providing support functions that service nearly all production lines, some of which are uniquely tailored to meet special weapon requirements.

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Source: KC ASAC, 1993b.

gallons of perchloroethylene were released into the storm sewer system. This release was reported under the requirements of the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) and *Superfund Amendments and Reauthorization Act* (SARA) because of the amount released. Analysis of samples at the affected outfall indicated perchloroethylene concentrations were less than the instrument detection limit of 0.005 milligrams per liter (mg/L). In 1990, 200-500 gallons of #6 fuel oil were discharged into an onsite drainage ditch; a small amount entered the outfall. This release was also appropriately reported under CERCLA regulations.

A third incident involved radioactive contamination from a leaking promethium-147 sealed source used in a beta backscatter measuring system. This release was discovered in 1989. Surveys revealed contamination in other facility laboratories and adjacent areas, as well as the residence of one laboratory worker. Bioassays of personnel indicated no uptake of the promethium-147 and the minor contamination was cleaned up. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned for start by the end of 1993 are:

- Replacement of the current KCP Emergency Notification System with an electronically supervised plant-wide system and a non-emergency public address system. Completion of this project is planned for 1997.

- A planned Chemical Sampling Facility upgrade will expand the Polymer Building to provide a dedicated area with required personnel protection and environmental controls to dispense hazardous and nonhazardous materials. Completion is planned for 1993.

- KCP plans to upgrade the heating, ventilation, and air conditioning (HVAC) system in the Foam Molding Area to comply with ventilation requirements for control of hazardous air contaminants in compliance with 29 CFR 1910.94. Completion is planned for 1994.

- Configuration Records Fire Protection is planned to upgrade a classified document storage area. Fire protection and life safety systems will be upgraded to provide personnel and document protection to ensure compliance with regulations. Completion is planned for 1993.

- An additional Air Monitoring Station is planned to house equipment to monitor ambient air quality to ensure compliance with state and national standards. Completion is planned for 1994.

- Explosive Actuated Device Storage Facility is planned to provide a segregated storage area for Class C Explosive Actuated Devices as required by DOE Explosives Safety Manual. Completion is planned for 1994.

3.2.1.3 *Waste Management*

Waste operations at KCP involve management of four broad waste types: low-level waste (LLW), low-level mixed waste, hazardous/toxic waste, and nonhazardous waste. KCP also generates small quantities of hazardous and mixed wastes which are considered classified for national security reasons due to the nature of the generating process or composition. The quantity of classified waste is included in the hazardous and mixed waste quantities that follow. Table 3.2.1-2 presents a summary of the 1991 waste generation at KCP. A detailed description of the waste stream generation processes/activities, onsite management, storage and treatment capabilities, and ultimate disposition is presented in appendix A, section A.1.

Radioactive Waste Streams and Management. KCP generates small quantities of LLW. Activities that generate LLW are the disassembly and testing of irradiated components, scheduled replacement of tritium exit signs, disposal of X-ray sources, and small amounts of contaminated cleanup towels, disposable gloves, and packing materials. Less than one gallon per year of LLW is generated. Periodically, the liquid LLW is solidified and mixed into concrete or plaster of paris for final handling and disposal.

The solid LLW is accumulated and stored in one controlled access facility used to store both LLW and mixed waste. LLW is stored onsite temporarily using Department of Transportation (DOT)-approved containers until sufficient quantities accumulate to warrant shipment to approved LLW disposal facilities at the Nevada Test Site (NTS). The last shipment of solid LLW took place in May 1985. The current inventory of LLW in storage is 245 cubic feet (ft^3), which includes waste produced annually and that generated from the cleanup of the

TABLE 3.2.1–2.—*Kansas City Plant: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	183,000 gal	44,000 gal	None	Offsite
Solid	46,000 ft^3	83,000 ft^3	None	Offsite
Nonhazardous				
Liquid[a]	200,000,000 gal	None	474.5 MGY	Offsite-Sewer System Outfall
Solid	494,935 ft^3	None	None	Offsite
LLW				
Liquid	<1 gal[b]	5,280 gal[c]	None	Not Applicable
Solid	15 ft^3	705 ft^3[c]	None	Offsite-DOE
Mixed				
Liquid	None	c	None	None
Solid	None[d]	c	None	None

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a Industrial wastewater.
b Any liquid LLW is periodically solidified into concrete or plaster of paris and handled and disposed as solid LLW.
c KCP has a 250 ft^2 storage area that can store LLW and/or mixed waste. This translates into 5,280 gallons, or 705 ft^3.
d Although no mixed waste was generated, the potential exists for generation of mixed waste.

Source: KC ASAC, 1993b.

leaking promethium-147 source. Approximately 15 ft^3 of LLW are generated annually.

Mixed Waste. Current low-level mixed waste inventories consist of printed circuit boards which contain gap tubes, equipment sources in lead shielding, and a small amount of clean-up materials that contain used solvents. Through process changes that have been made, KCP no longer routinely generates mixed waste. However, the potential exists for the generation of mixed waste from shielded equipment sources and future clean-up debris.

All KCP mixed waste is stored with LLW in one controlled access, *Resource Conservation and Recovery Act* (RCRA) storage facility. At the present time, there are no facilities available to DOE for the treatment and disposal of this waste. The current inventory of mixed waste at KCP is 195 ft^3.

Hazardous/Toxic Waste Streams and Management. Hazardous waste is generated by a number of activities at KCP and consists of wastes such as acidic and alkaline liquids, solvents, and oils and coolants. Processes such as plating, etching, electronic assembly, metals and plastics machining and forming, and wastewater treatment are the principal generators. Polychlorinated biphenyl (PCB) liquids and solids are generated due to remediation efforts and the removal of PCB transformers.

KCP currently operates ten RCRA interim status waste storage areas for containerized nonradioactive hazardous wastes, one RCRA interim status waste storage area for containerized LLW and mixed waste, and six bulk storage tanks for nonradioactive hazardous wastes (appendix A, section A.1). These facilities are for temporary storage of wastes prior to disposal. The container storage and tank storage facilities have total design capacities of 44,000 gallons (gal) for liquid and 83,000 ft^3 for solid hazardous/toxic wastes.

No hazardous waste treatment, as defined under RCRA, is performed onsite at KCP. However, the plant operates a solvent reclamation/distillation unit and an industrial wastewater pretreatment facility, both of which are exempted from RCRA standards.

KCP does not dispose of waste onsite, although onsite disposal and leaks/discharges have occurred in the past. On March 6, 1989, the Environmental Protection Agency (EPA) requested DOE to enter into a RCRA section 3008(h) Administrative Order on Consent. On June 23, 1989, DOE and EPA Region VII signed the order. The provisions of the order require that DOE conduct all assessment and remediation activities regulated under the order in accordance with approved environmental restoration remediation schedules. The KCP Environmental Restoration Program serves to identify the nature and extent of environmental contamination at inactive waste sites. The site investigations conducted to date have indicated that hazardous waste constituents found in soil and groundwater at KCP are associated with past operations and are found at or near units now considered regulated hazardous waste management and solid waste management units.

Hazardous wastes generated at KCP are manifested and shipped under contracts with DOT-registered transporters to RCRA- or *Toxic Substances Control Act* (TSCA)-permitted incineration, reclamation, or disposal facilities. In addition, procedures have been developed by KCP to evaluate all prospective treatment, storage, and disposal sites to ensure that the facilities are operating in accordance with all applicable regulations. An annual reevaluation site visit is conducted by KCP environmental and waste management personnel for all treatment, storage, or disposal facilities utilized by KCP.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. The wastes are put in 8-, 20-, and 42-cubic yard (yd^3) metal roll-off boxes for tractor-trailer transport to a sanitary landfill. Industrial wastewaters are discharged to the Industrial Wastewater Pretreatment Facility or to the sanitary sewer in compliance with Kansas City, MO, sewer-use ordinance provisions and permit discharge limits.

3.2.1.4 *Utility and Resource Requirements*

The utilities at KCP include the following: electrical power; potable, process, and fire protection water; steam and condensate; natural gas and fuel oil; and, compressed air. The support systems include sanitary sewage disposal, drainage and storm sewers, chemical storage, and communications.

KCP has two primary energy needs: electricity and boiler fuel. Electricity is provided by the Kansas City Power and Light Company and the Missouri Public Service Company. Boiler fuel, natural gas, and fuel oil (for emergency backup only) is obtained from the Defense Fuel Supply Center contract. Table 3.2.1-3 lists KCP's existing resource requirements.

There are no onsite surface water withdrawals (KC DOE, 1989). The Kansas City, MO, municipal water supply system provides all drinking and process water for KCP. The present chemical storage capabilities are adequate for the existing KCP mission.

TABLE 3.2.1–3.—*Kansas City Plant: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	521,000 kWh	35,000 kW	100,000 kW
Natural Gas	1,847,000 ft^3	195,000 ft^3/hr	1,800,000 ft^3/hr
Water	1,443,000 gal	3,000 gpm	22,000 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	2,393,000 gal	40,800 gal
Argon	871,000 ft^3	a
Helium	162 ft^3	0 ft^3
Hydrogen	200 ft^3	0 ft^3
Carbon Dioxide	5,912,000 ft^3	494,000 ft^3

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Table assumes that KCP operates 365 days per year. Numbers in this table represent 1991 baseline utilities and 1991 emissions inventory.

[a] Procured from commercial sources. No onsite bulk storage.

Source: KC ASAC, 1993b.

3.2.2 Mound Plant

Mound is located in the greater Dayton area in Montgomery County within the city limits of Miamisburg, OH (figure 3.2.2-1). Mound is a government-owned, contractor-operated facility operated by EG&G Mound Applied Technologies, Inc. Mound has been operating since 1948 on the 306-acre site.

Figure 3.2.2-2 shows the local setting and facilities of Mound. The site lies south and west of Mound Road in Miamisburg. Tracks of the Consolidated Rail Corporation (Conrail) roughly parallel the western boundary at distances ranging from approximately 50 to 200 feet. The Great Miami River flows 1,500 to 2,000 feet west of the site.

3.2.2.1 *Mound Plant Missions*

Mound manufactures nonnuclear components for nuclear weapons assembled at other DOE Complex sites. Work is performed under a contract between EG&G, Inc., and DOE.

Mound's primary missions are:

- Fabrication, assembly, and procurement of:
  - Detonators, firesets, and pyrotechnic devices.
  - Flexible circuits.
  - Explosively actuated timers.
  - Powder and thermite processing.
- Explosive and reservoir surveillance testing.
- Design and production of calorimeters (non-DP mission).
- Stable isotope separation and sales (non-DP mission).
- Isotope heat source piece part fabrication (non-DP mission).
- Radioisotopic Thermoelectric Generator (RTG) heat source fabrication and qualification (non-DP mission).

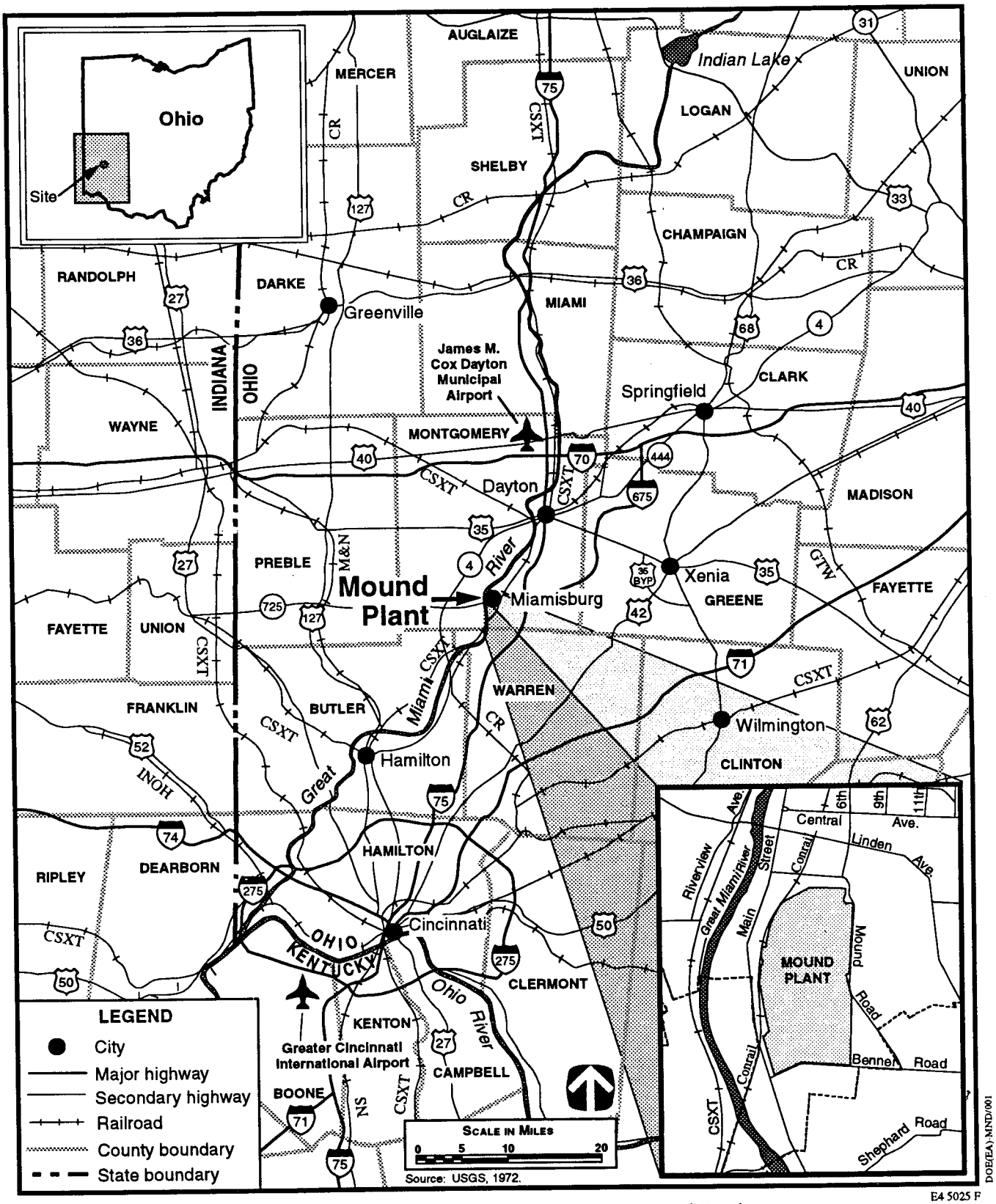

FIGURE 3.2.2–1.—*Mound Plant, Ohio, and Region.*

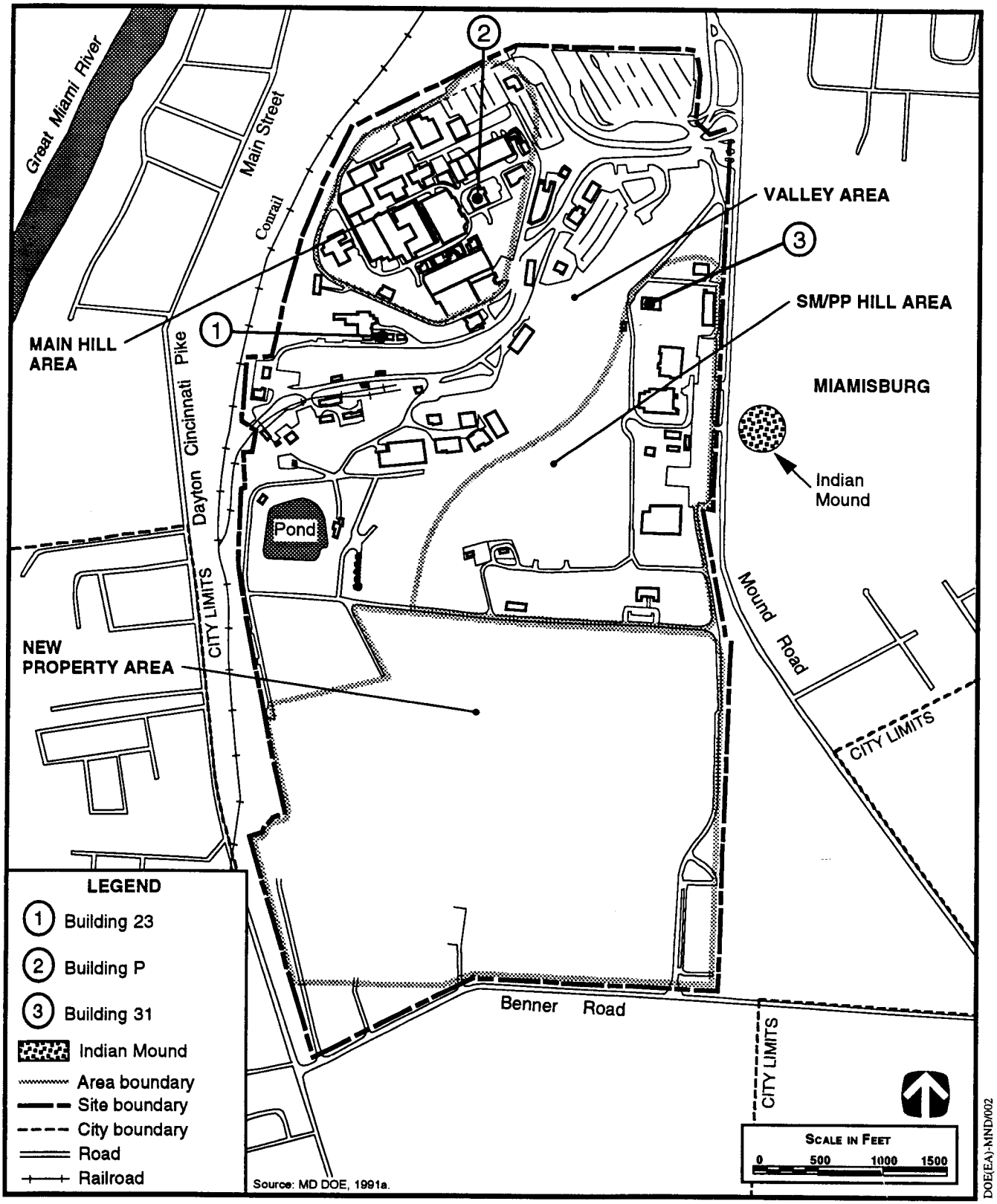

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FIGURE 3.2.2–2.—*Location of Facilities at the Mound Plant.*

- Commercial tritium sales/inertial confinement fusion target loading.
- Tritiated aqueous waste recovery.
- Savannah River Operations Contingency.
- Solid storage transfer systems.
- Nuclear materials safeguards.
- Performance of surveillance activities to ensure reliability of nuclear stockpile.
- Pollution prevention.
- Waste management.
- Storage of nuclear materials.
- Maintenance of process capability program.
- Development and production engineering support.
- Maintenance of a standards and calibration facility.

The majority of Mound's work is done for DP. However, it has a number of non-DP related activities that will be affected by this consolidation as indicated above. Some of these, such as calorimeters, which are required by DP for nuclear inventory control, would be moved as a part of this action and are covered in the EA. Other items such as RTGs, which are used as power sources for spacecraft, would not be moved. In addition, isotope separation and sales (except tritium and helium 3), which include development of isotope separation methods for biomedical applications and molecular science research, would not be moved.

Non-DP activities would continue to receive support related to security, non-destructive testing, waste disposal, public relations, finance, plant engineering and maintenance, and health and safety programs. Should there be a decision to terminate the Complex missions at Mound, an infrastructure would remain there for a number of years to support the ongoing D&D and site cleanup activities conducted by DOE EM. Therefore, the DOE Office of Nuclear Energy's commercial stable isotope separation and sales program will not be appreciably affected by termination of the Complex missions, and decisions regarding the future of the isotope program will be made independent of such termination.

Similarly, the decision whether the Office of Nuclear Energy's RTG activities remain at Mound or move to another DOE site will be unaffected by the nonnuclear consolidation decision. Whether these facilities will remain at Mound is driven by the decision on the production or procurement of plutonium (Pu)-238 and not nonnuclear consolidation.

3.2.2.2 *Facility/Process Description*

There are 158 buildings and facilities at Mound. Total floor area at Mound is approximately 1.4 million ft^2 (MD EG&G, 1991c).

The DP activities at Mound consist of both weapons and non-weapons activities and for the purpose of this analysis have been divided into electrical and mechanical products, special products, tritium handling, and high explosives. The specific manufacturing activities are presented in table 3.2.2-1. A more detailed discussion is presented in appendix A, section A.2.

The workforce at Mound in September 1992 was 1,719 employees (DOE, 1993c).

Effluents and Emissions. Normal operations at Mound release small quantities of tritium (less than 10 curies per year for the total site) to surface waters. Concentrations of these releases are discussed in section 4.1.6.3. Pretreated industrial process

TABLE 3.2.2–1.— *Mound Plant: Nonnuclear Manufacturing Activities Considered for Consolidation*

Electrical/Mechanical Products	
Flat Cable Products	Manufacture of cables used to detonate the main explosive charge of the weapon.
Round Wire Detonator Cables	Manufacture of detonator cables used to ignite various explosive devices used in weapons systems.
Mechanical Assemblies	Manufacture of electromechanical devices used as detonator safing stronglink mechanisms.
Nonnuclear Acorn	Manufacture of nonnuclear components of reservoirs.
Plastic Headers	Manufacture of molded plastic devices having imbedded electrode wires, to which bridgewires (very thin wires designed to explode upon application of current) are ultimately attached.
Special Products	
Milliwatt Heat Source Surveillance	Environmental storage and testing of inert, nonradioactive heat source containers.
Calorimeters	Activity providing calibration, manufacture, assembly, and development of calorimeters.
Tritium Handling	
Gas Transfer Systems	Activity providing the development of processes and components for the manufacture of gas transfer systems.
Reservoir Surveillance Operations	Activity providing assessment of quality, reliability, and safety of gas transfer systems, including pre-production evaluations, gas transfer system functions, material testing, and product acceptance testing.
Commercial Sales/Inertial Confinement Fusion (ICF) Target Loading	Activity providing the commercial sale and filling of tritium containers for use in private industry and the loading of targets for fusion research.
Detonators	
High Power Detonators	Manufacture detonator assemblies used in explosive devices. This action includes the processing of organic explosive crystal powders, destructive testing of explosive components, and surveillance of explosive components including stockpile, shelf life, and accelerated aging evaluations.

E4 3500

Source: KC ASAC, 1993b; SNL, 1992; SR DOE, 1992a; LA FDI, 1992.

wastewater and sanitary wastewater are discharged to the Great Miami River through National Pollutant Discharge Elimination System (NPDES)-permitted outfalls. Wastewater effluents from current operations at Mound are discussed in section 4.1.6.3.

Normal Mound operations release fewer than 1,800 curies per year of tritium to the atmosphere for the entire site. Tritium releases are discussed in section 4.1.6.2 and the associated human health impacts are discussed in section 4.1.6.9. The major sources of criteria air pollutants at Mound are the two boilers associated with the steam plant and the Keystone heat exchanger. Other sources include fugitive particulate emission sources from process operations, and from laboratory and vehicle emissions. Hazardous/toxic air pollutants emission sources at Mound would be from the glass melter facility when operating and by various laboratory operations. Predominant hazardous/toxic air pollutant emissions include acetone, nitric acid, 1,1,1-trichloroethane (TCA), and isopropyl alcohol. The concentrations of criteria air pollutant and hazardous/toxic air pollutants from current operations at Mound are

discussed in section 4.1.6.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.2.

Safety and Accidents. The review of historical information at Mound indicated that during the period 1986-1990, four accidental releases occurred that resulted in material reaching offsite locations. Three were chemical in nature and one involved radioactive material. The chemical incidents involved two releases of calcium chloride brine to the plant storm sewer in 1987 (one release was 2,100 gal and the other 475 gal) and one release of 2,250 gal of ethylene glycol to the sanitary sewer system in 1988. The radiological release occurred in 1989, when an estimated 37,000 curies, or 3.7 grams, of tritium gas were released. The maximum hypothetical offsite exposure from this estimated release was calculated to be 0.004 millirem (mrem). Compared to the EPA standard of 10 mrem, this release did not result in significant adverse impacts offsite. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned for start prior to the end of 1993 include:

- Replacement of the current Emergency Notification System at Mound, including the existing fire alarm and radio system, with a new emergency paging and announcement system and a new personnel accountability system. Completion of this project is planned for 1998.

- A site drainage control project, planned for completion in 1998, would provide upgraded stormwater management facilities. This project would include stormwater containment basins, concrete-lined channels, piping, curbing, and berms which would increase stormwater containment capacity; reduce erosion, flooding, and pooling; reduce the amount of stormwater running offsite in an uncontrolled manner; and reduce the groundwater recharge from potentially contaminated stormwater.

- An offsite drainage containment project, planned for completion in 2001, would provide an impervious conduit to transport Mound's drainage to the Great Miami River. The purpose of this project is to protect the underlying Buried Valley Aquifer.

- Technical Building Life Safety Code upgrades are expected to be completed in 1998. This project would provide for the necessary upgrades to bring the Technical Building into compliance with the current Life Safety Code. The project includes providing new delivery access for the building, modifying the tunnel, constructing new corridors, and upgrading electrical, and fire protection systems.

3.2.2.3 *Waste Management*

Waste management operations at Mound consist of five broad waste types: transuranic (TRU), LLW, mixed waste, hazardous/toxic waste, and non-hazardous waste. Because there are no TRU wastes associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of TRU waste generation and management. However, disposal of existing TRU waste and waste generated as a result of transition activities would be addressed in the EM transition plan. Further discussion of this issue can be found in section 4.1.6.8. Table 3.2.2-2 presents the 1991 waste generation at Mound. A detailed description of the

TABLE 3.2.2–2.—*Mound Plant: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	19,000 gal	14,686 gal	None	Offsite
Solid	2,825 ft^3	2,880 ft^3	a	Offsite
Nonhazardous				
Liquid	47,400,000 gal	b	47.5 MGY	Offsite-NPDES Outfall
Solid	140,130 ft^3	21,492 ft^3	None	Offsite
LLW				
Liquid	0	c	c	Not Applicable
Solid	176,678 ft^3	123,000 ft^3 [b]	d	Offsite-DOE
Mixed				
Liquid	79 gal	325.2 gal	None	None
Solid	4.5 ft^3	1,600 ft^3	None[e]	None

E4 3938

[a] Burn Area has treated an average of 42 ft^3/yr of explosive/reactive wastes.
[b] Additional capacity is obtained as required by renting commercial trailers.
[c] The Waste Disposal Plant has four influent tanks having a combined storage capacity of 120,000 gallons of alpha wastewater. On the average, 30,000 gallons per week of alpha wastewater are treated and discharged to the Great Miami River. Low-level tritium contaminated liquid wastes (30,000 gallons per year) are solidified and disposed of as solid LLW.
[d] Sludges produced in the clariflocculator from the above process are held in two 1,000-gallon tanks until solidified in 55-gallon drums.
[e] When available in 1995, the glass melter thermal treatment unit is expected to have a treatment capacity of 740 ft^3/yr.

Source: FDI, 1993; MD DOE, 1991b; MD DOE, 1992.

waste stream generation processes/activities; onsite management, storage, and treatment capabilities; and ultimate disposition is presented in appendix A, section A.2.

Radioactive Waste Streams and Management. LLW consists of paper, wood, building debris, and soil contaminated with Pu-238, Pu-239, and thorium; and paper, wood, plastic, and scrap equipment contaminated with tritium. Currently, approximately [illegible] percent of the LLW generated at Mound is a result of ongoing D&D activities.

Liquid waste treatment at Mound is confined to Pu-238. This liquid waste is treated in the Waste Disposal Facility for the precipitation of Pu-238 and the solidification of the sludge with Portland cement. Low-level tritium-contaminated liquid wastes are transported in doubly-enclosed above-ground pipelines to the Waste Disposal Annex Facility where the liquids are solidified with cement in 55-gal steel drums. The remaining low-level liquid wastes are stored onsite. Additional low-level management facilities are described in appendix A, section A.2.

All solid LLW is transported by commercial carriers in closed vans to NTS for burial. Prior to shipment, solid LLW is staged in Building 31 (boxes) or Building 23 (drums). As of the end of September 1992, there were approximately 160,382 ft^3 of LLW at the plant awaiting shipment.

Mixed Waste. Mound's low-level mixed waste is generated from scintillation vials, lead residue and bricks, PCBs, and contaminated mercury. Low-level mixed waste is containerized and stored in Building 23 at Mound pending completion of waste characterization and identification of an acceptable waste treatment/disposal option by DOE.

Mound is now planning the construction of a 5,300-ft^2 radioactive waste storage facility. Conceptual design has been completed and the facility is scheduled to be operational by June 1994. This building will allow the use of Building 23 exclusively for mixed waste storage.

Mound is finding it difficult to comply with land disposal restrictions and waste storage time limits for its mixed wastes, since disposal options are not available. It is anticipated that Mound's glass melter thermal treatment unit, with a treatment capacity of 740 cubic feet per year (ft^3/yr), would be available for treatment of much of this waste in 1995. The glass melter would be used to burn hazardous waste and mixed waste and vitrify the bottom ash. An RCRA Part B permit application and a Trial Burn Plan for the glass melter have been submitted for Ohio EPA approval. Mound has no current or planned onsite disposal facilities for radioactive wastes.

Hazardous/Toxic Waste Streams and Management. Hazardous/toxic wastes are generated in several production and laboratory facilities at Mound. The quantity of the wastes and the disposal methods for each are summarized in table 3.2.2-2

The current storage and treatment facilities at Mound are listed in appendix A, section A.2. Preconceptual design and budget planning is underway for construction of a new hazardous waste storage facility that would improve waste handling and loading operations and reduce chances of waste spills. The new facility would also permit better separation of incompatible wastes and provide climate-controlled storage of wastes to prevent container pressurization or rupture due to high or low temperatures. The addition of the new facility, which incorporates 7,800 ft^2 of storage space, when combined with the existing 2,400 ft^2 of Building 72, would result in 10,200 ft^2 of available hazardous waste storage area. Mound has submitted a revised RCRA Part A and B permit application which is currently being processed by the state.

There are no active onsite disposal facilities for hazardous wastes at Mound. The only wastes currently treated onsite are explosives and pyrotechnics. Several hundred pounds of these materials are treated annually by open burning and by use of a retort (a vessel or chamber in which substances are distilled or decomposed by heat). All other hazardous wastes are treated and disposed of offsite by RCRA-permitted commercial contractors. Prior to offsite shipment, all hazardous/toxic waste is packaged in DOT-approved containers, mostly 55-gal drums, manifested and shipped under contract with DOT-registered transporters to RCRA- or TSCA-permitted facilities for treatment or disposal depending on the waste form. Some lead-acid batteries and excess laboratory chemicals are also sent offsite for recycle or reuse. Mound has a program to monitor the offsite management of its hazardous wastes by commercial facilities on a regular basis. Records and manifests are maintained for all hazardous wastes picked up from Mound generators that are shipped offsite for treatment or disposal.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. Metallic and wood waste, stored in a salvage area, is sold periodically by lot sale as surplus. Trash is accumulated onsite and taken to the local sanitary landfill on a regular basis.

3.2.2.4 *Utility and Resource Requirements*

The P-Building at Mound serves both as a primary distribution center for natural gas, fuel oil, and electrical power and for providing other services such as: compressed air; ethylene glycol cooling; potable, process, and fire protection water; and, steam and condensate.

The support systems at Mound include: sanitary sewage disposal; drainage and storm sewers; and communications.

Mound's electrical distribution system consists of a "dual primary selective" 13 kilovolt (kV) system with three service entrances supplied by the Dayton Power and Light Company. An automatic transfer scheme is used to prevent prolonged facility outages. Mound's primary electric service is meeting current demands.

The Dayton Power and Light Company supplies natural gas to Mound. Annual consumption at Mound is approximately 3 million ft^3.

Mound furnishes its own potable water, cooling water, firewater (sprinklers and hydrants), storm-water drainage, and sanitary sewage system. Water is distributed to the entire plant through two separate underground networks, one for fire protection and the other for potable/process water. The current water usage at Mound ranges from 18 to 25 million gallons per month and water consumption averages about 700 gallons per minute (gpm) during peak periods. Nearly 75 percent of the water consumed at Mound is process water. Fewer than 100,000 gallons per day (GPD) are for domestic water usage (MD EG&G, 1988).

The present chemical storage area is sufficient for current Mound missions. Existing resource requirements are summarized in table 3.2.2-3.

TABLE 3.2.2–3.—*Mound Plant: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	179,000 kWh	11,700 kW	18,800 kW
Natural Gas	8,000 ft^3	332 ft^3/hr	339 ft^3/hr
Water	475,000 gal	600 gpm	1,600 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	20,900 gal	36,500 gal
Argon	139,000 gal	8,400 gal
Helium	47,000 ft^3	60,000 ft^3
Hydrogen	3,300 ft^3	0 ft^3

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Table assumes that Mound operates 365 days per year.

Source: MD DOE, 1992.

3.2.3 Pinellas Plant

Pinellas, located in Pinellas County in Largo, FL, and operated by Martin Marietta Specialty Components, Inc., manufactures specialized products for nuclear weapons and their associated systems. Martin Marietta took over operation of this plant from General Electric Neutron Devices in June 1992. Plant operations include the manufacture of neutron generators, lightning arrestor connectors, neutron tube loading, thermal and lithium ambient batteries, capacitors and super capacitors, encapsulated magnetics, frequency devices, neutron detectors, optoelectronics, and others.

The plant site consists of approximately 100 acres with 24 buildings. The plant is located in Pinellas County between the cities of Clearwater and St. Petersburg (figure 3.2.3-1). Pinellas County is located on a peninsula bordered by the Gulf of Mexico to the west and Tampa Bay to the east and south.

3.2.3.1 *Pinellas Plant Missions*

The mission of Pinellas is mainly devoted to DP activities and involves small volume production of nonnuclear components of selected technologies that require strict control of materials and processes in an ultraclean environment. This includes process development, design, production, testing, and laboratory functions for these components.

Pinellas' primary missions are:

- Fabrication and assembly of:
  - Neutron generators.
  - Cap assemblies.
  - Magnetics.
  - Optoelectronics devices.
  - Frequency devices.
  - Neutron detectors.
  - Transducers.
  - Support pads.
  - Ceramics.
  - Lightning arrestor connectors.
  - Specialty capacitors and switches.
  - Product testers.
  - Other small electronic components.
- Fabrication and procurement of thermal batteries.
- Performance of surveillance activities to ensure reliability of nuclear stockpile.
- Pollution prevention.
- Waste management.
- Storage of low-level radioactive material.
- Maintenance of process capability program.
- Development and production engineering support.

3.2.3.2 *Facility/Process Description*

The plant facility contains more than 700,000 ft^2 of manufacturing space, laboratories, offices, and support space. Figure 3.2.3-2 shows the Pinellas layout. Specific nonnuclear manufacturing activities at Pinellas are presented in table 3.2.3-1 A more detailed discussion of these activities is presented in appendix A, section A.3.

The workforce at the plant in September 1992 was 1,575 employees (DOE, 1993c).

Effluents and Emissions. During operations at Pinellas, small quantities of tritium (less than 1 curie per year) are discharged to the Pinellas County Sanitary Sewer System along with industrial and sanitary wastewater. The Industrial Wastewater Permit allows the plant to discharge up to 5 curies per year (PI DOE, 1992a). These releases and measured concentrations are discussed in section

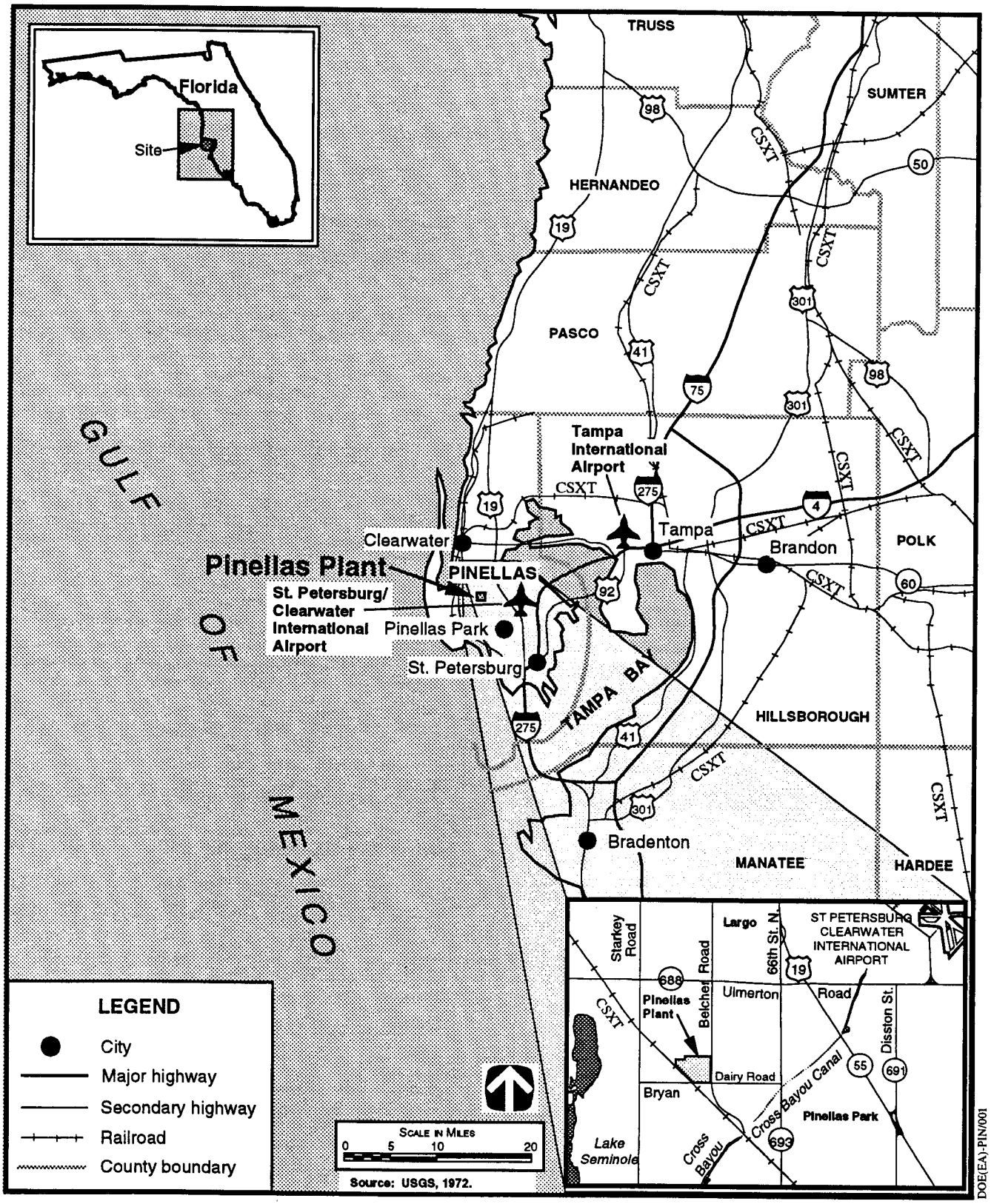

FIGURE 3.2.3–1.—*Pinellas Plant, Florida, and Region.*

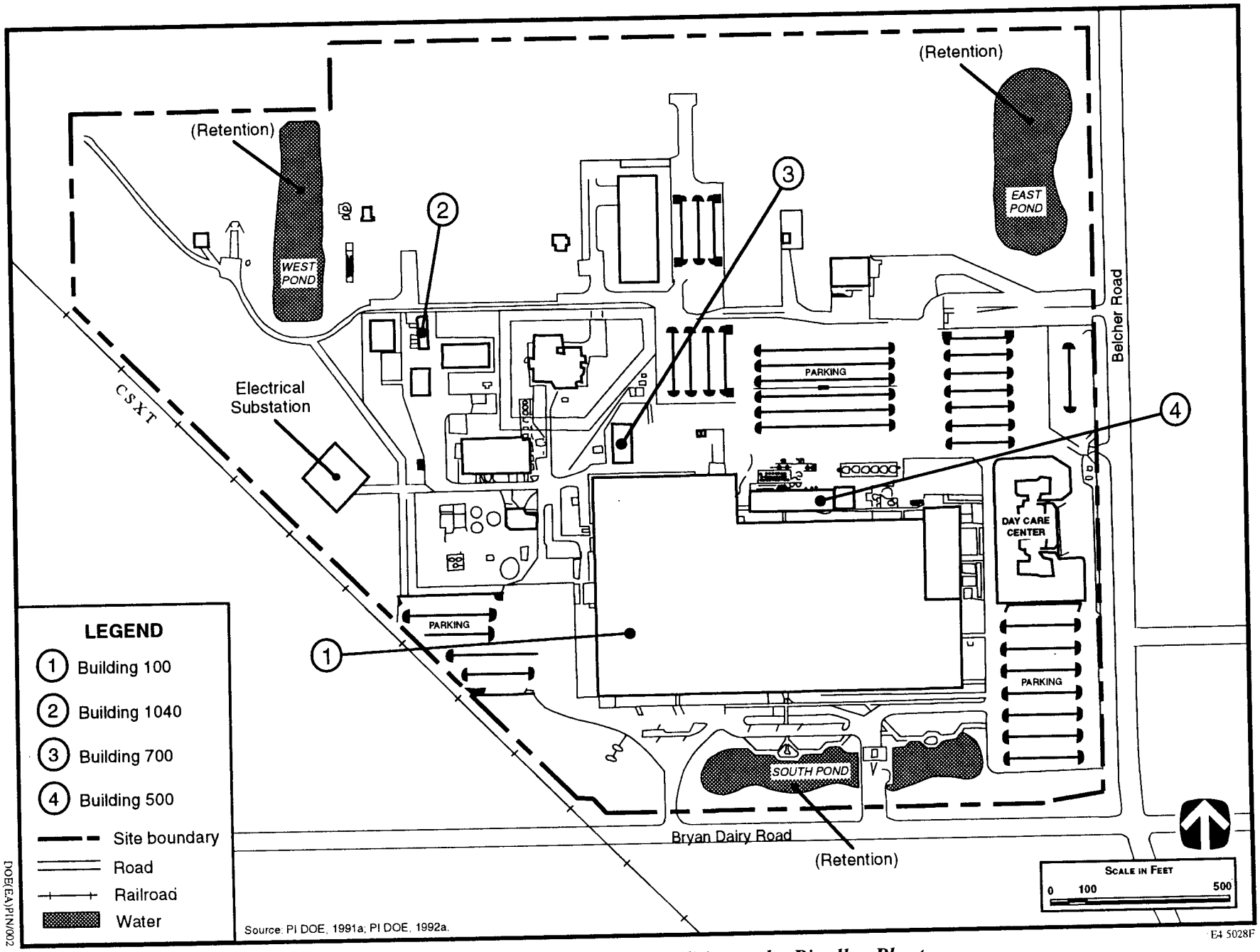

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FIGURE 3.2.3–2.—*Location of Facilities at the Pinellas Plant.*

TABLE 3.2.3–1.—*Pinellas Plant: Nonnuclear Manufacturing Activities Considered for Consolidation*

Neutron Generators, Cap Assemblies, & Batteries	
Thermal Batteries	Development and backup production capabilities for the manufacture of thermal batteries, a long shelf life battery that uses an exothermic (heat generating) chemical reaction to produce electricity.
Lithium Ambient Batteries	Activities involve procuring lithium anode cells commercially and then building them into battery assemblies.
Neutron Generators	Manufacture of neutron generators which provide a controlled source of neutrons.
Cap Assemblies	Manufacture of a weapons component used with gas transfer systems.
Electrical/Mechanical Products	
Neutron Detectors	Manufacture of electronic detectors used to verify the output of neutron generators in joint test assemblies.
Optoelectronics Assemblies	Manufacture of electrical devices using light rather than electrical conductivity to transfer information, perform switching functions, and act as sensors.
Lightning Arrestor Connectors	Manufacture and testing of electrical connectors for weapons cables that are designed to short circuit lightning strike pulses to ground.
Support Pads	Manufacture of molded pads that are used to protect weapons components within the weapon assembly.
Transducers	Manufacture of mechanical shock sensing devices used in weapons testing sequences.
Tritium Handling	
Neutron Tube Target Loading	Activities involve tritium loading (exposing materials to gaseous tritium) of targets for neutron generator tubes.

E4 3504

Source: KC ASAC, 1993b; SN DOE, 1992d.; LA FDI, 1992.

4.1.7.3. Pretreated industrial process wastewater and sanitary wastewater are discharged to the Pinellas County wastewater treatment facility in compliance with the Pinellas County Sewage System permit discharge limits. Wastewater effluents from current operations at Pinellas are discussed in section 4.1.7.3.

Normal operations at Pinellas release small amounts of tritium (less than 100 curies per year) to the atmosphere (PI DOE, 1992a). The tritium releases are discussed in section 4.1.7.2 and the associated health impacts are discussed in section 4.1.7.9. The main sources of criteria air pollutants at Pinellas are the manufacturing processes in Building 100. Buildings 500, 700, and 1040 are also sources. Hazardous/toxic air pollutants include acids, resin compounds, and common industrial solvents. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at Pinellas are discussed in section 4.1.7.2. The potential emission rates for these pollutants are discussed in appendix D, section D.2.1.3.

Safety and Accidents. The review of historical information at Pinellas indicated that, during the period 1986-1990, seven minor accidental releases occurred which resulted in material reaching offsite locations. These incidents caused no significant adverse impact. The chemical incidents involved the release of high pH industrial wastewater to the public sewer system on three occasions in 1990: 10,000 gal, 305 gal, and 400 gal. Neither CERCLA nor SARA regulate pH. Therefore, none of these releases was required to be reported under CERCLA or SARA. The radiological incidents were of a minor nature with no public impact. These incidents involved the release of 1.45 curies of gaseous tritium, 39 curies of radioactive Krypton gas, 27 curies of

unidentified airborne radioactive material, and approximately 1 curie, or 1.1 cubic centimeter, of tritiated water. These incidents were reported and investigated in accordance with DOE procedures. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned to start prior to the end of 1993 include:

- Renovation of the health physics drain system is planned for completion in 1993.

3.2.3.3 *Waste Management*

Waste operations at Pinellas involve management of three waste types: LLW, hazardous/toxic waste, and nonhazardous waste. Table 3.2.3-2 presents a summary of the 1991 waste generation at Pinellas. A detailed description of the waste stream generation processes/activities; onsite management, storage, and treatment capabilities; and ultimate disposition is presented in appendix A, section A.3.

Radioactive Waste Streams and Management. All radioactive waste generated at the plant is LLW. Systems and supporting equipment used to load neutron generators and other materials with tritium gas and laboratory analytical equipment are sources of tritium gas waste streams. Tritium is managed as aqueous, gaseous, and solid material.

The Tritium Recovery System is the onsite treatment facility that reduces gaseous tritium discharges. The primary source of tritium is from pumps in tritium processing systems. These are closed systems piped to the Tritium Recovery System. Since 1989, the Tritium Recovery System has converted residual tritium to tritiated water for disposal using a high-temperature converter that oxidizes the tritium gas and captures the resulting water in molecular sieve columns. The seive columns are shipped as solid LLW to SRS for disposal. Prior to 1989, the plant

TABLE 3.2.3–2.—*Pinellas Plant: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	49,555 gal	24,500 gal	b	Offsite
Solid	110 ft^3	a	c	Offsite
Nonhazardous				
Liquid	65,800,000 gal	None	110 MGY	Offsite-Sewer System Outfall
Solid	3,942 ft^3	None	None	Offsite
LLW				
Liquid	0 gal	30,000 gal	None	None
Solid	2,090 ft^3[a]	a	None	Offsite-DOE
Mixed				
Liquid	None	a	None	None
Solid			None	None

E4 3505

[a] Additional storage capacity can be made available depending on existing storage requirements, storage capacity, and permit conditions.

[b] Chemical treatment of water reactive metals (14 ft^3 of calcium materials or 4 ft^3 of lithium-contaminated solids in separative batch operations).

[c] Thermal treatment facility for explosives, maximum quantities treated at any one time are 2 pounds of heat powder and 1/8 pound of heat powder in the steel pan, and 10 squib charges in the cast iron vessel.

Source: PI DOE, 1992d.

was equipped with a stack effluent control system that performed the same function as the current system.

Areas using tritium are provided with drains connected to a storage tank facility consisting of three 10,000-gal tanks. Prior to releasing wastewater from these tanks, sampling and analysis are performed to verify that the contents are below the plant's as-low-as-reasonably-achievable level of 3,000 picocuries per liter (pCi/L) prior to discharge to the Industrial Wastewater Neutralization System. During the plant's operating history, this self-imposed level has never been exceeded.

Solid LLW is generated in small quantities and consists of scrapped equipment and by-products of decontamination, effluent control, analytical procedures, and scrapped product. Tritium-contaminated compactible solid waste consisting mostly of paper products and protective clothing are compacted directly in DOT Specification 17C 55-gal steel drums with a hydraulic drum compactor. Because Pinellas does not have a long-term storage capacity, solid LLW generated at the plant site is shipped to the SRS burial site for final disposal. As of November 1992, the current inventory of LLW at Pinellas was 1,345 ft^3 or 183 drums (PI DOE, 1992d). The holding period for this waste at Pinellas is less than one year. Solid LLW generation volumes are shown in appendix A, section A.3.

Mixed Waste. Pinellas does not routinely generate mixed waste. Controls are in place to minimize the potential for generation of such waste.

Hazardous/Toxic Waste Streams and Management. Hazardous/toxic waste generated at Pinellas consists of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; spent electroplating strippers; flammable solids and liquids; lithium silica and thermal batteries; aqueous and solid wastes contaminated with heavy metals; off-specification new materials; sludges; and lab packs.

Pinellas has an approved RCRA Part B permit composed of two separate permits administered by the Florida Department of Environmental Regulation and EPA. Each of the hazardous waste storage and treatment activities described below are covered by the RCRA permit.

Hazardous waste operations consist of storage and treatment units. Appendix A, section A.3 describes in detail the hazardous waste container and tank storage units at Pinellas. Included are two 5,000- and one 2,000-gal storage tanks, and a container storage building. Hazardous wastes are not permanently stored or disposed of at Pinellas.

Annually, Pinellas manifests and ships approximately 400 drums of hazardous/toxic waste (including laboratory wastes) and 3,500 gal of ignitable hazardous waste, under contract with DOT-registered transporters for offsite disposal at commercial RCRA-permitted disposal facilities and DOE sites (PI DOE, 1992d). Appendix A, section A.3 shows the offsite disposition of the hazardous wastes, and provides quantities of hazardous wastes shipped offsite in 1992.

Pinellas has a program to monitor the offsite management of its hazardous wastes by commercial facilities on a regular basis. The contractor facilities are inspected by Pinellas waste management personnel.

There are no approved commercial facilities available to treat Pinellas' explosive wastes; therefore, RCRA-permitted onsite open burn thermal treatment is provided for the chemical and thermal treatment of reactive and Class C explosive materials. Pinellas is currently operating in accordance with the plant's hazardous waste operating permit and interim status under 40 CFR Subpart X for open burning/open detonation of heat powder, heat paper, and small charge Class C explosives. The materials undergoing thermal treatment include heat powder (iron shavings and potassium perchlorate), heat paper (metallic

zirconium and barium chromate), and explosive primer components.

The heat powder, heat paper, and squibs are generated from production of thermal batteries. They are burned in a specially designed stainless steel pan. The powder or pellets are burned in 2-lb batches using a small amount of petroleum to initiate the burn. The residue from this process is disposed offsite as nonhazardous waste. Heat paper is treated in the same manner as heat powder, except the residue which contains barium and chromium is collected and disposed of offsite as hazardous waste. Annually, fewer than 100 lb of explosive wastes are burned onsite.

The Reactive Metals Treatment facility is used for the reaction of calcium metal, calcium bimetal and lithium-contaminated solids, which are hazardous because of reactivity. The calcium metal and bimetal are off-specification materials from laboratory and production areas. The lithium-contaminated solids (finger cots, paper wipes, and gloves) are generated from the production and inspection of thermal batteries. The metal residue from the reaction vessels is nonhazardous and is disposed of as solid waste at the local sanitary landfill.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes such as scrap metal and cardboard are segregated and recycled whenever possible. Trash is accumulated onsite and taken to the local sanitary landfill. In Pinellas County, the burnable trash is incinerated at the "Refuse-to-Energy Plant" while recyclable trash is separated and recycled.

3.2.3.4 *Utility and Resource Requirements*

Pinellas resource requirements are summarized in table 3.2.3-3. Electric power is purchased from Florida Power Corporation. Emergency service is provided by four diesel-engine-driven generators. One-third of the emergency power is used for emergency lighting and the balance serves critical building services and process loads (PI GE, 1986).

The only water used at the plant is supplied by the Pinellas County Water System. Process equipment cooling water is supplied by 15 operating equipment cooling water recirculators that range in size from 6 to 100 gpm. A deionized water distribution system has a capacity of 345,600 GPD (PI GE, 1986).

Pinellas uses four types of gas systems in production activities. The cryogenic gases used are hydrogen, nitrogen, argon, and liquid oxygen.

Fuel types at Pinellas include natural gas, #2 fuel oil, and gasoline. The regular use of natural gas was eliminated in 1983 after the installation of three heat pumps; however, a backup boiler using natural gas is still maintained. The #2 fuel oil is used for the boiler and emergency diesel generators (PI GE, 1986).

The amount of stored chemicals is being reduced because of decreased production schedules, pollution prevention and awareness programs, and waste minimization programs. The present chemical storage area is adequate for the Pinellas mission (PI DOE, 1992b).

TABLE 3.2.3–3.—*Pinellas Plant: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	150,000 kWh	8,700 kW	17,200 kW
Natural Gas	1,500 ft^3	9,200 ft^3/hr	9,220 ft^3/hr
Water	135,000 gal	200 gpm	900 gpm
Chemical Resources	**Total Annual Consumption**		**Storage Capacity**
Nitrogen	1,500,000 gal		48,000 gal
Argon	225,000 gal		12,200 gal
Helium	unknown		unknown
Hydrogen	78,000 gal		20,000 gal
Oxygen	1,200 gal		600 gal

E4 3511

Table assumes that Pinellas operates 365 days per year.

Source: PI DOE, 1992d.

3.2.4 Rocky Flats Plant

RFP is located in northern Jefferson County, CO, approximately 16 miles northwest of downtown Denver (figure 3.2.4-1). Other nearby communities include Boulder, Arvada, and Golden. The main plant shown in figure 3.2.4-2 is a 384-acre complex consisting of manufacturing, chemical processing, laboratory, and support facilities. It is situated within a 6,550-acre natural preserve which functions as the plant's buffer zone. Currently, RFP has 3,000,000 ft^2 of floor space in 436 buildings and facilities.

3.2.4.1 *Rocky Flats Plant Missions*

Since it began operation, the primary mission of RFP has been to fabricate the plutonium components (or "pits") for nuclear weapons and to carry out associated plutonium processing and waste management activities. RFP also has been engaged in the manufacture of non-plutonium components for weapons from materials such as stainless steel and beryllium. The principal nonnuclear manufacturing operations performed at RFP are metal forging, fabrication, assembly, and chemical processing. There also is heavy emphasis on production-related research.

Due to the evolving role of Rocky Flats, the primary mission has become a combination of the following actions:

- Stabilize materials for storage and shipment.
- Store and transport special nuclear materials.
- Provide special nuclear materials safeguards, security, and surveillance.
- Maintain an analytical laboratory within the Complex.
- Transition to prepare for D&D of four major plutonium handling buildings.
- Process and ship existing wastes and residues.
- Monitor site for environmental compliance.
- Continue environmental restoration and waste management activities.

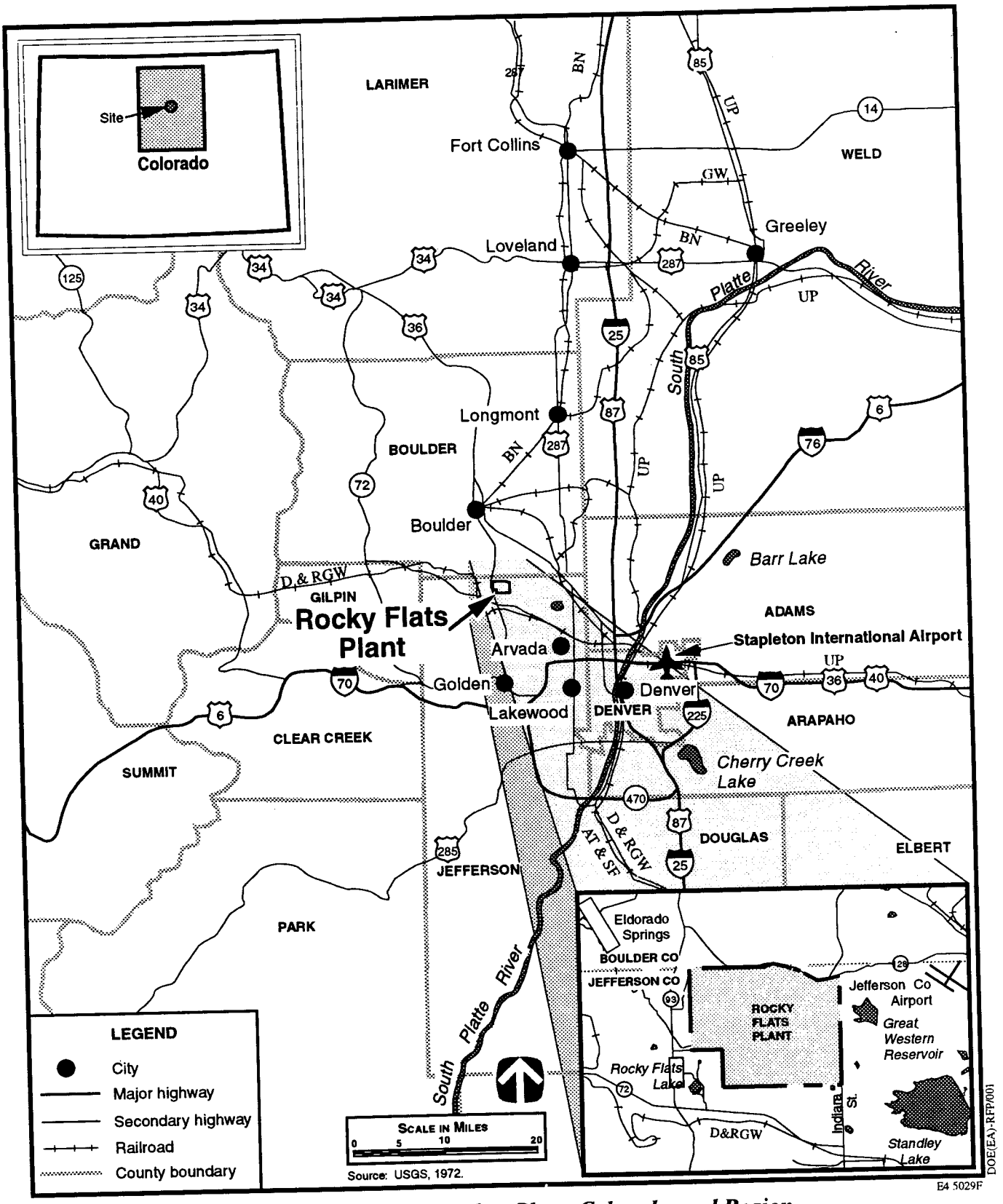

FIGURE 3.2.4–1.—*Rocky Flats Plant, Colorado, and Region.*

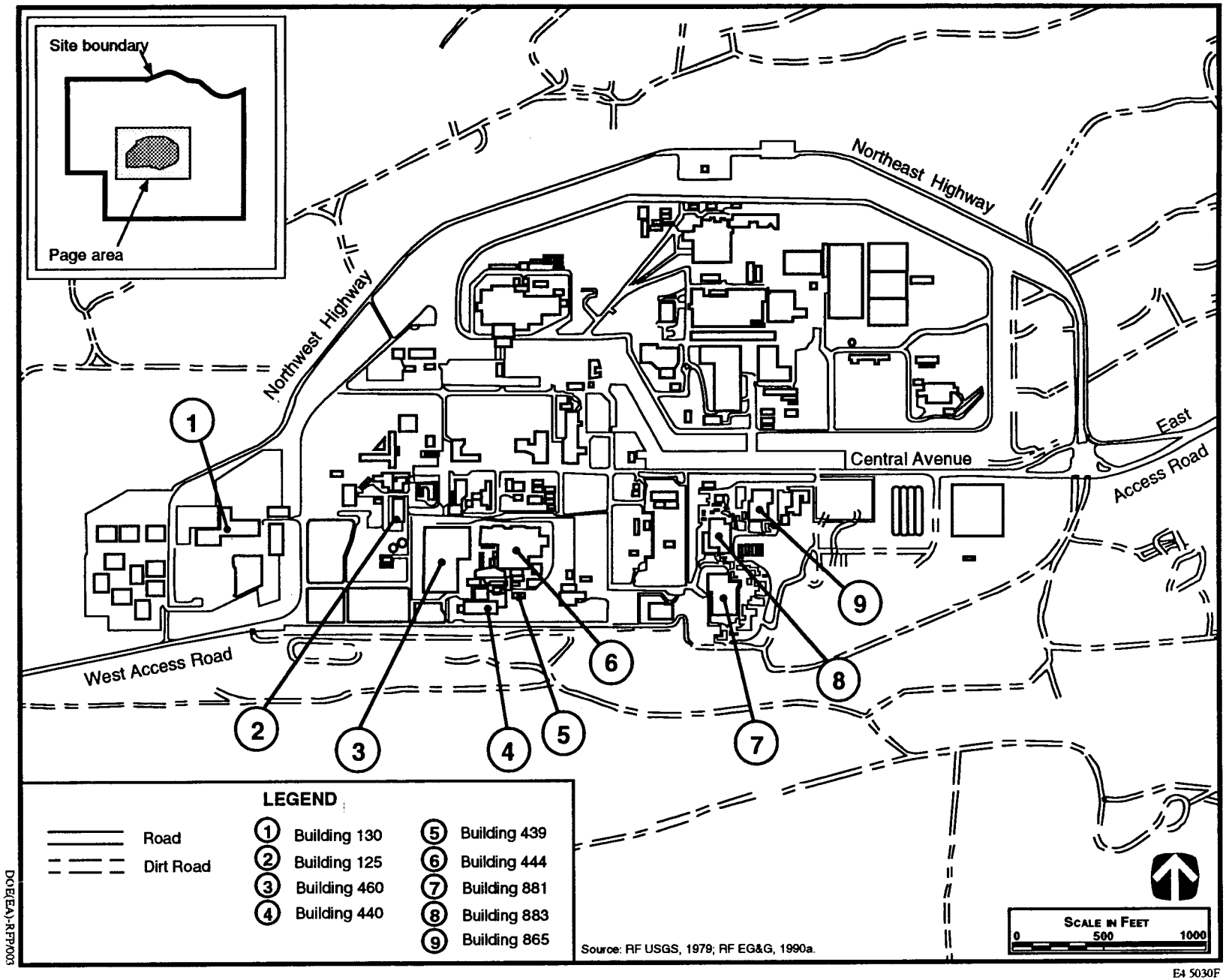

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FIGURE 3.2.4–2.—*Location of Facilities at the Rocky Flats Plant.*

- Support the transfer to LANL of functions associated with the Stockpile Surveillance Program.

- Maintain the Complex plutonium component production capability in a contingency status.

DOE has prepared a Transition Plan apprising the Congress about proposed mission plan changes from weapons production to remediation and environmental cleanup for RFP.

3.2.4.2 *Facility/Process Description*

Nonnuclear manufacturing and support activities are located in Buildings 125, 130, 439, 440, 444, 460, 865, and 881 (figure 3.2.4-2). The nonnuclear activities occupy approximately 445,000 ft^2 of space, including 60,000 ft^2 of outside storage space. With reduced workloads, this amount of space is expected to be reduced by approximately one-half (RF DOE, 1992a). The Rocky Flats Transition Plan proposed to declare nonnuclear manufacturing and support Buildings 439, 440, 444, 460, 865, and 883 as surplus as a result of relocating RFP's nonnuclear manufacturing activities (RF DOE, 1992b).

Nonnuclear manufacturing activities at RFP are listed in table 3.2.4-1. A more detailed discussion of these activities is contained in appendix A, section A.4.

As of September 1992, RFP employed 7,299 workers (DOE, 1993c).

Effluents and Emissions. Activities that are the subject of this EA do not, under normal operating conditions, release radioactive water pollutants. Wastewater effluents from RFP processing activities are treated separately and are used for process make-up water. A small fraction (approximately 3 percent) of the effluent discharged from the sewage treatment plant is comprised of make-up water. Sanitary wastewater is treated at the sewage treatment plant

TABLE 3.2.4–1.—*Rocky Flats Plant: Nonnuclear Manufacturing Activities Considered for Consolidation*

Electrical/Mechanical Products	
Reservoirs	Manufacture, assembly, and shipping of weapon gas stainless steel reservoir assemblies.
Special Products	
Safe Secure Trailers	Manufacture, repair, and refurbishment of safe and secure highway semi-tractor trailers used to transport weapon components and material.
Weapon Trainer Shop	Activity providing weapon component and assembly illustrations as well as display and instructional models for use within the Complex and the Department of Defense (DOD).
Metrology Services	Activity involving the calibration of dimensional standards such as thread gauges, height blocks, comparator charts, special design gauges, surface plates, and optical flats.
Nuclear Grade Steels/Oxnard	Activity involving the procurement, certification, and storage of bulk stock for a variety of metals for the Complex.
Beryllium Technology & Pit Support	
Beryllium Technology	Activity involving the machining, melting, atomizing, and forming of beryllium metal.
Pit Support Functions	Activity involving the machining and joining of various pit components.

E4 3509

Source: KC ASAC, 1993b; LA FDI, 1992.

and discharged to Pond B-3 located on South Walnut Creek. Stormwater runoff from the plant is conveyed by several ditches and culverts to the terminal ponds (A-4, B-5, and C-2) located on the east side of the buffer zone. The ponds restrict offsite discharges and allow water testing and, if necessary, treatment to meet water quality standards. Water is transferred from Pond B-5 to Pond A-4. Pond A-4 water is released to Walnut Creek in compliance with NPDES permit discharge limits. Water from Pond C-2 is transferred to the Broomfield Diversion Ditch located east of the plant boundary or, in an emergency, to Ponds A-4 or B-5. Discharges into Walnut Creek from Pond A-4 contain radionuclides, but are in compliance with NPDES permit discharge limits and meet applicable water quality standards. Water effluents from current operations at RFP are discussed in section 4.1.8.3.

Activities which are the subject of this EA do not, under normal operating conditions, release radioactive air pollutants to the environment. The major sources of criteria pollutants at RFP are the steam plant boilers. Other sources include various small boilers, diesel generators, and various manufacturing operations. Hazardous/toxic air pollutant sources include laboratories and manufacturing facilities. RFP hazardous/toxic air pollutants include beryllium, carbon tetrachloride (CCl_4), hydrocarbon vapors, trichlorotrifluoroethane, and ammonia. Only trace amounts of beryllium are released at RFP. The beryllium emissions in 1990 were 8.2 grams per year compared to the state daily limit of 10 grams over a 24-hour period. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at RFP are discussed in section 4.1.8.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.4.

Safety and Accidents. The review of historical information at RFP indicated that during the period 1986-1990, five known incidents of offsite contamination occurred as a result of accidental releases. However, these incidents resulted in no significant adverse impact. All involved the release of radiological material and were not associated with the activities that are the subject of this EA. The incidents were as follows: in 1988, an employee was contaminated and contamination was found in his automobile; in 1989, contamination was found in a rail car from RFP at the DOE Pantex Plant, and contaminated boxes were found in a rail car from RFP at the DOE Idaho National Engineering Laboratory (INEL); and, in 1990, a contaminated electric motor was discovered in an offsite warehouse and four contaminated static strip inverters were discovered in another offsite warehouse. These incidents were reported and investigated. Lessons learned were applied, appropriate correction actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. The ES&H projects (DOE, 1992i) at RFP nonnuclear manufacturing facilities that are planned to start prior to the end of 1993 include the following. These projects may be modified as a result of continuing transition planning:

- Replace or modify fire and security alarm systems in nearly all buildings at RFP to bring these facilities up to current DOE orders and National Fire Protection Association standards. This project is planned to be completed in 1998.

- Upgrade, refurbish, or replace facilities and utility systems in manufacturing and support buildings. Included in this project is the restoration of HVAC systems for 26 nonnuclear manufacturing and support buildings, electrical power distribution equipment in approximately 30 primarily nonnuclear manufacturing buildings, replacement of a water treatment plant, and modification to the Plant Data Acquisition and

Control System. Completion of this project is planned for 1998.

- Provide complete fire protection packages for seven laboratories and buildings including installation of automatic sprinklers and a fire suppression system to meet DOE orders. Completion of this project is planned for 1993.

- Provide sampling port toxic air monitoring system capable of operating continuously without a full-time operator. Completion of this project is planned for 1996.

3.2.4.3 *Waste Management*

Waste management operations at RFP involve management of six broad waste types: TRU waste, LLW, mixed waste, residues, hazardous/toxic waste, and nonhazardous wastes. Because there are no TRU wastes or residues associated with any of the proposed activities that would be consolidated, there is no discussion of TRU waste or residue in this EA. However, disposal of existing TRU waste and residues, and waste generated as a result of transition activities, would be addressed in the Rocky Flats Transition Plan. Table 3.2.4-2 presents a summary of the 1991 waste generation at RFP. Appendix A, section A.4 addresses the principal RFP treatment facilities and the categories of waste treated.

Radioactive Waste Streams and Management. Approximately 1,430 gal/yr of liquid LLW and 38,880 ft^3/yr of solid LLW were generated in 1991 from activities at RFP. Liquid LLW streams generated from laundry wastewater, plant waste, pond water, and effluent from precipitation processes are treated by the evaporation process located in Building 374. The sewage sludge solid byproduct of the sanitary wastewater treatment process is currently identified and managed as LLW. The sludge produced is dried, packaged, and currently stored onsite pending approval for offsite disposal at NTS. NTS has approved the shipment of LLW from Building 559. Shipment of LLW from other buildings could follow after inspection by NTS personnel to ensure that the LLW meets the NTS waste acceptance criteria. In 1993, approximately 83,686 ft^3 of LLW are planned to be shipped offsite. All waste forms must be certified before they may be shipped.

Mixed Waste. RFP's RCRA permits specify storage locations and volume limits for low-level mixed waste stored onsite. Currently, RFP-permitted storage capacity for low-level mixed waste is 710,548 ft^3 including interim status units currently storing pondcrete and saltcrete. Pondcrete is a solidified mixture of (waste) sludge from solar ponds and Portland cement. Saltcrete is the low-level mixed waste form originating from the low-level wastewater evaporation system. The brine resulting from concentration of wastewater by the evaporator is dried to low-level mixed salt and then remixed with brine and Portland cement. The result is the solid waste form saltcrete, which is packaged for shipment and disposal in plywood boxes (RF DOE, 1991b).

The construction of new waste storage buildings is being considered to consolidate waste storage and improve efficiency. A new 25,000 ft^2 centralized waste storage facility, which would consolidate low-level, low-level mixed, and hazardous wastes, is scheduled to be completed in April 1994. An additional 19,440 ft^3 of low-level mixed waste storage capacity would be available, allowing RFP to extend permitted storage capacity well beyond 1994 (RF DOE, 1991b).

Low-level mixed shipments to NTS were suspended in May 1990 when the RCRA Land Disposal Restriction went into effect. Permits pertaining to shipments of this waste to NTS have been submitted; however, action is still pending with the State of Nevada. RFP is currently developing a compliance agreement with the State of Colorado to stipulate the provisions for the storage of Land Disposal Restriction mixed wastes at RFP pending the

TABLE 3.2.4–2.—*Rocky Flats Plant: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	5,005 gal	e,f	None	Offsite
Solid	1,090 ft^3	9,280 [f,g]	None	Offsite
Nonhazardous				
Liquid	55,200,000 gal [b]	f	150 MGY	Onsite
Solid	268,000 ft^3 [c,d]	None	None	Onsite
LLW				
Liquid	1,430 gal	27,674 gal[f]	h	None
Solid	38,880 ft^3	160,272 ft^3 [f]	None	Offsite-DOE
Mixed				
Liquid[a]	13,859,700 gal	e	13,700,000 gal/yr[i]	None
Solid	19,170 ft^3	728,776 ft^3 [g]	None	None

E4 3507

[a] Liquid wastes are stored and/or treated at RFP. "Stored" liquid wastes are placed in drums, or other containers, and held for later disposal. "Treated" liquid wastes are aqueous wastes which are piped or trucked to treatment facilities (Buildings 374 anc 774) for treatment. Treated liquid wastes are considered low-level mixed wastes and may be comprised of many waste types (e.g., LLW, low-level mixed waste, hazardous, and/or nonhazardous) collected from several locations on the plant site (i.e., laundry, production, utilities, and solar ponds).

[b] This is the quantity of water processed by the wastewater treatment plant.

[c] There are no validated data showing the amount of waste that was disposed of in the landfill during 1991. This quantity is a back estimate based on quantities generated during November 1992 to January 1993. It is believed by the operators of the landfill that this is a reasonable estimate of nonhazardous solid waste disposed of in 1991.

[d] In addition, approximately 465,000 pounds (approximately to 2,280 ft^3) of paper was recycled during this year.

[e] This capacity included with storage capacity for Hazardous/Toxic solids.

[f] Additional storage capacity can be made available depending on existing storage requirements, storage capacity, and permit conditions.

[g] This capacity represents 1991 end-of-year quantity in storage.

[h] This capacity is included with Treatment Capacity for Mixed Liquid.

[i] Treatment of process wastewater is based on the operating capability of the evaporator which is 2,100 gallons per hour.

Source: RF DOE, 1992a.

development of treatment and disposal facilities for these wastes.

Hazardous/Toxic Waste Streams and Management. Excluding related maintenance and utility activities, 5,005 gal of liquid hazardous/toxic waste and 1,090 ft^3 of solid hazardous/toxic waste were generated in 1991. The hazardous waste consisted of spent solvents, solvent-contaminated combustibles, waste oils, and paint products. RFP has a hazardous waste permit storage capacity of 9,280 ft^3. RFP does not dispose of hazardous/toxic wastes on the plant site. All hazardous/toxic wastes are manifested and shipped offsite under contract with DOT-registered transporters to commercial RCRA- or TSCA-permitted disposal facilities. RFP has a program to monitor the offsite management of its hazardous waste by commercial facilities on a regular basis.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. The amount of recycled paper

from all of RFP in 1990 was 141 tons, a 23 percent increase from 1989. Scrap metal sales in 1990 included steel, aluminum, copper, and lead.

The onsite sanitary landfill accepts all nonhazardous, nonradioactive solid waste generated at RFP. The present landfill, which began operations in 1968, will discontinue operations when the new landfill is opened. Closure of the current landfill is a requirement of an interagency agreement. A site for the new landfill has been recommended by the preliminary conceptual design document. Construction of the first cell is scheduled to begin in March 1994, with completion scheduled for February 1995. A total of four cells will be constructed, each with an expected life of 5 years.

Sanitary liquid sewage wastes from plant cafeterias, lavatory sinks, toilets, showers, and other drains located outside of the process areas are treated in the onsite sewage treatment plant using an activated sludge process. The treatment plant discharges onsite to Pond B-3.

3.2.4.4 *Utility and Resource Requirements*

Most plant utility needs are filled by combinations of under- and above-ground utilities, which provide for water, electrical, steam, and condensate-return lines and sanitary sewer piping. The majority of the RFP utility systems are 30 years old and their conditions vary. Existing resource requirements are summarized in table 3.2.4-3.

The RFP site is provided with electrical power through four primary 115-kV Public Service of Colorado feeder lines that connect to RFP through a ring bus. The existing RFP substations are designed to support 34.5 megavoltamperes (MVA). A current project will remove the 7.5-MVA substation and replace two existing 5-MVA substations with a single 21-MVA substation. This project will increase the RFP capacity to 38-MVA continuous with 64.4-MVA peaks. Current peak electrical demand is 26-MVA. No new lines from Public Service Company are currently planned for the RFP electrical distribution system.

The RFP site has limited groundwater sources within the plant complex and obtains all water through the Denver Municipal Water District. The district supplies 139 million gal of water annually (318,000 GPD average consumption) with unguaranteed supply to 1.5 million gallons per day (MGD). The water treatment facility can process 1 MGD.

Existing chemical storage facilities for solid, liquid, and gaseous chemicals are adequate for the current RFP mission.

TABLE 3.2.4–3.—*Rocky Flats Plant: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	504,000 kWh	26,000 kW	38,000 kW
Natural Gas	1,900,000 ft^3	117,000 ft^3/hr	188,000 ft^3/hr
Water	318,000 gal	400 gpm	1,000 gpm
Chemical Resources	**Total Annual Consumption**		**Storage Capacity**
Nitrogen	12,230,000 gal		120,000 gal
Argon	17,500,000 ft^3		20,800 ft^3
Helium	1,700,000 ft^3		122,000 ft^3
Hydrogen	0 ft^3		0 ft^3

E4 3510

Table assumes that RFP operates 365 days per year.

Source: RF DOE, 1992a.

RFP has an extensive domestic wastewater treatment system consisting of primary, secondary, and tertiary treatment using an activated sludge process. The wastewater treatment system has a treatment capacity of 480,000 GPD and processes an average of 250,000 GPD. The domestic wastewater treatment system is separated from the process industrial wastewater treatment system to preclude contaminating local water sources. All plant effluents are monitored to detect unauthorized releases through the sanitary sewage system, with water diversion and retention and holding facilities to recycle through the liquid waste treatment system if necessary.

The existing Western Natural Gas Pipeline is adequately sized for the future. The current supply is on an interruptible basis which would have to be changed if any new facilities are built with gas heating.

3.2.5 Savannah River Site

SRS occupies a 300-square-mile area 12 miles south of Aiken, SC, and approximately 16 miles southeast of Augusta, GA (figures 3.2.5-1 and 3.2.5-2). SRS contains 15 major production, service, and research and development (R&D) areas capable of supporting nuclear materials production and processing operations.

3.2.5.1 *Savannah River Site Missions*

The primary SRS mission is to produce tritium and special nuclear materials for national defense. The site is operated by Westinghouse Savannah River Company (WSRC), Inc., under contract to DOE.

SRS' primary missions are:

- Production of nuclear materials for weapons.
- Production of other isotopes for both weapons R&D and nonweapons applications.
- Supporting the viability of the stockpile through recycle of limited-life components.
- Processing and storage of nuclear materials.
- Pollution prevention.
- Waste management.
- Heavy water recovery and purification.
- Nonweapons work.
- Californium sources.
- Maintaining process capability program.

3.2.5.2 *Facilities/Process Description*

SRS contains more than 3,000 facilities, including 740 buildings with 5.5 million ft^2 of floor area. Current operating facilities include the production reactors, a fuel and target fabrication plant, chemical separation plants, and the Savannah River Technology Center (an applied research and development center that provides technical support for all major activities and operating facilities). Operating areas are generally classified as Reactor Materials, Heavy Water, Reactor, Waste Management, Defense Waste Processing, and, of particular interest for nonnuclear operations, Separations (the 200 Area). The Separations Area, further subdivided into the 200-F and 200-H areas, contains approximately 17 major facilities. The key facilities from the tritium-handling standpoint are discussed below.

The Extraction and Tritium Purification Facility (Building 232-H) contains the tritium target processing equipment. After irradiation in the

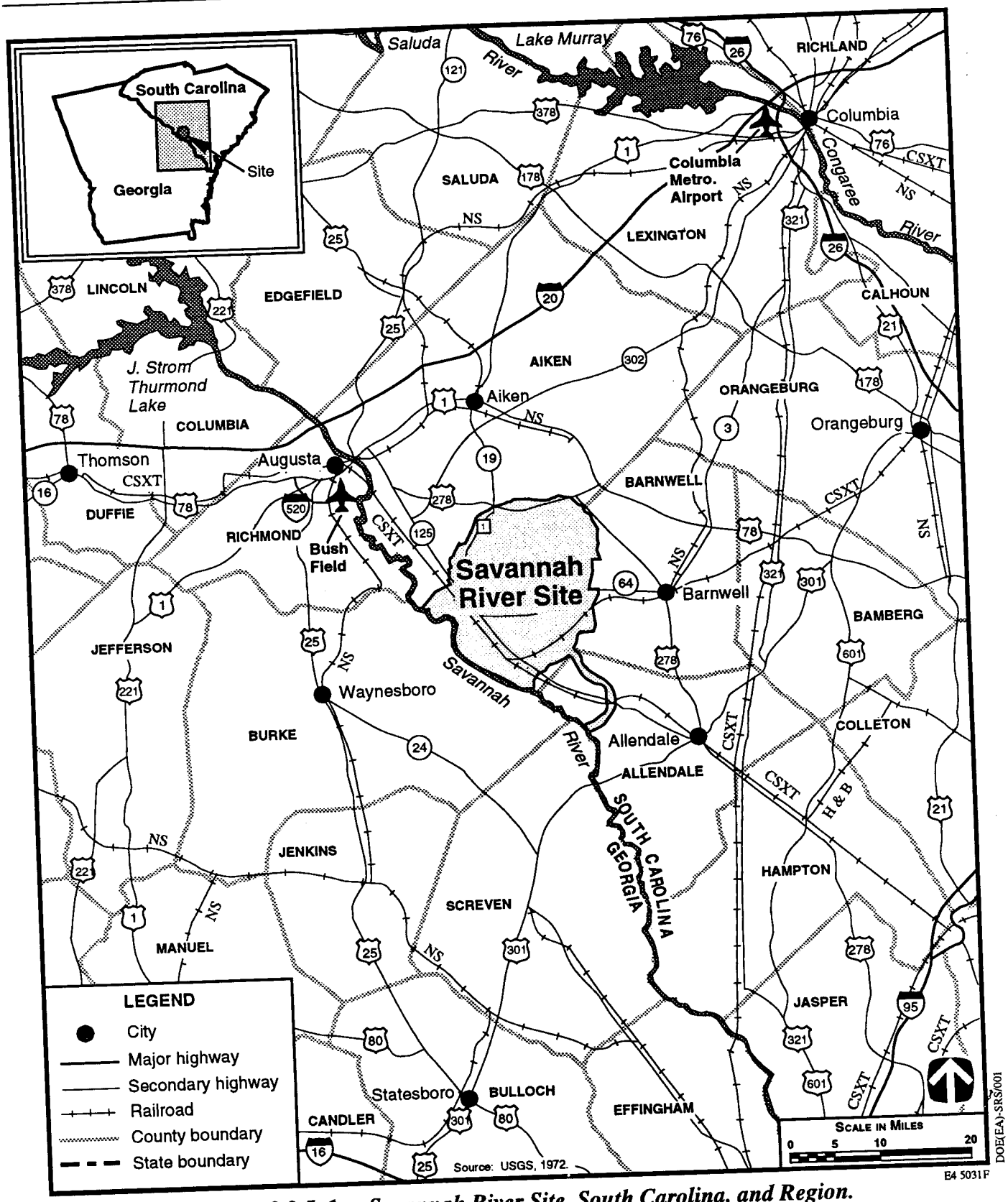

FIGURE 3.2.5–1.—*Savannah River Site, South Carolina, and Region.*

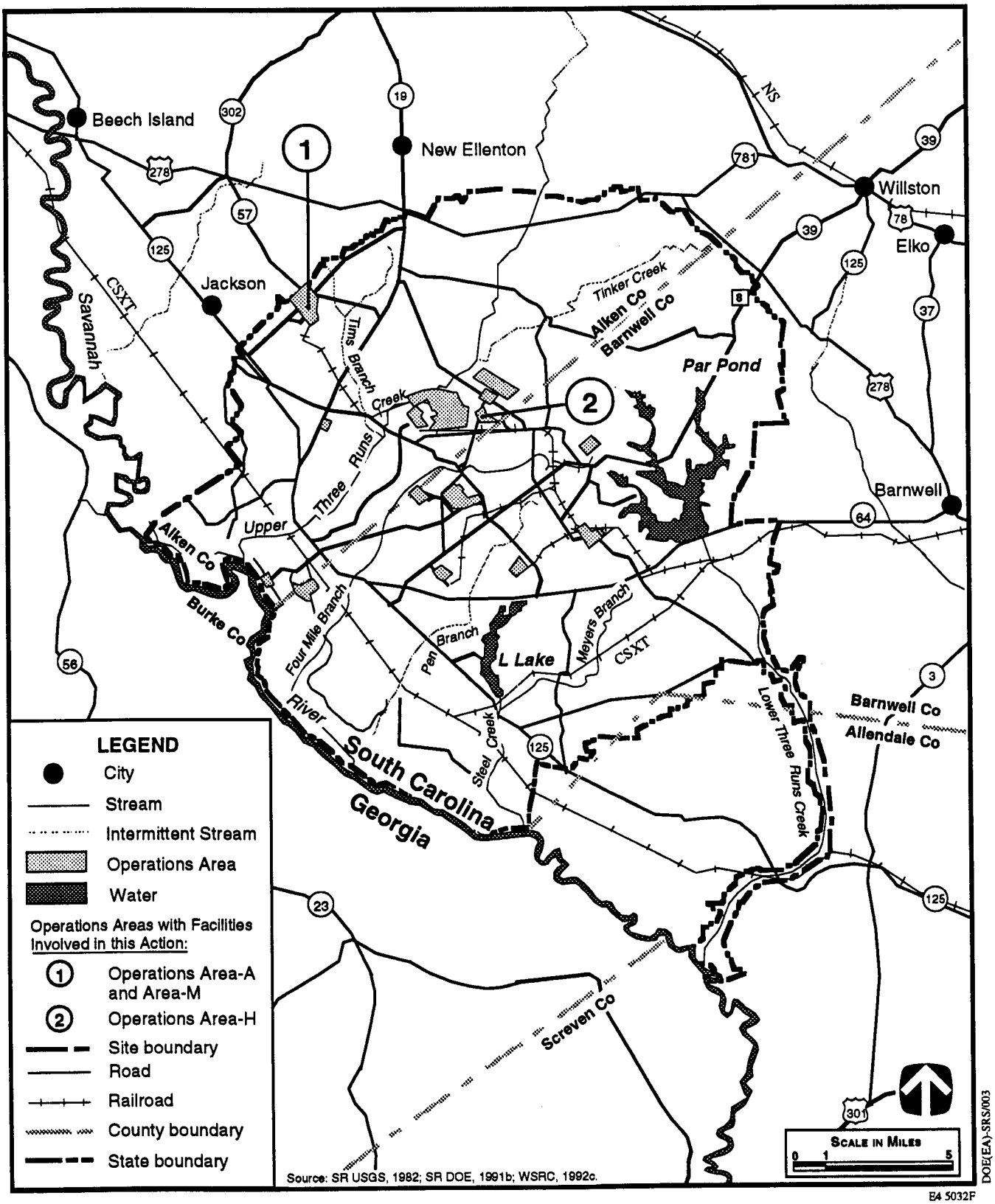

FIGURE 3.2.5–2.—*Location of Operations Areas at the Savannah River Site.*

reactor, followed by appropriate cooling and disassembly, targets are processed to provide virgin tritium. Building 234-H receives tritium from Building 232-H for reservoir filling, packaging, and shipment to support the weapons stockpile. This facility also empties reservoirs returned from the field to recover and purify tritium for reuse.

Starting in late 1993, the new Replacement Tritium Facility (RTF), Building 233-H, would assume the tritium processing functions of Building 234-H. The RTF incorporates state-of-the-art technology for tritium storage, enrichment, and pumping to enhance safeguards and security and to prevent significant tritium losses to the environment. All process operations are located within the reinforced concrete, underground, seismic-resistant structure. Process equipment and operations are contained within nitrogen-blanketed glove boxes for secondary confinement. Stripper systems remove tritium from the recirculating nitrogen in the glove boxes if a process leak occurs.

The Materials Test Facility, also located in Building 232-H, conducts life storage of filled reservoirs, metallography, and reservoir failure analysis. The reclamation facility, located in Building 238-H, rebuilds used reservoirs for the stockpile. If the reservoirs were not reclaimed they would be disposed of as radioactive waste.

The workforce at SRS in September 1992 was 21,478 employees (DOE, 1993c).

Effluents and Emissions. SRS discharges wastewater into Savannah River via onsite tributaries under a site NPDES permit. These discharges include cooling water effluent from the reactor and pretreated domestic and industrial wastewater, some of which contains small amounts of radioactive and nonradioactive contaminants. Water effluents from current operations at SRS are discussed in section 4.1.2.3.

Normal SRS production operations routinely release trace quantities of tritium to the atmosphere. The tritium releases are discussed in section 4.1.2.2 and the associated health impacts are discussed in section 4.1.2.9. The major sources of criteria air pollutants at SRS are the nine coal burning and four fuel-oil burning boilers that produce steam and electricity; and fuel and target fabrication and power facilities. Other emissions include fugitive particulate emissions from coal piles and coal processing facilities and vehicles. Hazardous/toxic air pollutant sources include the various SRS operations. Hazardous/toxic air pollutant emissions include trichlorotrifluoroethane, nitric acid, and TCA. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at SRS are discussed in section 4.1.2.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.5.

Safety and Accidents. The review of historical information at SRS indicated that during the period 1986-1990, three accidental chemical releases occurred and were reported under the requirements of CERCLA and SARA because of the quantities released. These included the release of 2 to 3 gal of wastewater treatment sludge in 1986 and two incidents in 1989 involving the release of acidic wastewater with trace amounts of radioactivity and high-level waste (HLW) to the soil. However, these incidents resulted in no significant adverse impacts. Of the numerous releases of radioactive materials, 18 were associated with tritium production and handling activities. However, none of these releases resulted in a significant offsite impact. These incidents resulted in approximately 210,000 curies of tritium being released to the environment. The largest release, 172,000 curies, occurred in 1987 and was from the separations area stack. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1991h and 1992i) planned to start prior to the end of 1993 have been identified for the H-Area tritium-

handling facilities. A brief description of the projects follows:

- SRS plans to provide a permanent prefabricated building in the H-Area for 10 to 15 portal monitors to scan personnel for low levels of radioactive contamination. This action will help ensure SRS compliance with DOE Order 5480.11, which requires determinations and documentation of personnel radiation exposure. The building will have additional space for heath physics support contamination response, a fast scan unit, dosimeter issuance, and maintenance needs. This project is planned for completion in 1994.

The remaining projects are planned for completion in 1993.

- Sanitary wastewater treatment capacity will be increased by 80,000 GPD in the H-Area by the installation of a new equalization basin and wastewater treatment plant.

- Another H-Area improvement in the processing of sanitary wastewater calls for the installation of a new lift station with a large wet well and four pumps to handle the increased flow.

- A temperature-controlled, covered access corridor between Buildings 233-H and 234-H will connect the new facility (233-H) to the existing facility.

3.2.5.3 *Waste Management*

Waste management operations at SRS consist of six broad waste types: HLW, TRU, LLW, mixed waste, hazardous/toxic waste, and nonhazardous waste. Because there is no HLW or TRU waste associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of HLW or TRU waste generation and management. Table 3.2.5-1 presents the 1991 waste generation at SRS.

TABLE 3.2.5–1.—*Savannah River Site: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic			None	Offsite
Liquid	0	22,382 ft^3		
Solid	3,100 ft^3			
Nonhazardous				
Liquid	185,000,000 gal	None	32.9 MGY	NPDES Outfall
Solid	753,000 ft^3 [a]	None	None	Onsite Landfill
LLW				
Liquid	20,092,080 gal	None	78,840,000 gal/yr	None
Solid	763,732 ft^3	None	3,177,000 ft^3/yr	Onsite Burial
Mixed				
Liquid	47,427gal	None	1,161,600 gal/yr	None
Solid	1,169 ft^3	157,500 ft^3	1,050,000 ft^3/yr	None

E4 3921

[a] Following compaction; original volume 3,011,000 ft^3.

Source: DOE, 1991c and g; SR DOE, 1992a.

Radioactive Waste Streams and Management. The following materials are examples of solid LLW that are routinely handled:

- Operating and laboratory waste: small equipment, protective clothing, analytical waste, decontamination residue, plastic sheeting, and gloves.
- Contaminated equipment: obsolete or failed tanks, pipe, and jumpers.
- Reactor-related wastes.

Rigid metal containers are now used in most cases with building debris, soil, and other bulky material still being shipped to the burial ground in a noncontainerized form. LLW volumes are being reduced by factors of 8 to 10 through compaction processes in H-Area and M-Area.

The current LLW disposal site, known as the Solid Waste Disposal Facility, E-Area, which occupies 195 acres between the F- and H-Separation Areas, is approaching its capacity. Beginning in 1993, LLW will be disposed of in a 100-acre site expansion in the north portion of E-Area. It is projected to meet solid LLW storage/disposal requirements for the next 20 years. The site includes the radioactive waste disposal facility, the Mixed Waste Management Facility, and the TRU waste storage facility. This facility is designed to meet the performance objectives of DOE Order 5820.2A, including the EPA effective dose equivalent of 4 mrem per year for groundwater at the facility's perimeter.

Mixed Waste. SRS generates low-level mixed wastes such as lead, oil, spent scintillation fluid, incinerable mixed waste, benzene, contaminated mercury, nonincinerable mixed waste, and PCBs. The SRS facilities designed to store, treat, and dispose of mixed wastes include the Z-Area Saltstone Solidification Facility, the Effluent Treatment Facility, the Liquid Effluent Treatment Facility, the Consolidated Incineration Facility (planned operation 1995), the M-Area Treatment Stabilization Facility (planned operation 1996), the Y-Area Stabilization Facility (planned operation 1998), and the Hazardous/Mixed Waste Treatment Facility (planned operation 1998). Mixed waste is stored in RCRA-approved SRS storage facilities on an interim basis until treatment or disposal facilities are built and permitted. SRS is currently developing a compliance agreement with the State of South Carolina to stipulate the provisions for the storage of Land Disposal Restriction mixed wastes at SRS pending the development of treatment and disposal facilities for these wastes.

Hazardous/Toxic Waste Streams and Management. Typical hazardous wastes are lead, mercury, cadmium, TCA, leaded oil, chlorofluorocarbons, benzene, and paint solvent. All hazardous waste treatment, storage, and disposal facilities at the SRS are either fully permitted, have interim status, or are operating pursuant to enforceable agreements with regulations while other waste management facilities are being developed. Waste is stored in DOT-approved containers.

Hazardous wastes are manifested and shipped offsite under contract with DOT-registered transporters to RCRA- or TSCA-permitted commercial disposal facilities. Chlorinated hydrocarbons and lead batteries are sold to commercial recyclers.

Nonhazardous Waste Streams and Management. Scrap metal and other selected materials are recycled where possible. All other nonhazardous waste is sent to the onsite sanitary landfill. Nonhazardous waste oil is burned for energy recovery at the SRS powerhouse. Asbestos and rubble are sent to the onsite sanitary landfill. Powerhouse ash is sent to the ash basin and to land reclamation while domestic sewage is sent to the onsite sanitary treatment plant. After treatment of domestic sewage, the sludge is sent to land reclamation and the treated effluent is discharged to an NPDES-permitted outfall.

Sanitary solid waste is disposed of onsite in the sanitary landfill. The northern expansion section would be utilized from 1992 until 1997 if current generation rates continue. The northern expansion would cease operation when the new onsite sanitary landfill, with a 20-year capacity, is available in 1996.

3.2.5.4 *Utility and Resource Requirements*

Support facilities within the 200-H Area consist of utility systems for water, steam, electricity, sewage, and chemical separations. Existing resource requirements are summarized in table 3.2.5-2. Electricity is supplied from the 115-kV plant system through two 7,500-kVA, 115/13.8-kV transformers in Building 251-H. Either transformer is capable of carrying the area electrical load. Emergency power to critical equipment is primarily supplied from diesel generators; however, some equipment is supplied with emergency power from batteries.

The water supply comes from five wells and is combined to create two different systems. One system, consisting of two wells and a separate treatment building, supplies process cooling water to Building 242-H (waste tanks and make-up water for Building 283-H cooling tower). The other system, consisting of three wells and a separate treatment building, supplies water to domestic-water and service-water ground storage tanks. Steam is provided from two sources: 200-F and steam generation within the area. The F-H steam line is a 10-inch line approximately 2.2 miles long with a capacity of 80,000 lb/hr. Within the 200-H Area, there are three stoker-fired boilers with a capacity of 30,000 lb/hr each. Total capacity in the area is almost 150,000 lb/hr.

The sewage treatment plant within the 200-H Area uses an equalization basin to store excess sewage for treatment during periods of low demand. A new Centralized Sanitary Wastewater Treatment Facility to be built in G-Area is planned and due to be operational in December 1994. The new facility will serve the H-Area among others. Process sewers and storm sewers are adequate.

A plant that chemically processes materials that have been reactor-irradiated is located in the 200-H separations area. The 200-H Area plant recovers enriched uranium and other isotopes from irradiated

TABLE 3.2.5–2.—*Savannah River Site: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	38,000 kWh	2,000 kW	35,000 kW
Natural Gas	N/A	N/A	N/A
Water	576,000 gal	500 gpm	2,000 gpm[a]

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	160,000 gal	3,000 gal
Argon	1,300,000 ft^3	60,000 ft^3
Helium	10,000 ft^3	1,800 ft^3
Hydrogen	3,600 ft^3	600 ft^3
Deuterium	2,300 ft^3	400 ft^3

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Table assumes SRS operates 365 days per year. Table addresses resource requirements for H-Area Tritium-Handling facilities and H Area utilities.

[a] Includes firewater.

Source: SR DOE, 1992a.

fuel and puts them in a desired form for shipment or storage. The HB-Line processes Pu-238. The present storage capacity for chemical resources is adequate to support existing missions.

3.2.6 Los Alamos National Laboratory

LANL is located in north-central New Mexico adjacent to the Los Alamos townsite. It is about 60 miles northeast of Albuquerque and 25 miles northwest of Santa Fe. The laboratory is situated on approximately 43 square miles located mostly in Los Alamos County but with 5.6 square miles located in Santa Fe County (figure 3.2.6-1).

3.2.6.1 *Los Alamos National Laboratory Missions*

LANL's basic mission as one of the DOE Defense Laboratories is to perform the RD&T necessary to maintain and advance the critical technologies and core competencies required to produce nuclear weapons. The laboratory is operated by the University of California under contract to DOE.

LANL's primary missions are:

- Weapons RD&T, including:
  - Advanced weapons concepts, designs, and technologies.
  - Preparation for testing limitations.
  - Technological surprise.
  - Research in support of the stockpile memorandum including dismantlement.
  - Weapons surety.
  - Complex 21 technology development.
- Plutonium R&D.
- Tritium R&D.
- Arms control and treaty verification technology.
- Nonweapons R&D.
- Nuclear fusion.
- Geothermal energy.
- Nuclear science.
- Environmental science.
- Energy science.
- Intelligence.
- Laser isotope separation.
- Advanced conventional munitions.
- Environmental R&D including storage and management of radioactive waste.
- Nuclear materials processing, R&D, and storage.
- Technology commercialization.
- Stockpile surveillance.
- Pollution prevention.
- Waste management.
- Strategic Defense Initiative.
- Threat assessment.
- Advanced concepts research.
- Space technology.
- Nonproliferation.

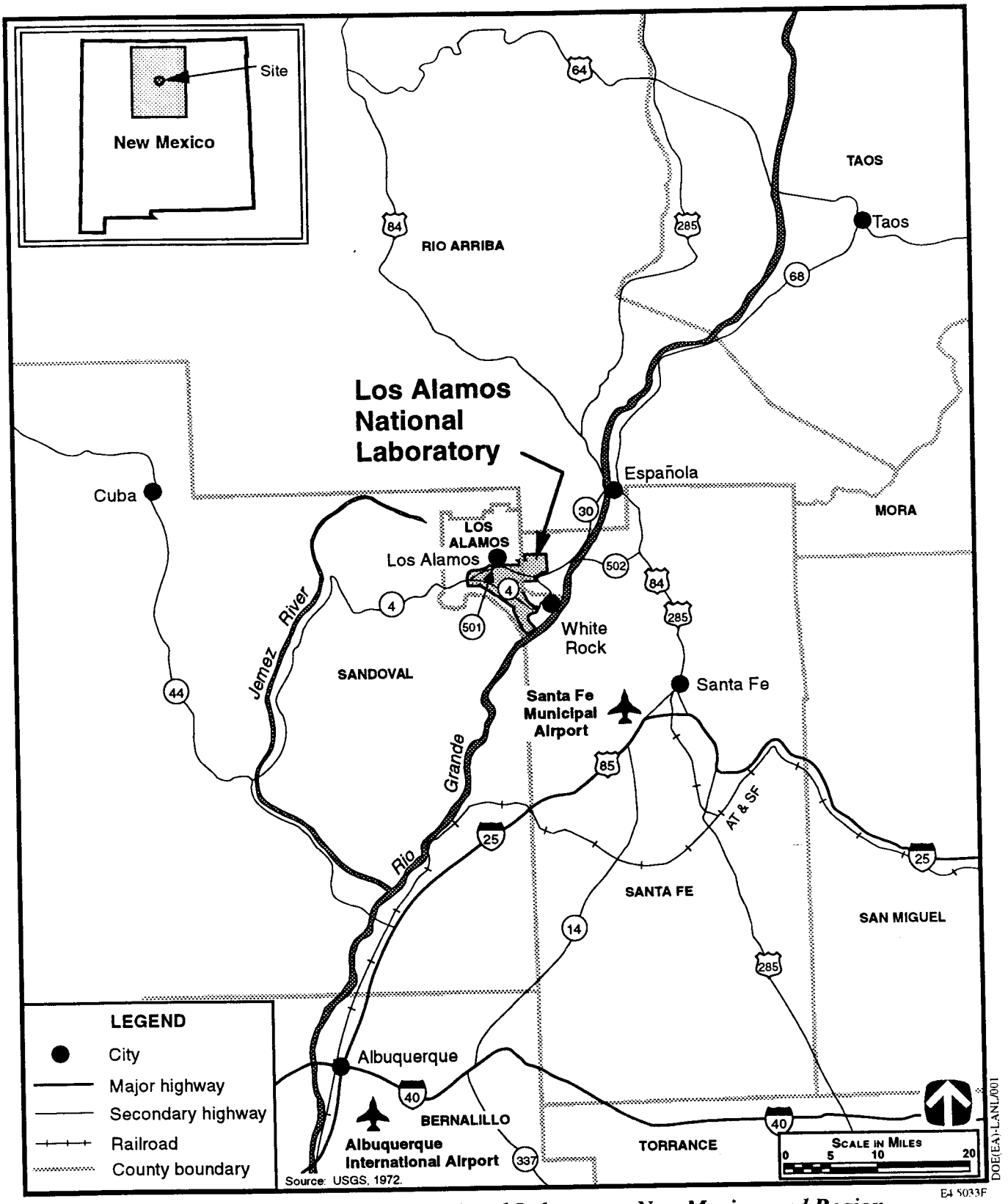

FIGURE 3.2.6–1.—*Los Alamos National Laboratory, New Mexico, and Region.*

- Emergency response.
- Underground nuclear testing.
- War Reserve surveillance of selected compounds.
- R&D to support development and production engineering.
- Nuclear effects, vulnerability, and lethality assessment.

3.2.6.2 *Facility/Process Description*

LANL has developed facilities at many separate technical areas (TA) throughout the site. Currently, 38 of these TAs are active; figure 3.2.6-2 depicts the specific areas that would be affected by this action.

LANL consists of 1,835 buildings totaling about 7.3 million ft^2. As of September 1992, LANL had 7,450 full-time employees (DOE, 1993c).

The following discussion provides additional information on the technical areas (TA-3, -16, -21, -22, -35, and -40) that are under consideration to receive additional nonnuclear functions.

- TA-3 (South Mesa Site) is the main technical area of the laboratory. It has three million gross ft^2 of building floor space (about half of the laboratory total) and occupies 359 acres of land. The main functions that occur in this area are administrative and technical support, theoretical and computational science, materials science, earth science, space science, and applied physics. Significant facilities include the Administration Building; the Otowi Building (largely for administrative support); the Technical Shops Building; the Chemistry and Metallurgy Research Building (which contains special nuclear materials); and the Sigma Building. The latter two include materials science and nuclear materials chemistry. Approximately 70 percent of all building space in TA-3 is greater than 30 years old, but the age and condition of specific facilities vary considerably.

- TA-16 (S Site) is the weapons engineering area. It occupies 2,006 acres and has 575,000 gross ft^2 of building space. Activities include research, design development, prototype manufacturing, and environmental testing. Approximately 87 percent of the building space exceeds 30 years of age; many of the oldest structures are planned for decontamination, decommissioning, or disposal.

- TA-21 (DP Site) is a former radioactive materials processing facility. It has 311 acres and 274,000 gross ft^2 of space. Remaining functions include nuclear chemistry RD&T, the Tritium Systems Test Assembly Building, and the Salt Facility. Most of the western portion of TA-21 is undergoing decontamination, decommissioning, or disposal.

- TA-22 (TD Site) develops detonators for nuclear weapons. It occupies 86 acres and has 73,000 gross ft^2 of building space.

- TA-35 (Ten Site) incorporates a mixture of experimental science activities. It occupies 149 acres and has 551,000 gross ft^2 of building space. Significant facilities include the Target Fabrication Building (for laser fusion), the former Antares Laser Complex, and the Nuclear Safeguards Laboratory.

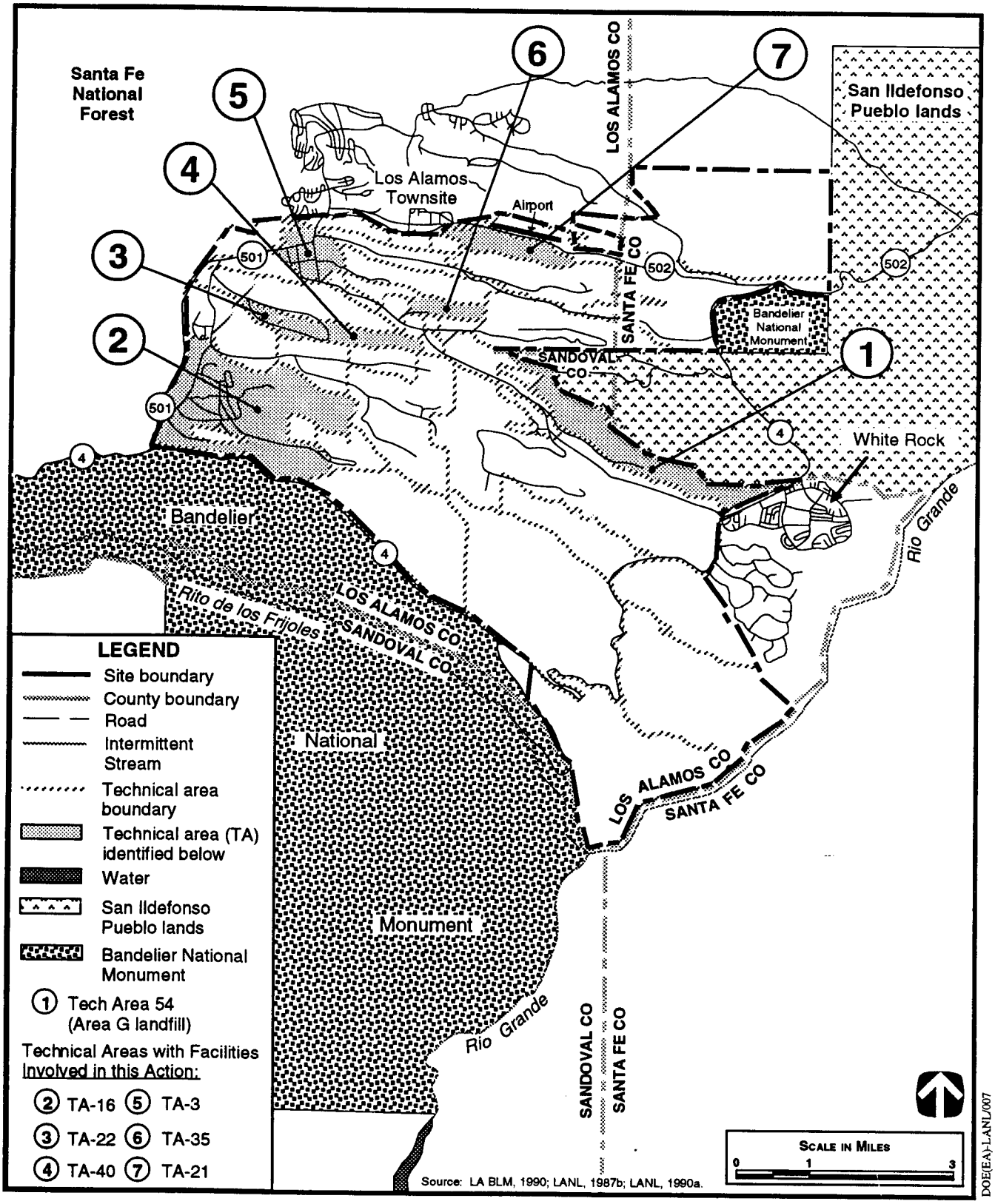

FIGURE 3.2.6–2.—*Location of Facilities at Los Alamos National Laboratory.*

- TA-40 abuts the east side of TA-22 and is also in the High Explosives (HE) RD&T area. The mission of TA-40 is explosives testing and characterization. The site is remote and surrounded by undeveloped open space with blast buffer zones contained within LANL boundaries (LANL, 1990a).

LANL is currently considering consolidation of all tritium activities at the site in the Weapons Evaluation Test Facility and adjacent Building 450 at TA-16. The proposed tritium activities consolidation project will require a variety of environmental reports and permit applications. At the appropriate time, separate NEPA documentation will be prepared to identify potential environmental impacts of the project.

Effluents and Emissions. Normal operations at LANL result in releases of small quantities of radionuclides and hazardous chemicals to surface water. These releases are discussed in section 4.1.3.3. Pretreated industrial wastewater and sanitary wastewater are discharged to various canyons at the site. Wastewater effluents from current operations at LANL are discussed in section 4.1.3.3.

Normal LANL operations release small quantities of radionuclides to the atmosphere. These radionuclide releases are discussed in section 4.1.3.2 and the associated health impacts are discussed in section 4.1.3.9. The major sources of criteria air pollutants at LANL are the steam plant and power plant, beryllium operations, the asphalt plant, the burning of HE waste, and the lead-pouring facility. Other emissions include fugitive particulate emissions from waste-burial activities and coal piles, and other process emissions. Hazardous/toxic air pollutant sources at LANL include various laboratories and process operations. Hazardous/toxic air pollutants include, but are not limited to, acetone, ammonia, methyl alcohol, methyl ethyl acetone, and hydrogen chloride. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at LANL are discussed in section 4.1.3.2. The emissions rates for these pollutants are shown in appendix D, section D.2.1.6.

Safety and Accidents. The review of historical information at LANL indicated that during the period 1986-1990, 12 known incidents of offsite contamination occurred as a result of accidental releases. However, these incidents resulted in no significant adverse environmental or health impacts. All but one incident involved the release of radiological materials. One involved the release of 0.4 curies of mixed fission products to the atmosphere in 1989. Ten incidents involved the release of tritium. A total of 11,485 curies of tritium were released to the atmosphere as a result of these incidents. The largest release involved 5,800 curies of tritium and occurred in 1988. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1991h and 1992i) affecting the TAs in question, which are planned to start prior to the end of 1993, have been identified. They are:

- A project consisting of interim upgrades to the Chemical and Metallurgy Building is planned for completion in 1998. Upgrades include compliance studies, continuous air monitoring, and instrumentation upgrades; High Efficiency Particulate Air (HEPA) filter motor upgrades; HEPA filter additions; electrical system modifications and upgrades; eyewash system additions; stack monitor system additions; duct modifications and upgrades; sanitary sewer modifications; perimeter safeguard additions; acid drain modifications; Wing 1 HVAC upgrades; and as-built drawings.

- LANL plans to replace portions of the Infrastructure Support Facility Gas Line. The project, expected to be completed in 1993, would replace portions of the 130 miles of underground natural gas transmission pipeline that serve LANL from Bloomfield, NM. The work would also include replacement of valve stations along portions of the line.

3.2.6.3 *Waste Management*

Waste management operations at LANL consist of five broad waste types: TRU, LLW, mixed waste, hazardous/toxic waste, and nonhazardous waste. Because there are no TRU wastes associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of TRU waste generation and management. Table 3.2.6-1 presents the 1991 waste generation at LANL.

Radioactive Waste Streams and Management. Liquid LLW is generated from many areas throughout LANL. LANL has two onsite liquid LLW treatment facilities; a 250-gpm chemical treatment and ion-exchange plant and a 125-gpm chemical treatment plant. A project providing for the construction of a facility for the solidification and subsequent volume reduction of radioactive liquid waste treatment plant sludge containing plutonium, americium, and other radionuclides is planned at LANL. The existing radioactive liquid waste treatment plant generates LLW sludge that is high in water content. This facility would allow for an approximately 80-percent reduction in sludge volume and result in a more stable form for burial or shipment offsite. Construction completion is anticipated in May 2000.

Solid LLW such as paper, plastic, glassware, rags, etc., is separated into compactible and non-compactible materials. They are then packaged and transported to an onsite location for compaction and burial. The Area-G landfill, located at TA-54, is the LLW burial area. LLW items such as large equipment and much of the D&D wastes generally

TABLE 3.2.6–1.—*Los Alamos National Laboratory: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic		17,710 ft^3 [a]		
Liquid	72,000 gal		b	Offsite
Solid	11,000 ft^3		b	Offsite
Nonhazardous				
Liquid	183,000,000 gal	None	280 MGY	NPDES Outfall
Solid	302,200 ft^3	None	None	Onsite Burial
LLW				
Liquid	5,787,430 gal	175,000 gal	200 gal/min	Not Applicable
Solid	203,600 ft^3	None	None	Onsite Burial
Mixed		86,426 ft^3 [a]		
Liquid	9,000 gal		None	None
Solid	4,000 ft^3		None	None

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[a] Includes both liquids and solids.

[b] Only HE hazardous waste and potentially-contaminated HE waste is burned at the incinerator flashpad at TA-16 (S-Site). Capacity available as needed. Ash residue is treated and when its hazardous characteristic can be removed and is otherwise nonhazardous, the residue is disposed of in the industrial non-RCRA landfill. Any hazardous constituent is shipped offsite using RCRA-permitted vendors.

Source: LA DOE, 1992.

are not packaged but are delivered to the burial site in covered or enclosed vehicles.

Mixed Waste. Low-level mixed waste includes solvents, pyrophoric substances, spray cans, scintillation vials, miscellaneous reagent chemicals, vacuum pump oil contaminated with mercury, and other contaminated material. Currently, LANL does not dispose of mixed LLW. The waste is stored at TA-54 and Areas -L and -G. All LLW mixed packages are planned to be transported by commercial carriers in closed vans to the NTS for burial after NTS is permitted.

Primary construction for the Controlled Air Incinerator has been completed. Minor upgrades are being made. The Controlled Air Incinerator is permitted for hazardous waste and has been granted interim status for mixed wastes. A RCRA mixed waste trial burn is currently scheduled for February 1995.

Construction of a hazardous waste treatment facility to consolidate all existing onsite hazardous waste treatment processes is planned to start construction in April 1995. This facility also will accommodate new treatment processes for hazardous and mixed wastes currently being accumulated and stored. Provisions for the storage of this waste until suitable treatment and disposal facilities are available will be developed later in a compliance agreement with the State of New Mexico.

Hazardous/Toxic Waste Streams and Management. LANL produces a wide variety of hazardous/toxic wastes. Small volumes of RCRA-characteristic and RCRA-listed wastes occur as a result of ongoing research. Primary laboratory sites for basic and applied chemistry RD&T generate typical chemical wastes consisting primarily of laboratory reagent chemicals, pump oil, solvents, test samples, and miscellaneous laboratory wastes. Once-significant volumes of beryllium, lithium hydride, and magnesium turnings generated from the main shops department; plating solutions containing chromates and cyanides; acid or base wastes heavily contaminated with copper; and nitric and sulfuric acid wastes have been greatly reduced.

HE waste is generated during processing and testing of various materials. Processing includes pressing, machining, and casting HE. Waste is produced as discrete pieces of HE, chips, machine cuttings, and powder. The chips, cuttings, and powder usually are in the form of waterborne suspensions, collected in specially designed accumulating and settling sump tanks. Wastes also consist of materials contaminated with HE: paper, oils, solvents, wood, machine tools, fixtures, etc. Chemically, the wastes consist of cyclotetramethylenetetranitramine (HMX), cyclotrimethylenetrinitramine (RDX), trinitrotoluene (TNT), pentaerythritoltetranitrate (PETN), ammonium nitrate, barium nitrate, boric acid, triaminotrinitrobenzene (TATB), nitrocellulose, tetryl, nitroguanidine, and various plastic binders. All HE hazardous waste and potentially contaminated HE waste is picked up and delivered to the TA-16 (S Site) incinerator flashpad where it is burned. Ash residue is treated, and when its hazardous characteristic can be removed and is otherwise nonhazardous, the residue is disposed of in the industrial non-RCRA landfill. Any hazardous constituent is shipped offsite using commercial RCRA-permitted vendors.

All hazardous waste treatment, storage, and disposal facilities at LANL are either fully permitted, have interim status, or are operating pursuant to enforceable agreements with the regulators while other waste management facilities are being developed. Many hazardous wastes are sent offsite for disposal. LANL has an EPA Letter of Authorization allowing disposal of radioactive PCB-contaminated articles at the TA-54 Area-G landfill. Much of the hazardous waste is shipped offsite to commercial incinerators and the residual ash is landfilled. LANL does not landfill RCRA-hazardous waste onsite, but contracts with DOT-registered transporters to deliver hazardous waste to commercial RCRA-permitted disposal facilities. Before waste is sent offsite, the potential disposal

facility is inspected by LANL personnel. Operating records and permits are also reviewed.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general facility refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. Trash is accumulated onsite and taken to the county sanitary landfill on a regular basis.

The Los Alamos County sanitary landfill is located on government property and is operated under a special use permit. Approximately one-third of the domestic solid waste disposed of at the county landfill originates from LANL. The Area-J landfill, operated by and under the administrative control of LANL, receives nonhazardous, nonradioactive solid waste.

A new sanitary wastewater treatment plant and collection system to replace 8 existing treatment facilities and 30 existing septic tanks is completed. The new treatment plant will enable reuse of the treated wastewater for cooling water and irrigation. The plant and collection system is designed to meet the requirements of LANL's existing Federal Facilities Compliance Agreement.

3.2.6.4 *Utility and Resource Requirements*

The LANL utility system has 400 miles of lines that provide electricity, telecommunications, water, sanitary sewer, radioactive liquid waste, and natural gas distribution within the laboratory. Existing resource requirements are summarized in table 3.2.6-2.

Electricity is supplied to LANL by a Los Alamos County/DOE power pool over two 115-kV lines (one from Santa Fe and one from Albuquerque). Substations in TA-3, -5, and -53 provide 13.2 kV service throughout the laboratory. There is also a 20-megawatt (MW) gas-fired generating plant in TA-3. LANL's total annual consumption of power is considerably below the transmission capacity of the system.

Natural gas used by the laboratory comes from the San Juan Basin in northwest New Mexico. The lines

TABLE 3.2.6–2.—*Los Alamos National Laboratory: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	1,045,000 kWh	87,000 kW	120,000 kW[a]
Natural Gas	4,200,000 ft^3	417,000 ft^3/hr	500,000 ft^3/hr
Water	4,100,000 gal	6,600 gpm	6,900 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Liquid Nitrogen	1,189,00 gal	5,500 gal
Argon	11,486,000 ft^3	1,125,000 ft^3
Helium	1,066,000 ft^3	67,000 ft^3
Hydrogen	35,000 ft^3	1,100 ft^3
Oxygen	5,057,000 gal	135,000 gal
Carbon Dioxide	686,000 ft^3	96,200 ft^3

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Table assumes LANL operates 365 days per year.

[a] Electrical system capacity in 1992 was 90,000 kW. By the end of 1995, the capacity will be increased by 30,000 kW.

Source: LA DOE, 1992.

are owned by DOE but operated and maintained by the Gas Company of New Mexico under contract to DOE. Natural gas is distributed to buildings directly, or to three central steam plants (TA-3, 16, and 21), and a standby plant for fueling the heating system. All plants also maintain reserves of fuel oil.

Water for the laboratory and adjacent areas (including Los Alamos townsite, White Rock and Bandelier National Monument) primarily comes from three DOE-operated well fields and surface water from the Jemez Mountains. The system depends on gravity flow for distribution from high elevation terminal storage facilities.

The existing LANL sanitary sewer system includes nine treatment facilities. Consolidation of this sanitary wastewater treatment system is underway and would eliminate eight of the existing treatment facilities. In addition, approximately 70 septic tanks are dispersed throughout laboratory areas not served by the existing sanitary sewer system.

The present chemical storage capacity is adequate for the laboratory's existing mission.

3.2.7 Y-12 Plant

The Oak Ridge Reservation (ORR), within which Y-12 is located, lies southwest of the city of Oak Ridge, TN, but within the incorporated city limits (figure 3.2.7-1). The largest city in the area is Knoxville, located approximately 20 miles to the east.

Within the 35,252-acre ORR, the DOE has three primary complexes (figure 3.2.7-2). These are the Oak Ridge Y-12 Plant, Oak Ridge National Laboratory (ORNL), and the K-25 Site (formerly the Oak Ridge Gaseous Diffusion Plant). The primary facilities at Y-12 are shown in figure 3.2.7-3. Y-12 is operated for DOE by Martin Marietta Energy Systems, Inc.

3.2.7.1 *Y-12 Plant Missions*

Y-12's primary mission is the production of nuclear weapons components involving the fabrication of various forms of materials into components, certification of the fabricated components, and the production of subassemblies from some components.

Y-12 primary missions are:

- Fabrication and assembly of uranium parts and lithium parts.
- Precision machining.
- Specialty subassembly processing.
- Inspection of precisional components.
- Safe, secure trailer vehicle maintenance.
- Pollution prevention.
- Waste management.
- Processing and storage of highly-enriched uranium materials.
- Performance of stockpile surveillance activities to ensure reliability of nuclear stockpile.
- Maintain process capability program.
- Weapon dismantlement.
- Handling, processing, and storage of returned weapons components and sub-assemblies.
- Special production for design laboratories.
- Storage of strategic quantities of lithium compounds.

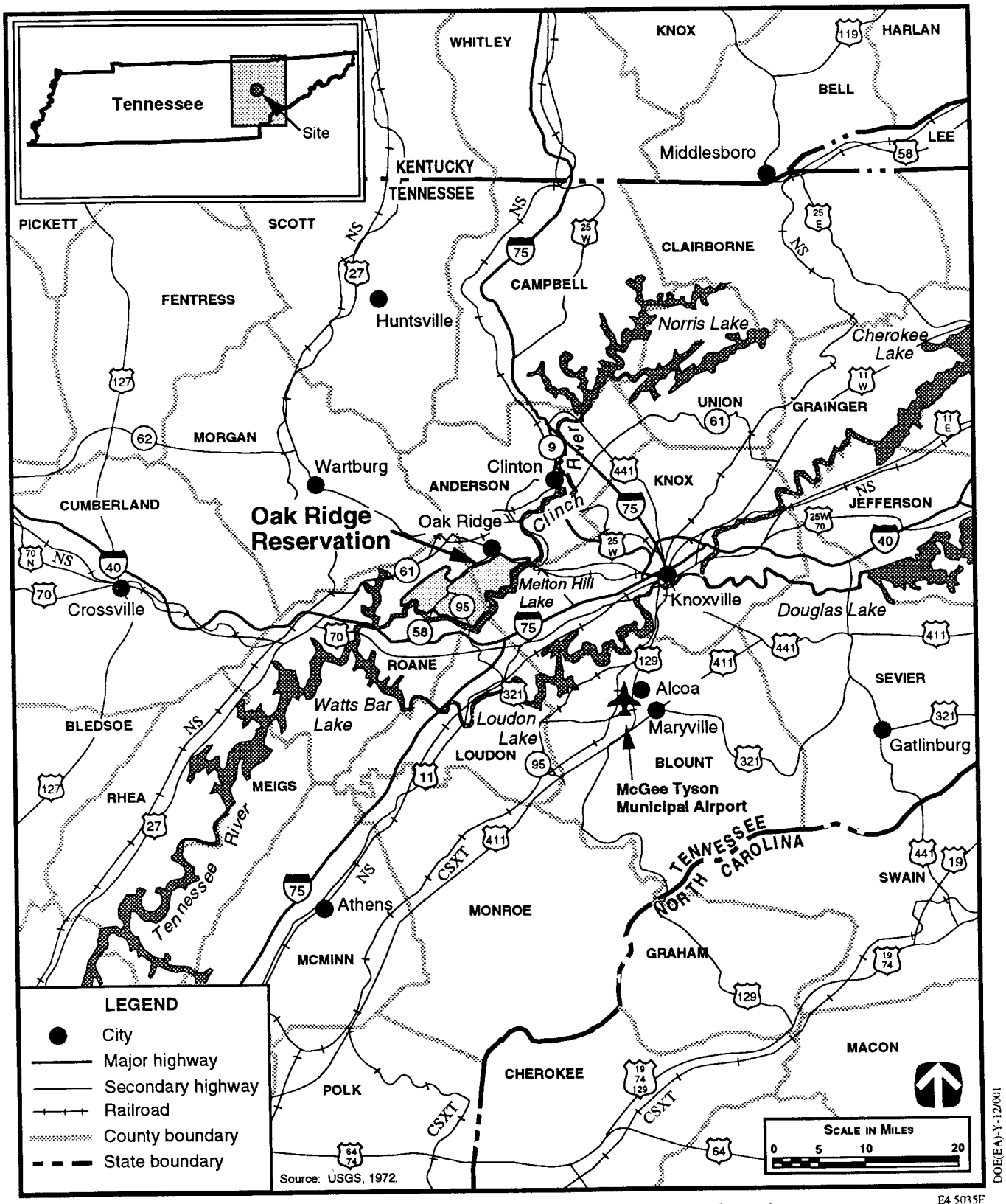

FIGURE 3.2.7–1.—*Oak Ridge Reservation, Tennessee, and Region.*

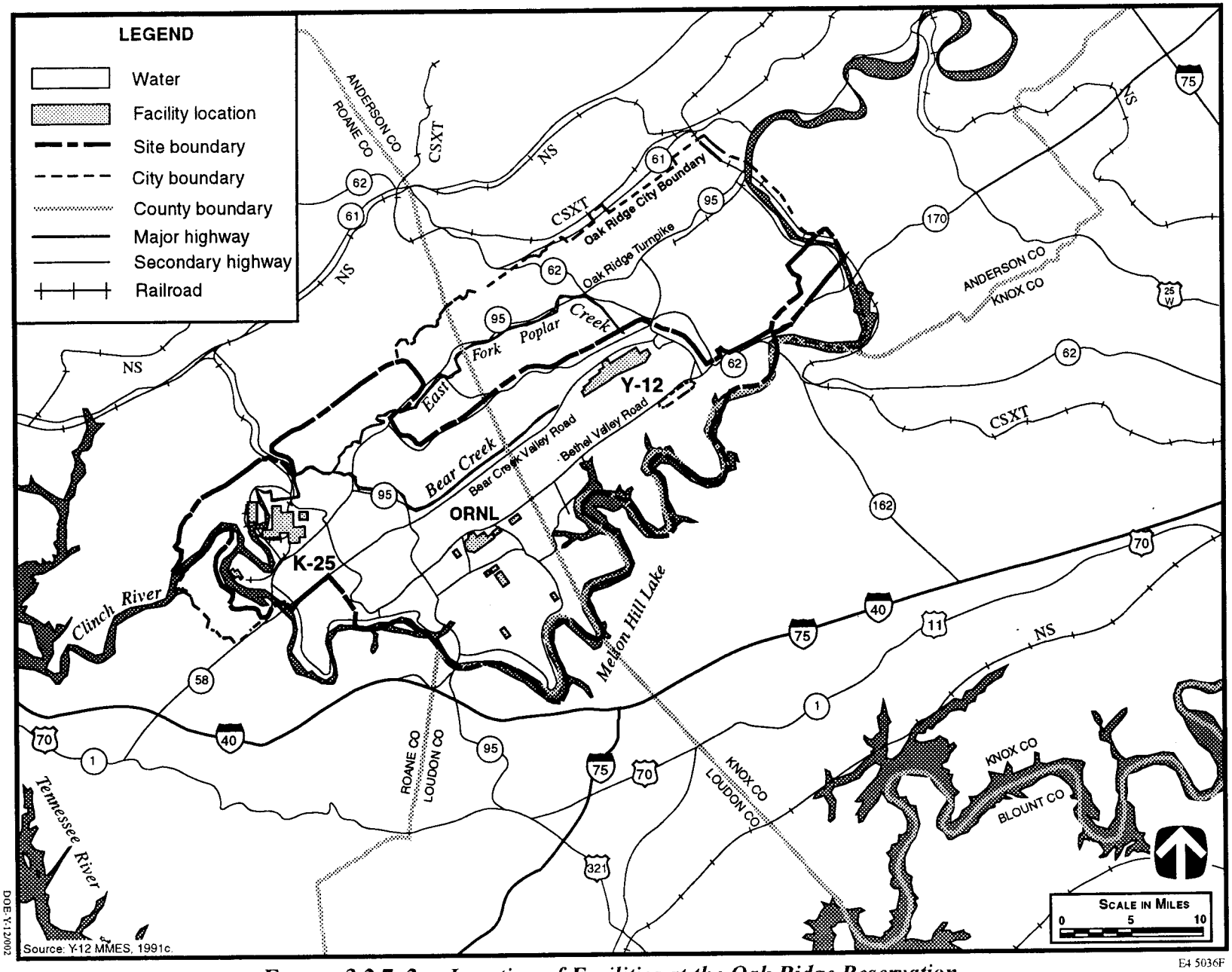

FIGURE 3.2.7–2.—*Location of Facilities at the Oak Ridge Reservation.*

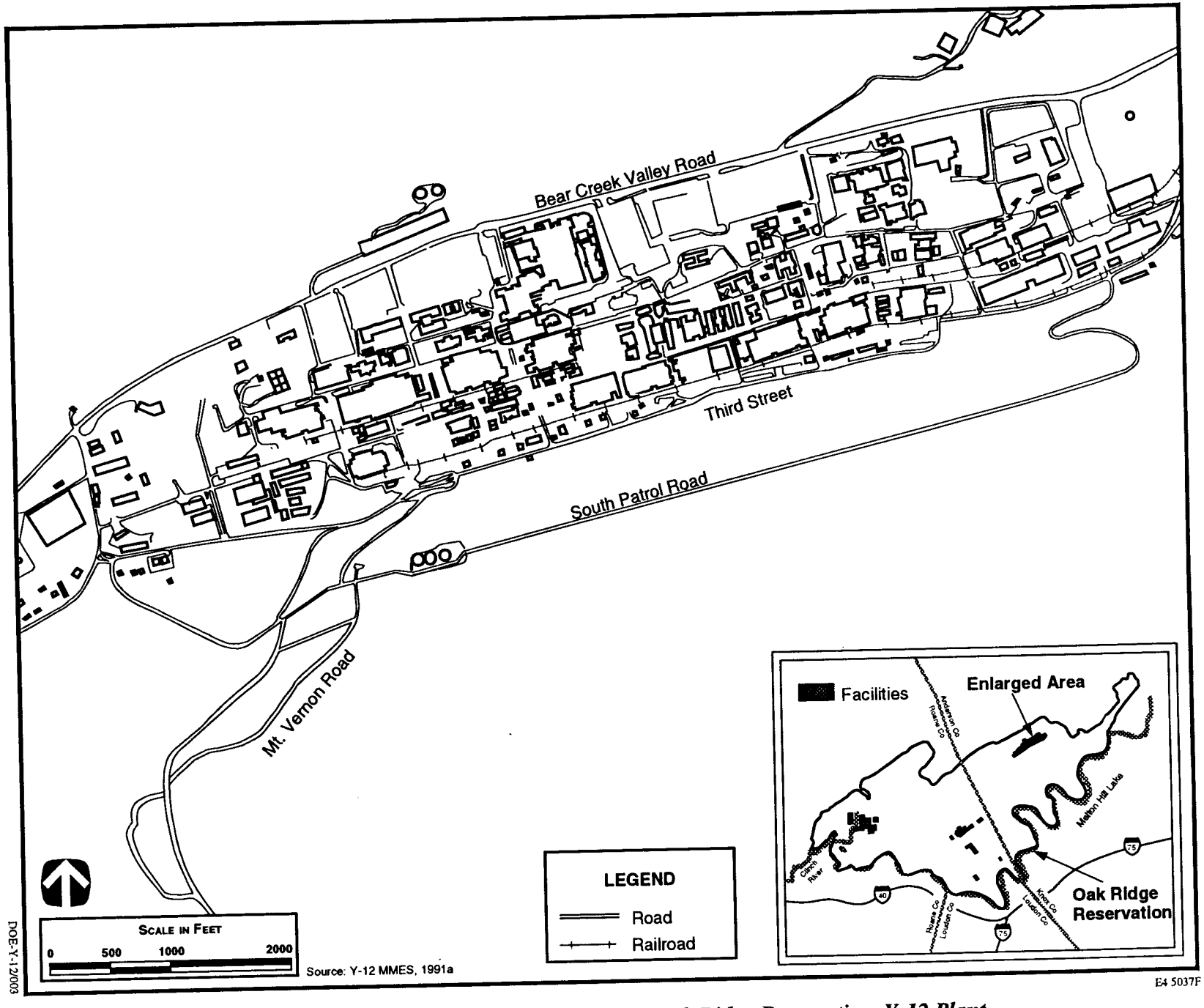

FIGURE 3.2.7–3.—*Location of Facilities at the Oak Ridge Reservation, Y-12 Plant.*

- Development and production engineering support.

3.2.7.2 *Facility/Process Description*

Y-12 is located in Oak Ridge, TN, on the 35,252-acre ORR. The plant site consists of approximately 811 acres, 630 of which are enclosed by security fencing. The site contains 492 buildings or other structures totaling 7.2 million ft^2. The site is used by DP in support of nuclear weapons production and surveillance, and nuclear materials production mission assignments. These activities are housed in approximately 425 of the 492 buildings containing 5.4 million ft^2. ORNL, whose primary facilities are located elsewhere on the ORR, uses approximately 47 buildings containing 1.5 million ft^2. These facilities are not related to the Y-12 DP mission. Also located on the Y-12 site are approximately 20 buildings containing 300,000 ft^2 which house support activities and several organizations of the DOE Oak Ridge Field Office.

As of September 1992, Y-12 had 5,384 employees (DOE, 1993c).

Effluents and Emissions. Normal operations at Y-12 do not discharge radioactive water pollutants as a result of the activities that are the subject of this EA. Pretreated industrial wastewater and sanitary wastewater are discharged to Bear Creek, East Fork Poplar Creek, McCoy Branch, and Kerr Hollow quarry. Wastewater effluents from current operations at Y-12 are discussed in section 4.1.4.3.

Normal Y-12 operations do not release radioactive air pollutants to the environment as a result of activities that are the subject of this EA. The major sources of criteria air pollutants at Y-12 are the steam plant and two commercial oil-fired boilers. Other sources include fugitive particulate emissions from coal piles, other process emissions, and vehicles. Hazardous/toxic air pollutant sources at Y-12 include various laboratories and process operations. Hazardous/toxic air pollutants include, but are not limited to, methanol, nitric acid, trichlorotrifluoroethane, hydrochloric acid, and TCA. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at Y-12 are discussed in section 4.1.4.2. The emissions rates for these pollutants are shown in appendix D, section D.2.1.7.

Safety and Accidents. The review of historical information at Y-12 indicated that during the period 1986-1990, 95 accidental releases were reportable under the requirements of CERCLA and SARA or the *Clean Water Act* (CWA). These mostly involved the release of petroleum products, mercury, asbestos, and sewage. However, none of these releases resulted in a significant adverse impact offsite. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned to start before the end of 1993 and that affect Y-12 include:

- ORR plans to provide upgrades in several life safety areas. This includes egress systems, fire protection systems, electrical equipment, and emergency power equipment required to meet the Occupational Safety and Health Administration (OSHA), the National Fire Protection Association Codes, and DOE orders and policies. This project is scheduled for completion in 1997.

- The Emergency Notification System would be replaced for portions of the protected, limited, and eastern areas of Y-12. The proposed Emergency Notification System is intended to provide a reliable, available emergency warning system as well as comprehensive monitoring and testing capabilities from the plant shift superintendent's

office. Emergency Notification System replacement will be completed in 1995.

- A new hazardous materials handling vehicle would be procured and equipped to meet response requirements. Procurement is expected to be completed in 1993.

- Powered platforms to be used by maintenance personnel throughout the plant would be procured beginning in 1993 and would be complete by 1995. This project would replace existing platforms designated as potential safety hazards.

- All Y-12 nonhazardous laboratory drains, except roof drains, would be rerouted to discharge to the sanitary sewer line. Internal piping alterations and lines would be provided to existing manholes modified to accept the new drain lines. This action is being accomplished to comply with pending NPDES regulations.

- The cooling tower water chemical treatment program would be replaced with an ozonation system to be installed at two cooling towers. Ozonation would reduce the amount of wastewater discharged from cooling towers. Project completion is scheduled for 1995.

- A 10,000-gal storage tank would be installed in the West End Tank Farm. Piping, pumps, level indicators and controls, and alarms are included as part of the project. The tank would replace the current practice of pumping directly into a diked tanker trailer and would reduce the potential for accidental spills. Installation is expected to be completed in 1995.

3.2.7.3 *Waste Management*

Waste management operations at Y-12 consist of four broad waste types: LLW, low-level mixed waste, hazardous/toxic waste, and nonhazardous waste. Table 3.2.7-1 presents the 1991 waste generation at Y-12.

Radioactive Waste Streams and Management. Machining operations use stock materials including steel, stainless steel, aluminum, depleted uranium, and other metals, which result in significant quantities of machine turnings and fines as a waste product. Uranium-contaminated industrial trash is generated by daily operations throughout the plant. These operations include janitorial services, floor sweepings in production areas, and production activities. Long-term Y-12 storage options include storage in warehouses, tanks, and vaults at Y-12, as well as storage of Y-12 mixed or hazardous wastes in buildings at the K-25 Site.

The Y-12 Central Pollution Control Facility also generates low-level uranium-contaminated RCRA hazardous sludge, which is collected and sent to the West End Tank Farm.

The Waste Feed Preparation Facility processes and prepares solid LLW for volume reduction by an outside contractor for storage at Y-12. The facility utilizes a 200-ton capacity baler to reduce the waste volume to one-eighth of its original size. Waste comes to the facility from areas known to generate contaminated materials, or from dumpsters that were analyzed at the Trash Monitoring Station and deemed to be above the radioactive acceptability limits for the sanitary landfill. The compacted bales are placed in DOT-approved metal boxes and staged in an adjacent warehouse prior to offsite incineration or storage at Y-12.

The Certification & Staging Facility is a proposed 1996 line item project to provide a facility that would determine the isotopic content of heterogeneous solid low-level and mixed waste contained in either 96 ft^3

TABLE 3.2.7–1.—*Oak Ridge Reservation, Y-12 Plant: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	273,670 gal	None	5,400,000 gal/yr[b, c]	Not Applicable[a]
Solid	37,295 ft^3 [a]	6,500,000 gal[d]	b	Onsite Burial[l, e]
Nonhazardous				
Liquid	12,400,000 gal	None	6 MGY[f]	Offsite-NPDES Outfall
Solid	289,110 ft^3	None	None	Onsite Burial[e]
LLW				
Liquid	247,495 gal	152,000 gal[g]	5,400,000 gal/yr[b, c]	Not Applicable
Solid	210,230 ft^3	1,250,000 gal[h, j]	k, b	Not Applicable[i, l]
Mixed				
Liquid	778,190 gal	152,000 gal[a, g]	b	None
Solid	42,705 ft^3	1,250,000 gal	b	None

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[a] Currently, all RCRA-hazardous wastes are stored at the Y-12 Plant or the K-25 Site awaiting further disposal. These wastes are not being sent offsite to RCRA-permitted commercial facilities.

[b] The K-25 TSCA incinerator has a design capacity to incinerate up to 2,000 lb/hr of liquids and up to 1,000 lb/hr of solids and sludge (200 lb/hr maximum sludge content). Current permits, funding, and DOE guidance have limited treatment capacity to approximately 48,000 ft^3/yr of liquids only.

[c] Combined throughout capacity of West End Treatment Facility and Central Pollution Control Facility waste treatment facilities.

[d] Remaining West End Tank Farm sludge storage capacity is approximately 1,250,000 gal (2.5 of 13 tanks, 500,000 gallons each).

[e] New landfill to open in 1994 with 43-year capacity. Ensures 160,000 yd^3/yr (uncompacted) fill rate. Approximately 186M ft^3 (uncompacted) capacity for disposal of Hazardous/Toxic solids (non-RCRA and non-TSCA hazardous materials) also applies for nonhazardous solid waste. The Y-12 sanitary landfill currently in use has a design capacity of 640,000 yd^3 and is anticipated to reach its limit in late 1993 or early 1994.

[f] Approximate Central Pollution Control Facility/West End Treatment Facility NPDES permit annual discharge volume limits for East Fork Poplar Creek.

[g] 3 x 40,000 gallon tanks in OD09 waste oil/solvent storage facility plus [(4 x 6,500 gallons) + (2 x 3,000 gallons)] in OD10 (flammables storage).

[h] Capacity of the Y-12 Salvage Yard depends on how high scrap is stacked and ability to compact the waste.

[i] Future ability to clean, segregate, recycle, and sell scrap metal, equipment still to be determined.

[j] PCB-contaminated solids also contaminated with uranium stored in 9720-9 (RCRA/PCB Warehouse), 9720-58 (RCRA and PCB Container Storage Area), and 9404-7 (PCB Drum Storage Facility).

[k] LLW non-metallic (non-TSCA, non-RCRA hazardous) wastes such as construction debris are supercompacted and/or incinerated offsite at a local commercial waste treatment facility.

[l] Currently there is no available treatment/disposal technology for the hazardous/toxic solid sludges and the LLW solid sludges in storage tanks in the West End Tank Farm. The most likely future scenario would be onsite thermal treatment to remove organics, followed by an onsite uranium extraction process, and chemical fixation. The RCRA component solids would be sent to an offsite commercial RCRA-permitted landfill. The LLW component solids would be buried onsite in the planned LLW disposal facility scheduled to be operational in 1996.

Source: Y-12 DOE, 1992b; Y-12 MMES, 1992a.

boxes or 55-gal drums. In addition to radiological characterization, the facility would also provide remote inspection of waste containers via real-time radiography. If the project remains on schedule, the facility is expected to be operational in the year 2000.

Y-12 does not have onsite disposal facilities for LLW. The Old Salvage Yard is used as a staging area for solid LLW scrap metal. The contaminated scrap is placed in boxes and would eventually be transferred to above-grade storage pads. Planned LLW disposal facilities scheduled to be operational in 1996 will serve waste generators from all three DOE complexes on the ORR. The planned facilities would have up to 40 years' capacity available to dispose of LLW.

Mixed Waste. Y-12 generates low-level mixed wastes from the following operations: metal plating, maintenance of sodium/potassium-cooled equipment, machine cooling and machine cleaning associated with the forming and machining of nuclear weapon parts, and general cleaning activities that involve regulated solvents or acidic and caustic cleaners. Non-defense process activities generating mixed wastes are wastewater treatment activities at the West End Treatment Facility and the Central Pollution Control Facility, environmental restoration activities, D&D, and storm sewer sludge cleanout activities.

Y-12 has a number of container and tank storage facilities with capacity available for management of mixed wastewater treatment sludges, RCRA/TSCA mixed waste, organic liquid mixed waste, solid mixed waste, flammable liquid mixed waste, lab-pack mixed waste, and classified mixed waste. The lack of available outlets for uranium-contaminated solid waste forces many combustible flammable wastes generated at Y-12 into long-term storage. An increased capacity for the storage of ignitable solid wastes is required due to the impending closure of the Interim Drum Yard in 1993. The oil drum storage facility, OD10, provides additional flammable storage in four 6,500-gal tanks and two 3,000-gal tanks. The Containerized Waste Storage Area would provide storage for most wastes stored at the Interim Drum Yard after closure. The Production Waste Storage Facility, scheduled for start-up in 1995, would provide several years of storage capability for mixed classified wastes.

Y-12 has no operating onsite disposal facilities for mixed wastes. The West End Treatment Facility/West End Tank Farm treats mixed acid wastes generated by Y-12 Plant Production operations. The Certification and Staging Facility planned for design in 1996 would ensure that mixed solid waste generated by defense and restoration activities at Y-12 meets the waste acceptance criteria of the receiving treatment, storage, or disposal facility. The Mixed Waste Treatment Facility, a proposed 1995 line item planned for construction to begin in 1997, would provide treatment capability for mixed soils and sludges. With a sufficient capacity to treat 1,400,000 ft^3 per year, the Mixed Waste Treatment Facility is intended to remove and segregate hazardous and radioactive components of the mixed wastes and to prepare mixed wastes for ultimate disposal when suitable disposal facilities are available. Present plans call for the Mixed Waste Treatment Facility to treat mixed wastes from Y-12, K-25, and ORNL.

Hazardous/Toxic Waste Streams and Management. Y-12 generates a large variety of hazardous/toxic wastes. Major waste-generating activities at Y-12 include construction/demolition activities that produce large volumes of contaminated wastes, including lumber, concrete, metal objects, soil, and roofing materials.

Plating waste solutions are generated by metal-plating operations, and reactive wastes and waste laboratory chemicals are generated from various laboratory activities. Sludges are generated as a result of treating process wastes at multiple sites, and waste oils and solvents are generated from machining and cleaning operations. Contaminated soil, soil solutions, and soil materials are generated from RCRA closure activities.

RCRA wastes generated at Y-12 were either treated and discharged (in the case of wastewaters) or shipped offsite to permitted, approved disposal facilities (in the case of solids). Due to the moratorium on offsite shipments from Y-12, RCRA wastes that are not discharged are being stored in permitted facilities.

Nonhazardous Waste Streams and Management. The average annual discharge rates from the Central Pollution Control Facility and the West End Treatment Facility are approximately 4.7 MGY and 7.7 MGY, respectively. The NPDES annual discharge volume permit limit for East Fork Poplar Creek is 6 MGY. Major waste-generating activities at Y-12 include construction and demolition activities that produce large volumes of non-contaminated wastes, including lumber, concrete, metal objects, soil, and roofing materials.

Noncontaminated industrial trash is generated by daily operations throughout the plant. These operations include janitorial services, floor sweeping in production areas, and production activities.

The Y-12 Centralized Sanitary Landfill II is a state-permitted facility that accepts combustibles, decomposed materials, and other industrial wastes, as well as certain special wastes such as asbestos, beryllium oxide, aerosol cans, and fly ash. The Y-12 Spoil Area I is a state-permitted shallow land burial facility for the disposal of noncontaminated rubble and construction spoil, including asphalt, brick, block, brush, concrete, dirt, tile, and other similar materials.

The new salvage yard is used for the staging and public sale of nonradioactive, nonhazardous scrap metal. Y-12 is restricted from sending any scrap metals offsite. Scrap metal sorting continues, however, in anticipation of future provisions for clean scrap metal consolidation/recycle/resale.

3.2.7.4 *Utility and Resource Requirements*

Major underground utility systems that serve the Y-12 site include water, the sanitary sewer system, and natural gas pipelines. Major above-ground systems

TABLE 3.2.7–2.—*Oak Ridge Reservation, Y-12 Plant: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	1,320,000 kWh	70,000 kW	300,000 kW
Natural Gas[a]	N/A	N/A	N/A
Water	7,000,000 gal	5,000 gpm	17,000 gpm
Chemical Resources	**Total Annual Consumption**		**Storage Capacity**
Nitrogen	4,027,770,000 gal		46,083,000 gal
Argon	90,000,000 ft^3		3,430,000 ft^3
Helium	4,464,000 ft^3		707,000 ft^3
Hydrogen	5,475,600 ft^3		234,000 ft^3
Oxygen	44,886,000 gal		30,672,000 gal

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Table assumes that Y-12 operates 365 days per year.

[a] The Y-12 Plant steam boiler currently consumes natural gas. Natural gas will become a backup boiler fuel in 1993 when the steam boiler plant reverts to burning coal using a clean coal burning technology approved by the State of Tennessee.

Source: Y-12 DOE, 1992b.

include steam and condensate, demineralized water, plant and instrument air, and electrical distribution. Two major utility facilities are located at Y-12: the water treatment plant and the steam plant.

Electrical power is procured from the Tennessee Valley Authority and transmitted throughout the plant by three 161-kV overhead radial feeders and one 161-kV interconnecting overhead feeder. Table 3.2.7-2 lists Y-12's utility and chemical resource requirements.

The source of water for Y-12 is Clinch River water impounded by the Melton Hill Dam. The filtration plant, with its 7-million-gallon storage reservoir, is the source of treated water for Y-12. The treated water supplies the fire protection system, process operations, sanitary requirements, and boiler feed at the steam plant. Heating and process steam is supplied by the main steam plant, which houses four boilers.

Chemical needs include industrial gases (argon, helium, hydrogen, nitrogen, and oxygen) delivered in an above-ground distribution system. The present handling and storage area is adequate for the Y-12 mission.

Y-12 has two primary energy needs: natural gas and electricity. Natural gas is used for process furnaces and laboratory needs. The Y-12 natural gas system is supplied by a pipeline from the East Tennessee Natural Gas Company. Beginning in 1993, coal would be used in place of natural gas for steam generation. As a result, an estimated 100,000 tons of coal per year would be required for the Y-12 missions. This is up from the 15 to 30 tons per year used from 1990 to 1992.

3.2.8 Sandia National Laboratories, New Mexico

Sandia National Laboratories, headquartered in Albuquerque, NM, maintains facilities in three locations: Albuquerque, NM; Livermore, CA; and Tonopah, NV. The facilities discussed in this document refer only to the Albuquerque location (SNL), which is located adjacent to the city of Albuquerque (figures 3.2.8-1 and 3.2.8-2). The site is approximately 6.5 miles east of downtown Albuquerque. SNL consists of 8,300 acres on Kirtland Air Force Base (KAFB) allocated to DOE.

3.2.8.1 *Sandia National Laboratories Missions*

SNL's basic mission as one of the DOE Defense Laboratories is to perform the RD&T necessary to maintain and advance the critical technologies and core competencies required to produce nuclear weapons. The laboratory is operated by AT&T under contract to DOE.

SNL's primary missions are:

- Weapons RD&T, including:
  - Advanced weapon concepts, designs, and technologies.
  - Preparation for testing limitations.
  - Technological surprise.
  - Research in support of the stockpile memorandum, including weapons dismantlement.
  - Weapons surety.
  - Complex 21 technology development.
- Nuclear weapons systems ordnance engineering.
- Nonnuclear component design and development.
- Field and lab testing.
- Manufacturing engineering.
- Verification and control technologies.
- Safeguards and security.

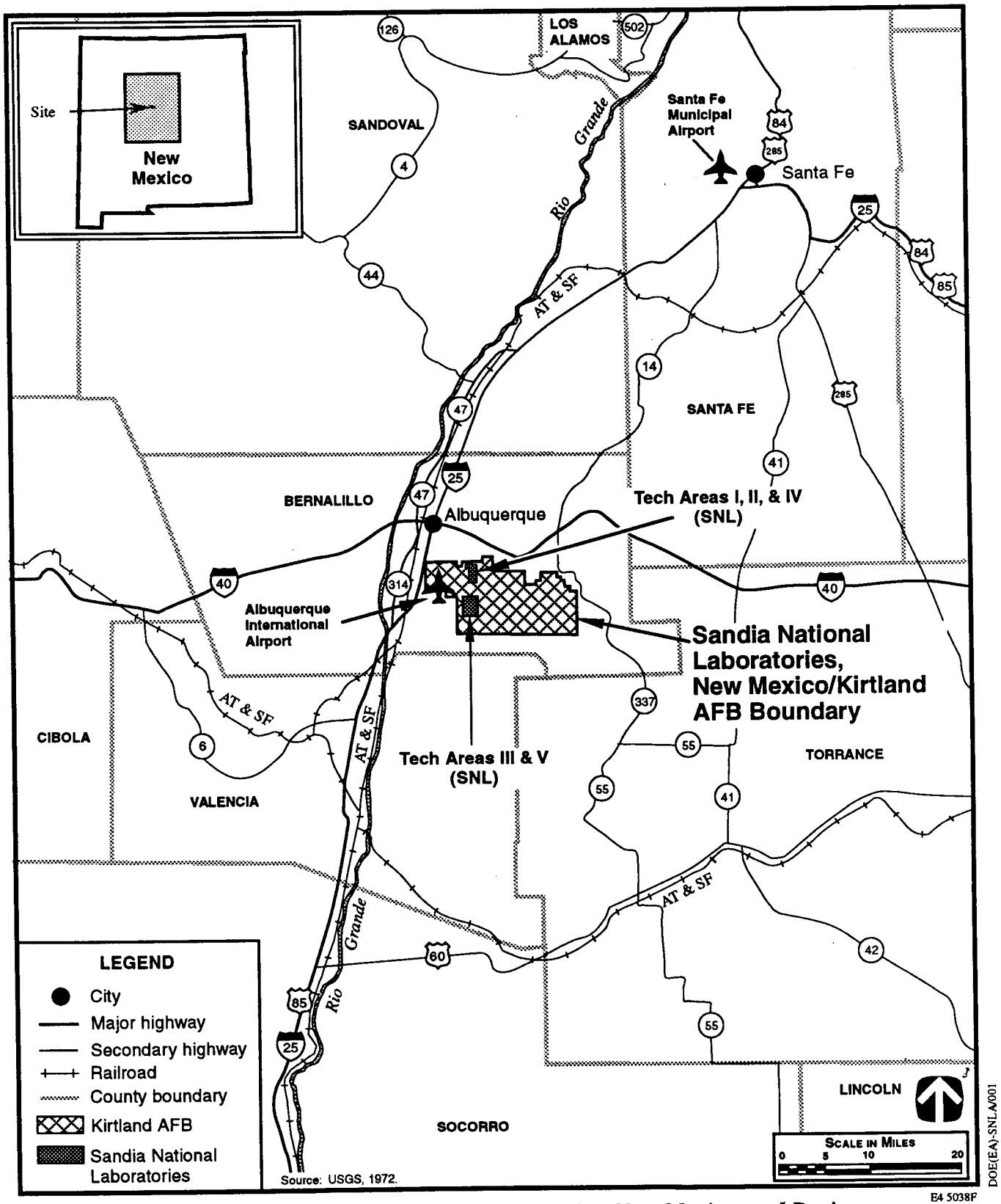

FIGURE 3.2.8–1.—*Sandia National Laboratories, New Mexico, and Region.*

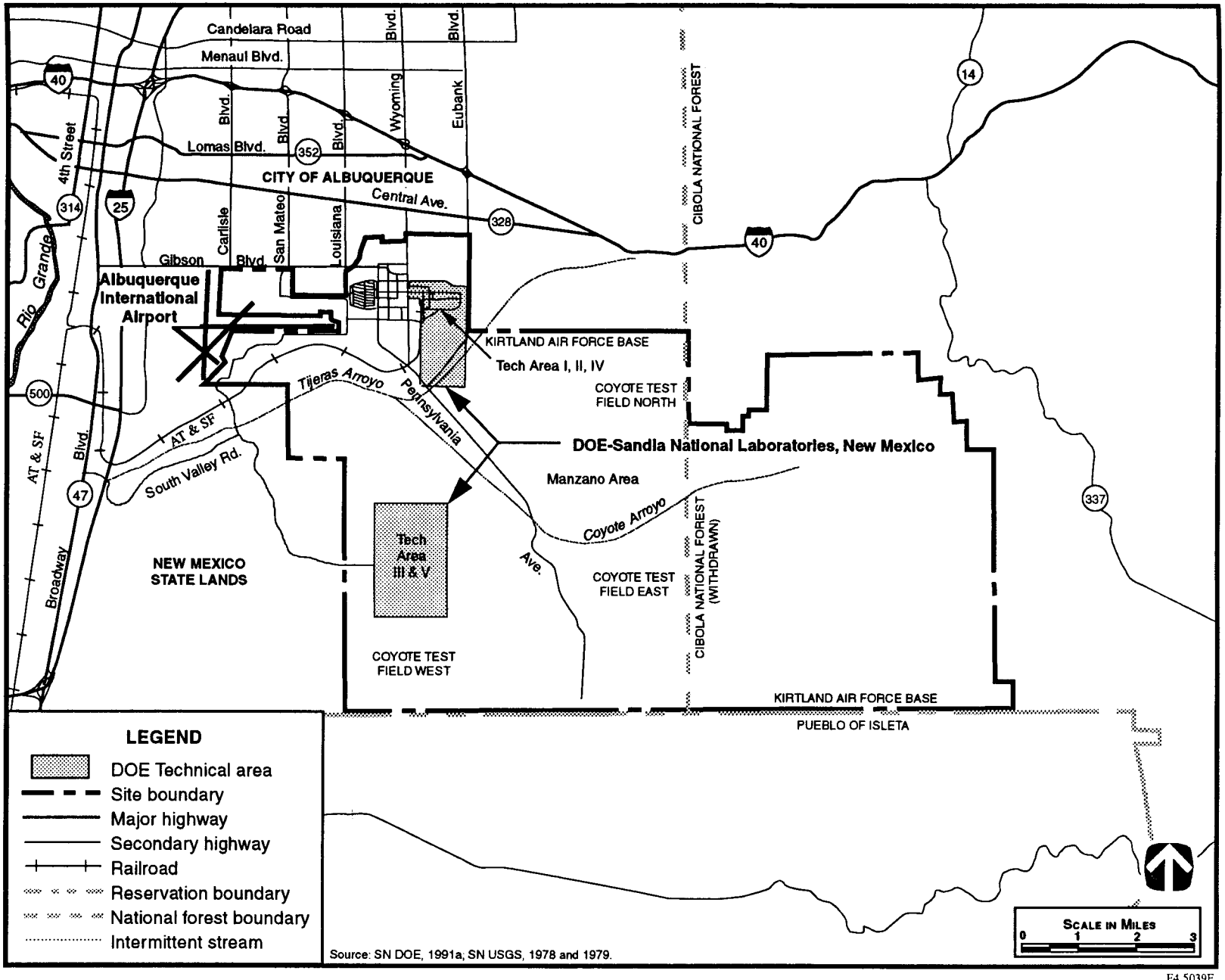

FIGURE 3.2.8–2.—*Location of Facilities at Sandia National Laboratories, New Mexico.*

- Nonweapons work.
- Particle beam technology.
- Intelligence.
- Advanced military technology.
- Radiation-hardened microelectronics.
- Nuclear Regulatory Commission (NRC) R&D.
- Activities for non-Federal entities.
- Technology commercialization.
- Performance of surveillance activities to insure reliability of stockpile.
- Pollution prevention.
- Waste management.
- Strategic Defense Initiative.
- Threat assessment.
- Advanced concepts research.
- Space technology.
- Nonproliferation.
- Emergency response.
- Underground nuclear testing.
- Energy Sciences.
- Environmentally conscious manufacturing.
- Energy systems development.
- R&D to support development and production engineering.
- Nuclear effects, vulnerability, and lethality assessment.

3.2.8.2 *Facility/Process Description*

SNL uses facilities at five Technical (Tech) Areas and a Test Field (figure 3.2.8-2).

- Tech Area I—Administration, site support, technical support, component development, research, energy programs, microelectronics, defense programs, and exploratory systems.
- Tech Area II—Testing explosive components.
- Tech Area III—Testing and simulating a variety of natural and induced environments, including two rocket sled tracks, two centrifuges, and a radiant heat facility.
- Tech Area IV—A remote site for pulsed power sciences such as X-ray, gamma-ray, and particle beam fusion accelerators.
- Tech Area V—A remote area for experimental and engineering reactors and particle accelerators.
- Coyote Test Field—Land parcels scattered throughout the Coyote Test Field used for testing.

There are currently 560 major buildings totaling 4 million ft^2 spread over Tech Areas I, II, III, IV, V, and the Coyote Test Field. This action would involve existing facilities only in Tech Areas I and III.

As of September 1992, SNL had 8,473 employees (DOE, 1993c).

Effluents and Emissions. Normal operations at SNL release small quantities of tritium to surface waters. These releases are discussed in section 4.1.5.3. Pretreated industrial wastewater and sanitary wastewater are discharged to the city of Albuquerque's wastewater treatment plant. None of the industrial or sanitary wastewater discharges go directly to surface water channels. Wastewater effluents from current operations at SNL are discussed in section 4.1.5.3.

Normal SNL operations release tritium to the environment. The tritium releases are discussed in section 4.1.5.2 and the associated health impacts are discussed in section 4.1.5.9 The major sources of criteria air pollutants at SNL are the steam plant at Tech Area I; paint shops, toxic machine shops, process development laboratory, emergency diesel generator plant, and solvent spray booth, all located in Tech Area I; and explosive testing at Tech Area II. Other emissions include fugitive particulate emissions from waste-burial activities, other process emissions, and vehicles. Hazardous/toxic air pollutant sources include various laboratories and miscellaneous operations. Hazardous/toxic air pollutants include, but are not limited to, TCA, toluene, and xylene. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at SNL are discussed in section 4.1.5.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.8.

Safety and Accidents. The review of historical information at SNL indicated that during the period 1986-1990, one accidental release was reported under the requirements of CERCLA and SARA because of the quantity released. This involved the release in 1987 of 30 lb of capacitor oil containing PCBs. Additionally, there have been numerous releases of lead associated with rocket tests which were reported to the National Response Center and the appropriate approval received before the tests were conducted. However, none of these releases resulted in a significant adverse impact offsite. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1991h and 1992i) planned to start prior to the end of 1993 include:

- The Robotic Manufacturing Science & Engineering Laboratory and Program Support Center projects would eliminate the serious problems of ventilation, chemical handling and storage, access to hazardous materials, structural deterioration, unsafe co-mingling of activities, and extreme overcrowding caused by the use of temporary and substandard buildings. Completion of this project is planned for 1996.

- The Fire Protection Main to Building 9925 project would enhance the fire response capability to remote facilities. Completion of this project is planned for 1995.

- The Acid Waste Neutralization System Upgrade would lower the probability of pH and fluoride excursions in the Microelectronics Development Laboratory's wastewater. Completion of this project is planned for 1995.

- The Closed Loop Rinse Water Pretreatment System is required to ensure meeting all Albuquerque wastewater requirements while minimizing water usage. This project is scheduled for completion in 1993.

- The Vacuum Plasma Spray Chamber and Plating Process Control project would replace outdated equipment. This

project is scheduled for completion in 1993.

3.2.8.3 *Waste Management*

Waste management operations at the SNL consist of five broad waste types: TRU, LLW, mixed waste, hazardous/toxic waste, and nonhazardous waste. Because there are no TRU wastes associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of TRU waste generation and management. Table 3.2.8-1 represents the 1991 waste generation at SNL.

Radioactive Waste Streams and Management. Radioactive waste at SNL is generated in both technical and remote test areas as the result of RD&T activities. Most of the waste consists of contaminated equipment, combustible decontamination materials, and cleanup debris.

All LLW and mixed waste are being temporarily stored at generator sites or in DOT-approved containers above ground at the permitted Technical Area III interim storage site. Approximately 1,600 ft^3 of waste were accepted at the Technical Area III storage site during 1990. The waste consists primarily of fission product and uranium-contaminated waste on a volumetric basis, and tritium-contaminated waste on an activity basis. All LLW packages are currently stored onsite pending approval to be transported by commercial carriers in closed vans to NTS for disposal.

Mixed Wastes. Low-level mixed wastes include radioactively-contaminated oils and solvents, radioactively-contaminated or activated lead, or other heavy metals. Other mixed wastes may be generated as a result of weapons tests. Completion of construction and operation of the Radioactive and Mixed Waste Management Facility is expected in 1996. This 6,000-ft^2 facility will have a centralized packaging and storage facility function for LLW and mixed waste. Mixed waste will be stored at the facility until accepted for disposal at the NTS or Waste Isolation Pilot Plant site. Processing at the Radioactive and Mixed Waste Management Facility

TABLE 3.2.8.–1.—*Sandia National Laboratories, New Mexico: Waste Management (1991)*

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	198,450 gal	70,000 gal[a]	None	Offsite
Solid	4,500 ft^3		None	Offsite
Nonhazardous				
Liquid	200,000,000 gal	None	None	Offsite-Sewer System
Solid	800,000 ft^3	None	None	KAFB Landfill
LLW		89,000 ft^3 [a]		
Liquid	4,160 gal		None	None
Solid	2,355 ft^3		None	Offsite DOE
Mixed				
Liquid	480 gal	b	None	None
Solid	115 ft^3		None	None

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[a] Includes both solid and liquid.
[b] The total storage capacity for both LLW and mixed waste combined is 89,000 ft^3. Separate storage capacities for LLW and mixed waste have not been designated.

Source: SN DOE, 1992d.

will include activities required to comply with the waste acceptance criteria and Federal regulations. Waste will be stored at this facility until suitable treatment and disposal facilities are available for the disposal of these wastes in accordance with the provisions of RCRA. SNL is currently aiding DOE in a compliance agreement to be negotiated with the EPA, Region VI Field Office. DOE and SNL are assessing their responsibilities as outlined in the *Federal Facilities Compliance Act* and may enter into similar agreements with the State of New Mexico.

Hazardous/Toxic Waste Streams and Management. Hazardous/toxic chemical wastes are generated at SNL by the numerous research and development activities conducted throughout the facilities. Major waste generators include the development shops (i.e., plating, plastics, glass) and chemical laboratories. Wastes consist of a large number of different reagents, chemicals, solvents, caustics, acids, and other general laboratory wastes. Chemical wastes generated by RD&T activities are collected from generator locations, segregated according to DOT Hazard Class, and transported to the Hazardous Waste Management Facility for storage.

There are no active onsite disposal facilities for hazardous/toxic wastes at SNL. All RCRA-regulated wastes are manifested and shipped under contract with DOT-registered transporters offsite to RCRA-permitted treatment, storage, and disposal facilities.

Nonhazardous Waste Streams and Management. SNL contains more than 15 miles of sewer lines interconnected with those of KAFB. SNL has five categorical pretreatment operations and three general wastewater streams discharging to the city of Albuquerque's sewer system. These discharges are regulated by the Albuquerque Public Works Department.

Nonhazardous solid sanitary wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. SNL operates a number of salvage/scrap yards throughout the technical and remote areas where surplus equipment is sold to offsite vendors. Trash is collected and taken to the KAFB sanitary landfill on a regular basis.

3.2.8.4 *Utility and Resource Requirements*

Electricity is supplied to SNL and much of southeast Albuquerque through the Public Service Company of New Mexico's switching station on Eubank Boulevard. Voltage is stepped down through transformers to two subtransmission voltages, 46 kV and 115 kV, for distribution through five subtransmission feeders.

KAFB is responsible for the overall natural gas system. The distribution system in Tech Areas I, II, & IV is owned by DOE and operated by SNL. Natural gas is purchased from KAFB, which buys it commercially. Fuel oil is stored in Tech Area I for refueling remote-site tanks and for emergency supply to the steam plant. The steam plant in Tech Area I supplies steam to both that area and KAFB for space heating, hot water converters, absorption chillers, and processes.

Responsibility for water storage and transmission rests with KAFB, with SNL handling distribution only to its own facilities. Remote test areas in Coyote Canyon have water trucked to them.

SNL is responsible for the collection system in its Tech Areas and in Coyote Test Field, while KAFB is responsible for the system base-wide. Tech Areas I and IV are tied into the KAFB system, while Areas II, III, V, and Coyote Test Field have septic tanks independent of the main system. The present chemical storage capability is adequate for SNL's existing missions. The existing resource requirements are summarized in table 3.2.8-2.

TABLE 3.2.8–2.—*Sandia National Laboratories, New Mexico: Existing Resource Requirements*

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	1,400 kWh	5,000 kW	50,000 kW
Natural Gas	1,500,000 ft^3	250,000 ft^3/hr	250,000 ft^3/hr[a]
Water	1,000,000 gal	1,400 gpm	2,800 gpm[a]

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	720,000 gal	72,000 gal
Argon	400,000 gal	46,000 gal
Helium	b	b
Hydrogen	1,152,000 ft^3	76,000 ft^3
Oxygen	5,330,000 ft^3	533,000 ft^3

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Table assumes that SNL operates 365 days per year.

[a] SNL's water and natural gas systems are extensive and complex. Peak system capacity estimates should not be considered definitive.

[b] Helium is supplied in small, portable bottles at the usage site. Cumulative site and usage figures are not available.

Source: SN DOE, 1992d.

3.3 PROPOSED ACTION—KANSAS CITY PLANT CONSOLIDATION

The Proposed Action is summarized in section 3.1.1 of this chapter; detailed descriptions of all activities involved with this action are presented here. Function transfers for the Proposed Action are illustrated in figure 3.3-1. The proposed facility modifications required to support each relocated function are discussed for each of the potentially affected sites. Table 3.3-1 shows the anticipated workforce requirements for this action.

Ongoing implementation planning by DOE and refinement of the conceptual design reports (CDR) prepared for the Proposed Action indicate that changes to these workforce numbers may occur. The Socioeconomics and Community Services Sections of Chapter 4 discuss the impact of these potential changes on the analysis of the workforce numbers presented in table 3.3-1 as appropriate.

3.3.1 Consolidate Electrical/Mechanical Functions at the Kansas City Plant

The electrical/mechanical functions to be consolidated at KCP would be situated within existing buildings at the KCP site as shown in figure 3.3.1-1.

Nonnuclear electrical/mechanical manufacturing functions from Mound, Pinellas, and RFP described in sections 3.2.2, 3.2.3, and 3.2.4, respectively would be consolidated at KCP. These functions consist of the 16 specific activities listed in table 3.3.1-1.

Under the Proposed Action, no new buildings or additional parking would be required at KCP. Interior modification, demolition, and remedial measure requirements are summarized in table 3.3.1-2. Anticipated construction material resource requirements for the consolidation of nonnuclear manufacturing activities at KCP are listed in table 3.3.1-3.

Buildings that would receive relocated activities include the Main Manufacturing Building, the Manufacturing Support Building, and the Electrical Products Manufacturing Building. The proposed activities would be incorporated into the existing product lines or moved into space that either is currently vacant or can be made available by rearranging other items. There would be a substantial amount of interior renovation such as relocation of walls, utilities, and equipment, and the construction or renovation of special facilities such as clean rooms.

A process waste assessment was conducted for each of the component manufacturing operations to be transferred to KCP. Table 3.3.1-4 presents a summary of the additional waste types and volumes of the liquid and solid wastes to be generated by the transfer. Appendix B, section B.1 provides more

TABLE 3.3–1.—*Estimated Additional Peak Construction/Operations Workforce Requirements–Proposed Action*

Site	Construction Workforce	Operations Workforce
Kansas City Plant	80	425
Savannah River Site	100	45
Los Alamos National Laboratory	60	115
Y-12 Plant	(80)[a]	(10)[a]
Sandia National Laboratories, New Mexico	95	385
Total	335[a]	970[a]

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[a] Y-12 option to Proposed Action workforce numbers not included in totals.

Source: DOE, 1993b; KC ASAC, 1992a; LA DOE, 1992; SN DOE, 1992d; SR DOE, 1992a; Y-12 MMES, 1992b.

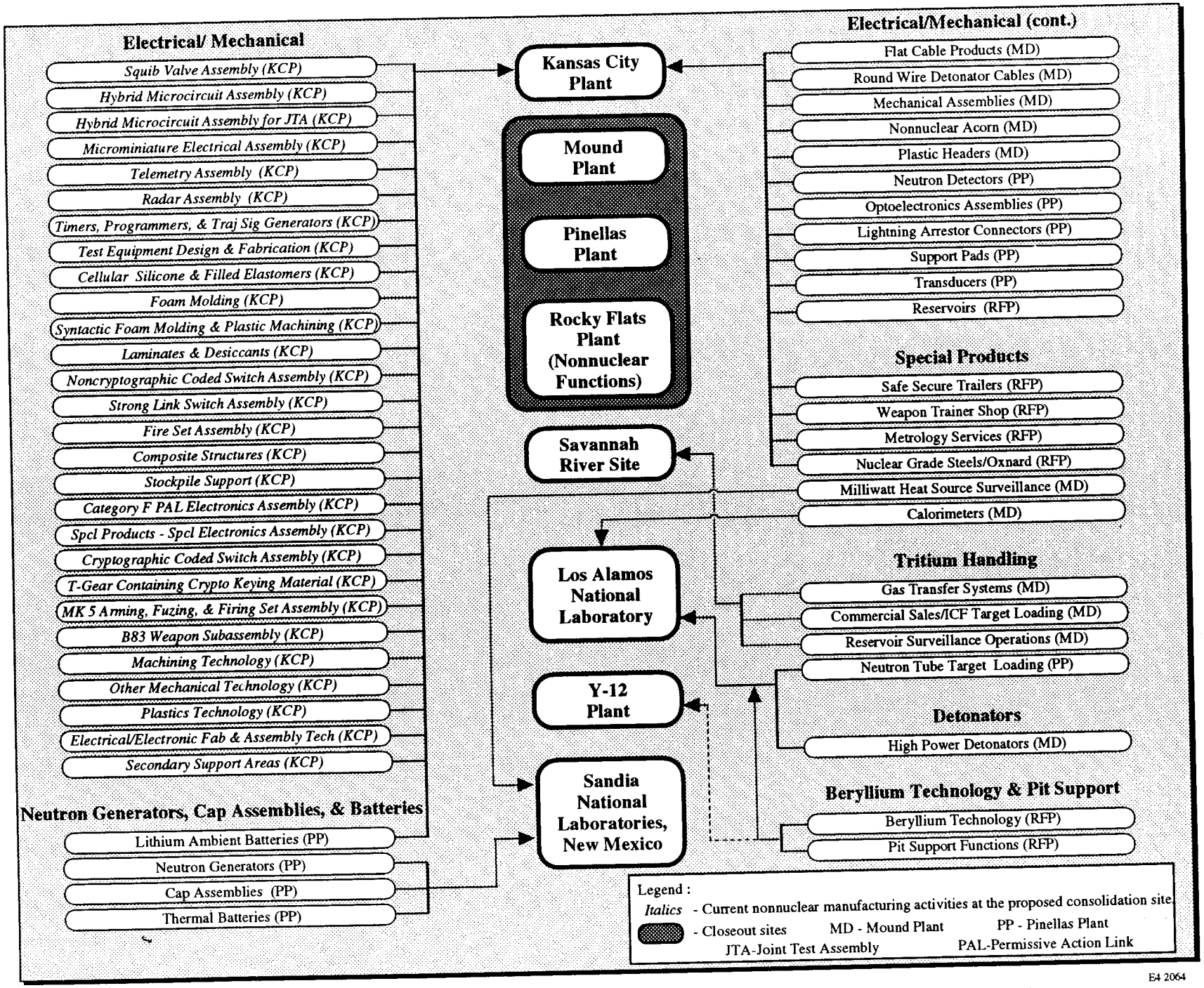


FIGURE 3.3–1.—*Consolidation of Electrical/Mechanical Products at the Kansas City Plant.*

detailed discussion and summary tables of the process waste assessment data for each component production operation. The management and disposal of generated waste and effluents is also discussed in appendix B, section B.1. Appendix D details air emissions.

As a result of this consolidation, certain hazardous chemicals (discussed in detail in appendix F and included in table F-3) would continue to be used in activities at the KCP. Because of exposure during normal use and possible release, the suspect carcinogenic chemicals toluene diisocyanate and methylene dianiline were analyzed. In 1991, KCP used 5,960 lb of toluene diisocyanate as a curing agent in a polyurethane molding process and 145 lb of methylene dianiline in a number of epoxy resin lamination processes. Processes that would be transferred as a result of this consolidation would cause negligible or no increases in the annual use of these chemicals. The consolidation would add 1 lb of toluene diisocyanate, used as a curing agent in a polyurethane compound, and 3 lb of methylene dianiline, used in "Z" Hardener as part of an epoxy encapsulating material. The impacts of chemicals associated with normal operations are discussed in section 4.1.1.9.

No new support facilities (e.g., storage facilities, electrical substations or power plants, and water treatment facilities) would be required.

Estimates of the anticipated additional total operations resource requirements resulting from the consolidation of electrical and mechanical nonnuclear manufacturing activities at KCP are shown in table 3.3.1-5.

Text continues on page 3-82

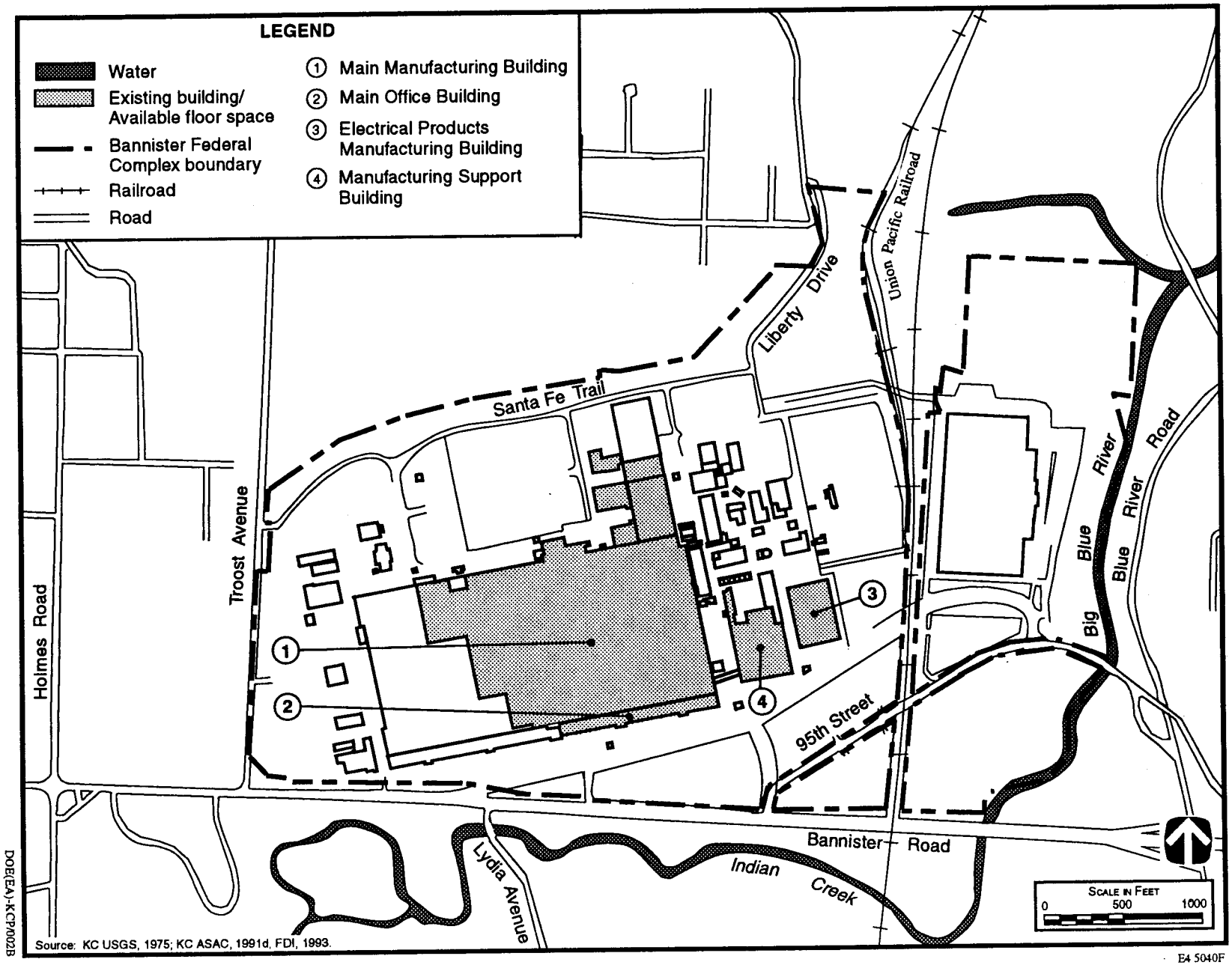


FIGURE 3.3.1–1.—*Proposed Location of New Operations at the Bannister Federal Complex/Kansas City Plant.*

TABLE 3.3.1–1.—*Kansas City Plant: Proposed Action*

Activity	Space Req. (ft^2)	Location	Donor Site
Support Pads	460	MMB	Pinellas
Optoelectronics Assemblies	2,500	MMB & MSB	Pinellas
Neutron Detectors	700	MMB	Pinellas
Lightning Arrestor Connectors	4,000	MMB & EPMB	Pinellas
Transducers	500	MMB	Pinellas
Lithium Ambient Batteries	1,200	MMB	Pinellas
Flat Cable Products	8,800	MMB	Mound
Mechanical Assemblies	2,200	MMB	Mound
Round Wire Detonator Cables and Plastic Headers	1,000	MMB	Mound
Reservoirs and Nonnuclear Acorn	31,600	MMB & MSB	Mound & RFP
Nuclear Grade Steels/Oxnard	8,800	MMB	RFP
Safe Secure Trailers	29,400	MMB	RFP
Weapon Trainer Shop	6,800	MMB	RFP
Metrology Services	0	MMB	RFP
Total	97,960		

E4 3200

MMB Main Manufacturing Building
MSB Manufacturing Support Building
EPMB Electrical Products Manufacturing Building

Source: KC ASAC, 1992a.

TABLE 3.3.1–2.—*Kansas City Plant: Interior Construction/Modification Requirements–Proposed Action* [Page 1 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Support Pads This activity would be located in two areas of the MMB. One area within the welding department would require modification to accommodate the equipment that would be moved from Pinellas.	Modify and enlarge existing acoustical spray rooms; relocate a pair of doors; rearrange existing equipment; remove and replace coreboard partitions.	None	Temporarily disconnect existing electrical utility service and reinstall after modifying existing acoustical spray room.
Optoelectronics Assemblies This activity would be moved into existing departments and vacant space in the MMB and MSB requiring modifications necessary to accommodate the equipment that would be moved from Pinellas. In the MSB, a hydrogen furnace area will be provided and in the MMB, equipment will be installed in an existing clean room.	Remove floor tile, coreboard partitions, and doors; construct hydrogen furnace/metallization work area.	None	Remove and replace utility piping, ductwork, and vents, including compressed air, city and chilled water, steam, gaseous and liquid nitrogen, argon, helium, and hydrogen piping; remove and replace bus tap switch; safety switch and panel board; rearrange existing electrical services; install hydrogen detection system; modify fire protection sprinkler system; install additional power and lighting.

E4 3779-1

Footnotes at end of table.

TABLE 3.3.1–2.—*Kansas City Plant: Interior Construction/Modification Requirements–Proposed Action*—Continued [Page 2 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Neutron Detectors This process would be integrated into the Telemetry Laboratory area in the MMB.	Rearrange existing equipment and install banker's partition within an existing department.	None	Relocate utility piping; install carbon dioxide piping system; install low voltage panelboard; relocate receptacles.
Lightning Arrestor Connectors This would be located primarily in the EPMB with two processes (testing and lead mixing) integrated into appropriate laboratory areas in the MMB.	Rearrange existing equipment; construct Lead Titanate room and install new Class 100 clean room and banker's partitions.	None	Remove existing ductwork and utility piping; install new compressed air, chilled water, gaseous nitrogen piping; modify existing sprinkler systems; remove and replace existing electrical utilities, including receptacles, bus tap switches, and miscellaneous wiring; install low voltage panelboard, additional power, and lighting.
Transducers This process would be integrated into the Telemetry Laboratory area in the MMB.	Rearrange existing equipment within an existing department.	None	Modify existing exhaust systems, vacuum pump, compressed air, chilled water, and gaseous nitrogen piping systems; install liquid nitrogen dewars, argon gas, and deionized water bottles; install dust collection system.
Lithium Ambient Batteries This activity would be located in the MMB requiring the rearrangement and excessing of equipment to provide space for equipment that would be moved from Pinellas.	Remove and replace existing coreboard partitions and crib fence; install new 8 foot high coreboard partitions.	None	Modify existing and install special exhaust systems for potential Sulfur Dioxide release with monitors and alarms. Modify existing gaseous and liquid nitrogen piping systems. Rearrange existing electrical services.
Flat Cable Products This activity would be moved into three areas in the MMB which would require modifications necessary to accommodate the equipment that would be moved from Mound in addition to building a new clean room.	Remove gypsum wallboard partitions; construct an addition to an existing Class 10,000 clean room. Construct a 1,000 ft.^{2} Class 1,000 clean room.	None	Remove and replace utility piping, ductwork, and drains; including compressed air, city, deionized, and chilled water, steam, gaseous nitrogen piping; install new HEPA filters, air handling unit, and ductwork; modify sprinkler system; remove and replace transformer and panel board; rearrange existing electrical services; install fire alarm and communications system; install additional power and lighting.

E4 3779-2

Footnotes at end of table.

TABLE 3.3.1–2.—*Kansas City Plant: Interior Construction/Modification Requirements–Proposed Action*—Continued [Page 3 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Mechanical Assemblies This product line would be integrated into five specific areas of the MMB.	Remove and replace existing vinyl floor tile; modify an existing Class 100,000 clean room.	None	Remove and replace utility piping, ductwork, and drains; including compressed air and gaseous nitrogen piping; install city, deionized, and chilled water, steam; install new HEPA filters, air handling unit, and ductwork; modify sprinkler system; rearrange existing electrical services; install additional power and lighting.
Round Wire Detonator Cables This product line would be integrated into the flex cables department and installed on existing workbenches located in the MMB. It will share the Class 1,000 clean room being constructed for Flat Cable Products.	Minor rearrangement of existing space and equipment required; equipment to be consolidated on existing workbenches.	None	None
Plastic Headers This technology would be absorbed into an existing department in the MMB without additional equipment, construction, or rearrangement being required.	Additional space requirements included with existing injection molded products manufacturing area.	None	None
Reservoirs and Nonnuclear Acorn This product line would make use of existing departments, requiring relocation and rearrangement of existing equipment, and vacant space, requiring removal and replacement of concrete floor, and modifications necessary to accommodate new production equipment in the MMB and MSB.	Remove and replace concrete floor, coreboard and sheetrock walls; construct chase walls and acoustical ceiling; modify existing vacant area in MMB.	Remove woodblock floor.	Install new HEPA filters, air handling unit, ductwork, and steam to water heat exchanger; install additional power and lighting.
Nuclear Grade Steels/Oxnard This activity would be placed in existing vacant space in the MMB which would require modifications necessary to accommodate new equipment.	Remove concrete floor; construct bridge crane superstructure and footings; modify existing vacant area in MMB.	None	Install deionized water system with pump and utility piping; modify existing utilities; install additional power and lighting.

E4 3779-3

Footnotes at end of table.

TABLE 3.3.1–2.—*Kansas City Plant: Interior Construction/Modification Requirements–Proposed Action*—Continued [Page 4 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Safe Secure Trailers This technology would be placed in two existing departments in the MMB and would require the relocation of storage racks to an existing vacated storage area.	Remove concrete floor and masonry wall; construct four bridge crane superstructures and footings; construct new masonry and reinforced concrete walls, ceiling openings, overhead door openings, and basement renovation for locker area.	None	Install new air handling units, and ductwork; remove and replace existing electrical services; install additional power and lighting; install new compressed air piping.
Weapon Trainer Shop This activity would be moved into vacated space within an existing department in the MMB and would require only minor modifications.	Remove and replace metal stud and gypsum wallboard partitions; cut opening in two-hour fire rated wall for new vehicle fire door, ceiling openings.	None	Install new dust collector/filter and ductwork; remove and replace existing electrical services; install additional power and lighting.
Metrology Services This activity would be incorporated into an existing department in the MMB. This activity requires no additional equipment or space at KCP.	No space requirements.	None	None

E4 3779-4

Source: KC ASAC, 1992a.

TABLE 3.3.1–3.—*Kansas City Plant: Estimated Construction Material/Resource Requirements–Proposed Action*

Materials/Resources	Requirement
Utilities:	
Electricity	40 kWh[a]
Water	2,330 gal[a]
Solids:	
Concrete	1,000 yd^3
Steel (structural, rebar, ductwork, and piping)	180 tons
Other[b]	90,000 ft^2
Liquid Fuels	0 gal
Gases	0 ft^3

E4 3469

[a] Average daily consumption.

[b] Includes 65,000 ft^2 of wall materials and 24,000 ft^2 of floor tile.

Source: KC ASAC, 1993b.

TABLE 3.3.1–4.—*Kansas City Plant: Estimated Additional Annual Waste Generation–Proposed Action*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	8,132 gal
Solid	108 ft^3
Nonhazardous	
Liquid	1,676,394 gal
Solid	282 ft^3
LLW	
Liquid	None
Solid	None
Mixed	
Liquid	None
Solid	None

E4 3780

Source: KC ASAC, 1993b.

TABLE 3.3.1–5.—*Kansas City Plant: Estimated Additional Operations Resource Requirements–Proposed Action*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	19,000 kWh	5,800 kW
Natural Gas	8,000 ft^3	8,000 ft^3/hr
Water	1,200 gal	60 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,400 gal
Argon	2,000,000 ft^3
Helium	800,000 ft^3
Hydrogen	7,500 ft^3
Oxygen & Acetylene	56,000 ft^3

E4 3471

Table assumes KCP operates 365 days per year.

Source: KC ASAC, 1993b.

3.3.2 Savannah River Site

Tritium-handling functions at Mound, discussed in section 3.2.2, would be relocated to SRS. Potential facility modification and resource requirements at SRS are discussed below.

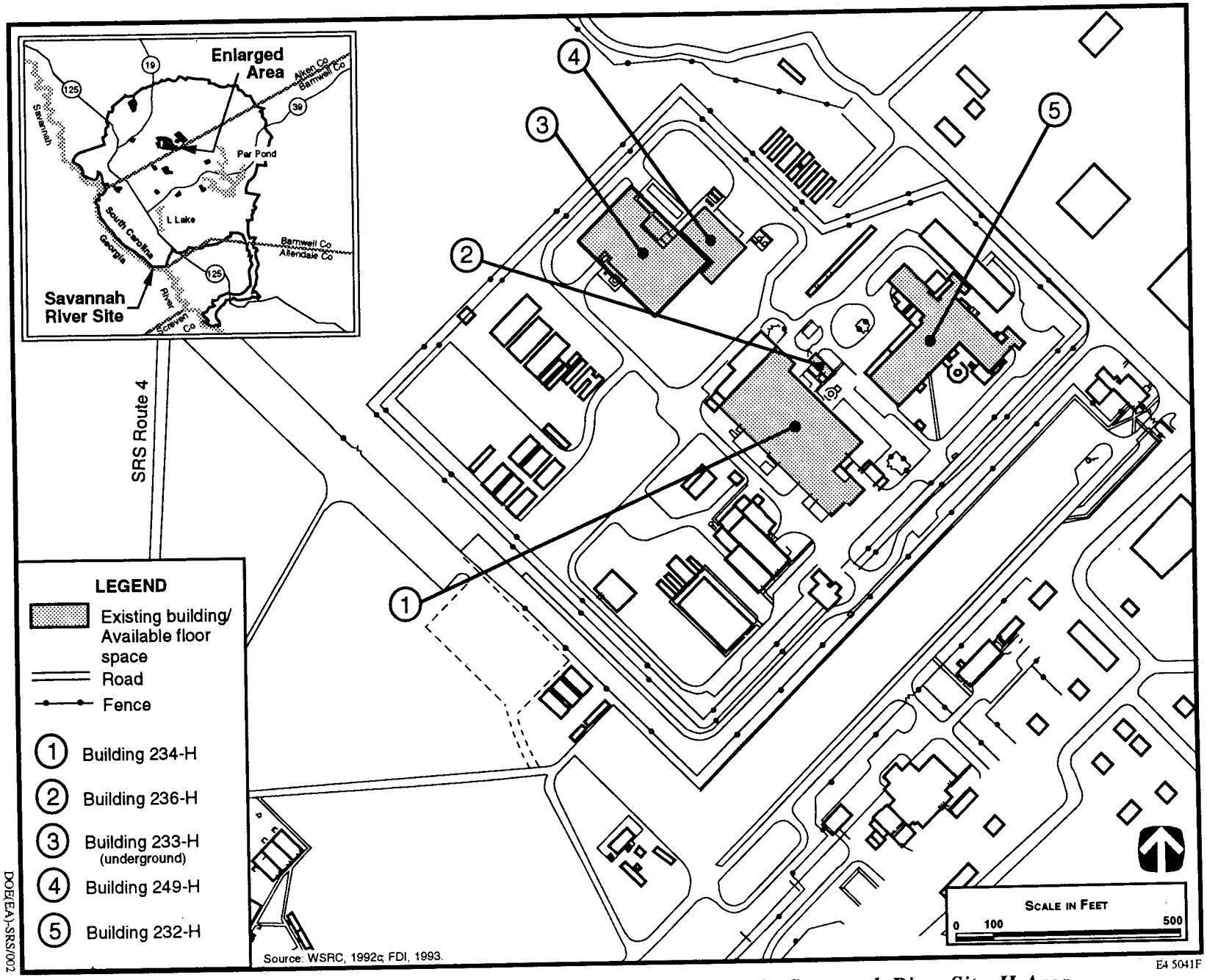
Tritium-handling activities (discussed in section 3.2.2) would be relocated to SRS within existing buildings as shown in figures 3.3.2-1 and 3.3.2-2. Table 3.3.2-1 lists the planned location of the relocated products and provides estimates of space requirements. No new support facility construction would be required to accommodate new products.

All proposed activities could be accommodated in five buildings in the H-Area and one building in the 700-Area. The RTF, Building 233-H, currently preparing for operational startup, would provide much of the needed space for the tritium-handling activities and would receive the most extensive modifications with the addition of a mezzanine and an upgraded or additional exhaust plenum. Interior construction/modification requirements at SRS are addressed in table 3.3.2-2. Anticipated construction material/resource requirements for the consolidation of tritium-handling activities at SRS are listed in table 3.3.2-3.

As a result of tritium-handling processes being transferred to SRS, tritium is of particular concern because of its possible release during potential accidents. The maximum increase of tritium is estimated to be 5 to 10 percent above the quantity estimated to be handled and stored at SRS in 1995. The impacts of tritium and chemicals associated with normal operations are discussed in section 4.1.2.9.

Table 3.3.2-4 presents the anticipated additional annual waste generation volume at SRS. A partial list of waste items resulting from the tritium handling activities is discussed below and in greater detail along with treatment and management in appendix B, section B.2. Effluents are also discussed in the same section, while air emissions are covered in appendix D.

- *Reservoir Surveillance Operations*—Waste generated would be low level compactible and non-compactible waste from nitrogen and argon blanketed glove boxes (approximately 200 ft^3 year). Waste would also be generated by de-contamination of tritium-contaminated components, gloves, etc. In addition, waste would be generated from non-repairable contaminated equipment.



DOE(EA)-SRS/002

FIGURE 3.3.2–1.—*Proposed Location of New Operations at the Savannah River Site, H-Area.*

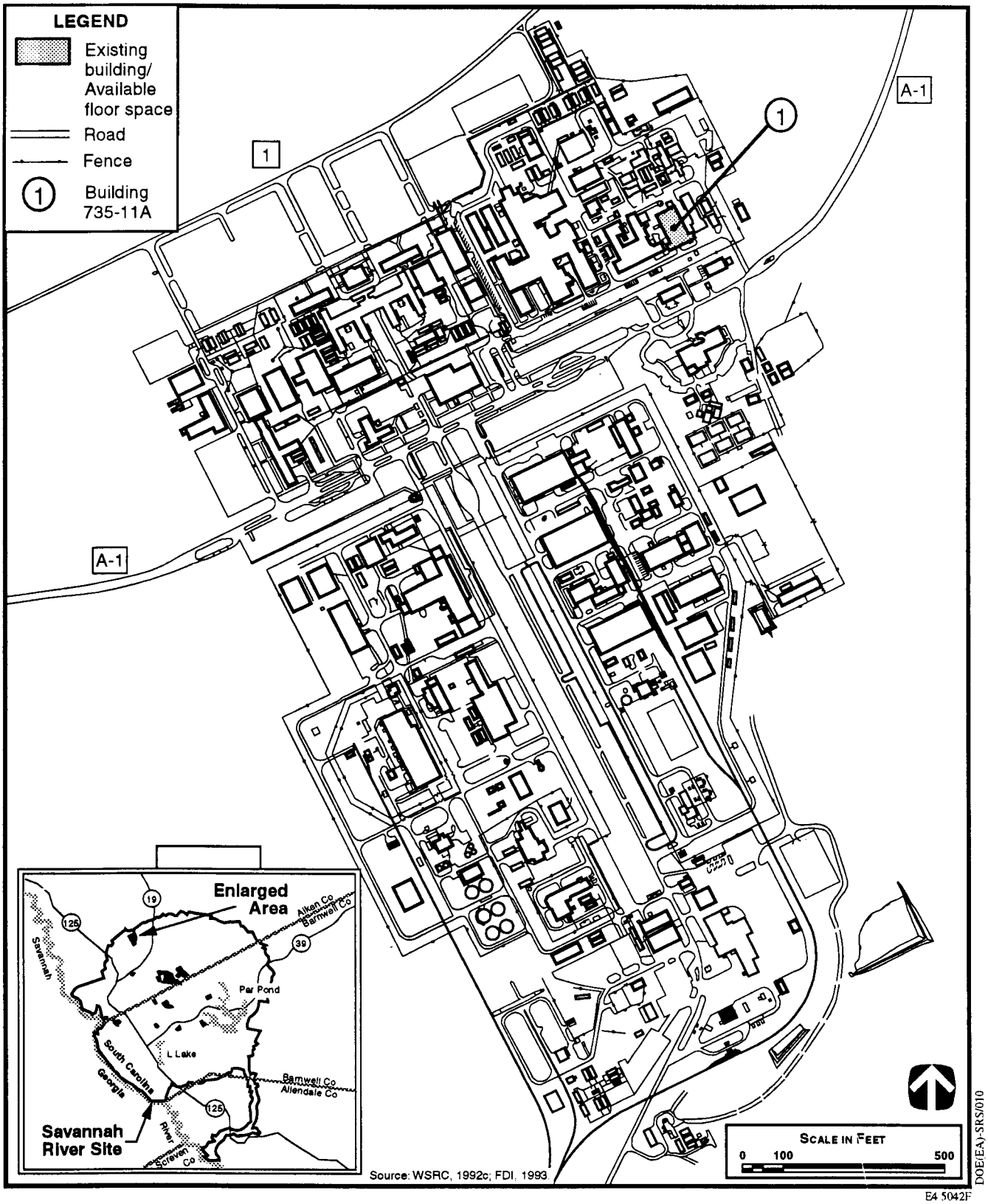


FIGURE 3.3.2–2.—*Proposed Location of New Operations at the Savannah River Site, A-Area.*

- *Gas Transfer Systems*—Materials containing tritium and materials contaminated with tritium would be processed in a vacuum furnace. Residual material would be transferred to the SRS burial ground for waste disposal.

- *Commercial Sales/Inertial Confinement Fusion Target Loading*—LLW would consist of alcohol, cleaning cloths, and gloves contaminated with tritium.

Besides modifying utilities in existing buildings, the relocation of tritium-handling activities would not require new utility services.

Anticipated resource requirements resulting from the consolidation of tritium-handling activities at SRS are provided in table 3.3.2-5.

Text continues on page 3-88

TABLE 3.3.2–1.—*Savannah River Site: Proposed Action*

Activity	Space Req. (ft^2)	Location	Donor Site
Commercial Sales/Inertial Confinement Fusion (ICF) Target Loading	1,000	Bldgs. 232-H, 233-H, 234-H, and 236-H	Mound
Gas Transfer Systems	4,300	Bldgs. 232-H, 233-H, 234-H and 735-11A	Mound
Reservoir Surveillance Operations	5,000	Bldgs. 232-H, 233-H, 234-H, 236-H, and 249-H	Mound
Total	10,300		

E4 3285

Source: SR DOE, 1992a.

TABLE 3.3.2–2.—*Savannah River Site: Interior Construction/Modification Requirements–Proposed Action*

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Gas Transfer Systems This activity would be located in four separate buildings. Building 735-11A would require modifications in order to provide space to install manufacturing development equipment. Building 232-H would require mechanical modifications and installation of additional equipment. Further modifications will be done in buildings 233-H and 234-H.	No structural or architectural modifications required.	None	Install new helium and argon tank systems, gas handling manifold, refrigeration units, dumbwaiter, and piping systems; modify existing glove boxes; install argon–inert glove box and function test station; modify existing communications and fire protection systems; install additional power and lighting.
Commercial Sales/ Inertial Confinement Fusion (ICF) Target Loading This activity would be located in two separate buildings both of which would require no building modifications.	No structural or architectural modifications required.	None	Modify existing utilities; install additional lighting.
Reservior Surveillance Operations This activity would be located in five separate buildings. Building 233-H would require extensive modifications and rearrangements. Building 249-H would require some mechanical and electrical modifications. Existing facilities and equipment would be used in buildings 232-H, 234-H, and 236-H.	Construct wall and mezzanine structure; construct access road to new nitrogen and argon tanks; install electrical dumbwaiter.	None	Modify existing HVAC system; install new nitrogen and argon tank systems and piping systems; modify existing communications and fire protection systems; install additional power and lighting.

E4 3781

Source: SR DOE, 1992a.

TABLE 3.3.2–3.—*Savannah River Site: Estimated Construction Material/Resource Requirements–Proposed Action*

Materials/Resources	Requirement
Utilities:	
Electricity	1,000 kWh [a]
Water	600 gal [a]
Solids:	
Concrete	230 yd^3
Steel (structural, rebar, ductwork, and piping)	154 tons
Other (electrical cable)	75,000 ft
Liquid Fuels	0 gal
Gases	0 ft^3

E4 3472

[a] Average daily consumption.

Source: SR DOE, 1992a.

TABLE 3.3.2–4.—*Savannah River Site: Estimated Additional Annual Waste Generation–Proposed Action*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	None
Solid	None
Nonhazardous	
Liquid	301,125 gal
Solid	1,000 ft^3
LLW	
Liquid	None
Solid	500 ft^3
Mixed	
Liquid	None
Solid	None

E4 3782

Source: SR DOE, 1992a.

TABLE 3.3.2–5.—*Savannah River Site: Estimated Additional Operations Resource Requirements–Proposed Action*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	2,700 kWh	650 kW
Natural Gas	NA	NA
Water	144,000 gal	100 gpm

Chemical Resources	Annual Consumption
Nitrogen	10,000 gal
Argon	500,000 ft^3
Helium	400 ft^3
Hydrogen	400 ft^3
Deuterium	450 ft^3

E4 3474

Source: SR DOE, 1992a.

3.3.3 Los Alamos National Laboratory

High-power detonators and calorimeters from Mound, neutron tube target loading from Pinellas, and beryllium technology and pit support functions from RFP are proposed for relocation to LANL. The option to the Proposed Action to relocate beryllium technology and pit support functions to Y-12 is discussed in section 3.3.4. Relocated functions and activities would be situated within existing buildings as indicated in table 3.3.3-1 and figures 3.3.3-1 through 3.3.3-1f. Descriptions of the functions to be relocated are presented in section 3.2 and appendix A.

Interior construction/modification requirements to existing buildings and facilities at LANL are addressed in table 3.3.3-2 and the anticipated construction material/resource requirements are addressed in table 3.3.3-3.

As a result of this consolidation, certain hazardous chemicals used in activities transferred to LANL are of particular concern because of their possible release during potential accidents (discussed in detail in appendix F and included in table F-3). These chemicals are beryllium compounds (beryllium oxide and beryllium sulfate) and tritium. LANL currently has on hand approximately 2,000 lb of beryllium and beryllium compounds. Under consolidation, the beryllium compounds would be used for coating graphite crucibles and molds to prevent exothermic reaction of molten beryllium with graphite in the vacuum induction and gas atomization melting processes. Processes that would be transferred as a result of this consolidation would increase the amount of beryllium and beryllium compounds on hand by 8,000 lb to 10,000 lb. The maximum increase of tritium would be less than 5 percent above the quantity currently handled and stored at LANL. The impacts of tritium and chemicals associated with normal operations are discussed in section 4.1.3.9.

Additional annual waste generation volumes at LANL due to relocation of the nonnuclear manufacturing activities are shown in table 3.3.3-4. Appendix B, section B.3 provides details on the effluents and additional wastes associated with each of the relocated functions. Appendix D provides details on the air emissions associated with the relocated functions. LLW would be generated from neutron tube target loading functions and calorimeters. Non-compactible materials may include metal shavings and non-repairable contaminated equipment such as disabled pumps, motors, etc.

The high-power detonators, beryllium technology, and pit support functions would generate liquid and solid wastes. The high-power detonators would generate 7,000 gallons per year of HE-contaminated solvents and 205 ft^3/yr of residues from solid scrap HE and HE-contaminated solid wastes after incineration. Beryllium technology and pit support

Text continues on page 3-97

TABLE 3.3.3–1.—*Los Alamos National Laboratory: Proposed Action*

Activity	Space Req. (ft^2)	Location	Donor Site
High-Power Detonators	13,000	Bldgs., 23, 34, 93 in TA 22 and Bldgs. 340, 342, & 460 in TA 16	Mound
Calorimeters	10,200	Bldgs. 2 & 27 in TA 35	Mound
Neutron Tube Target Loading	3,600	Bldg. 209 in TA 21	Pinellas
Beryllium Technology	15,170	Bldg. 141 in TA 3	RFP
Pit Support Functions	1,000	Bldgs. 39, 66 & 141 in TA 3	RFP
Total	42,970		

E4 3931

Source: LA FDI, 1993.

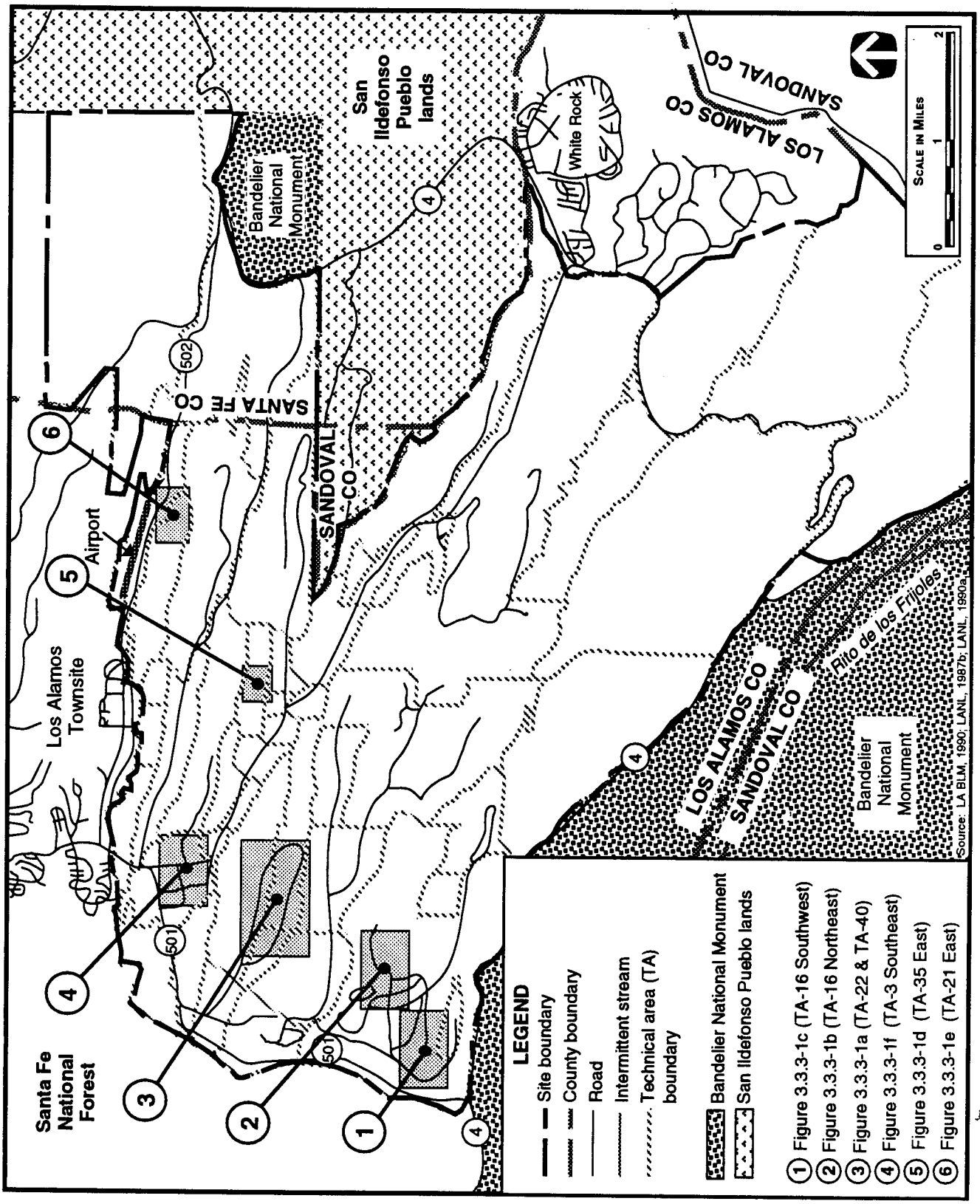


FIGURE 3.3.3–1.—*Los Alamos National Laboratory–Locator Map.*

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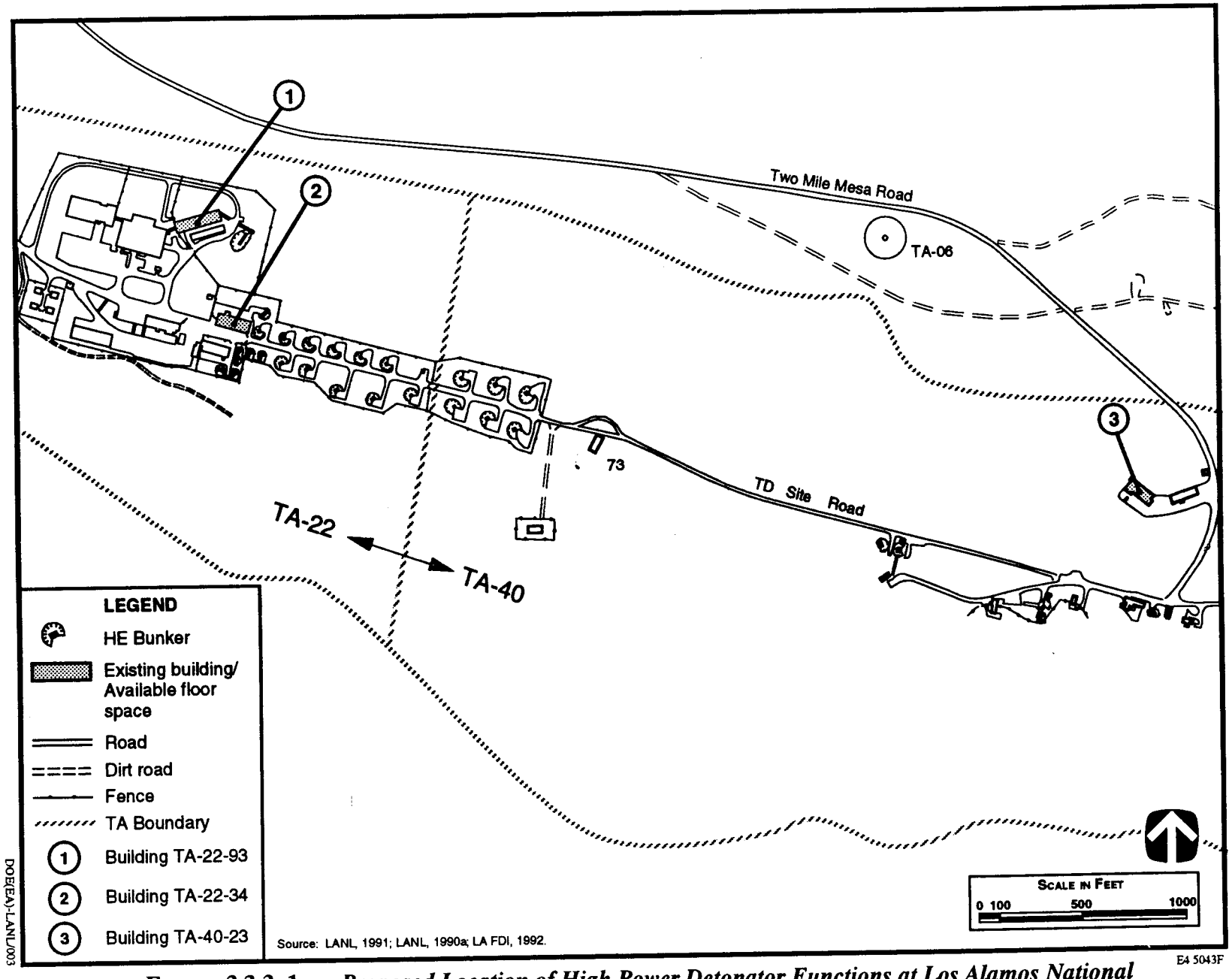

FIGURE 3.3.3–1a.—*Proposed Location of High Power Detonator Functions at Los Alamos National Laboratory, TA-22 and TA-40.*

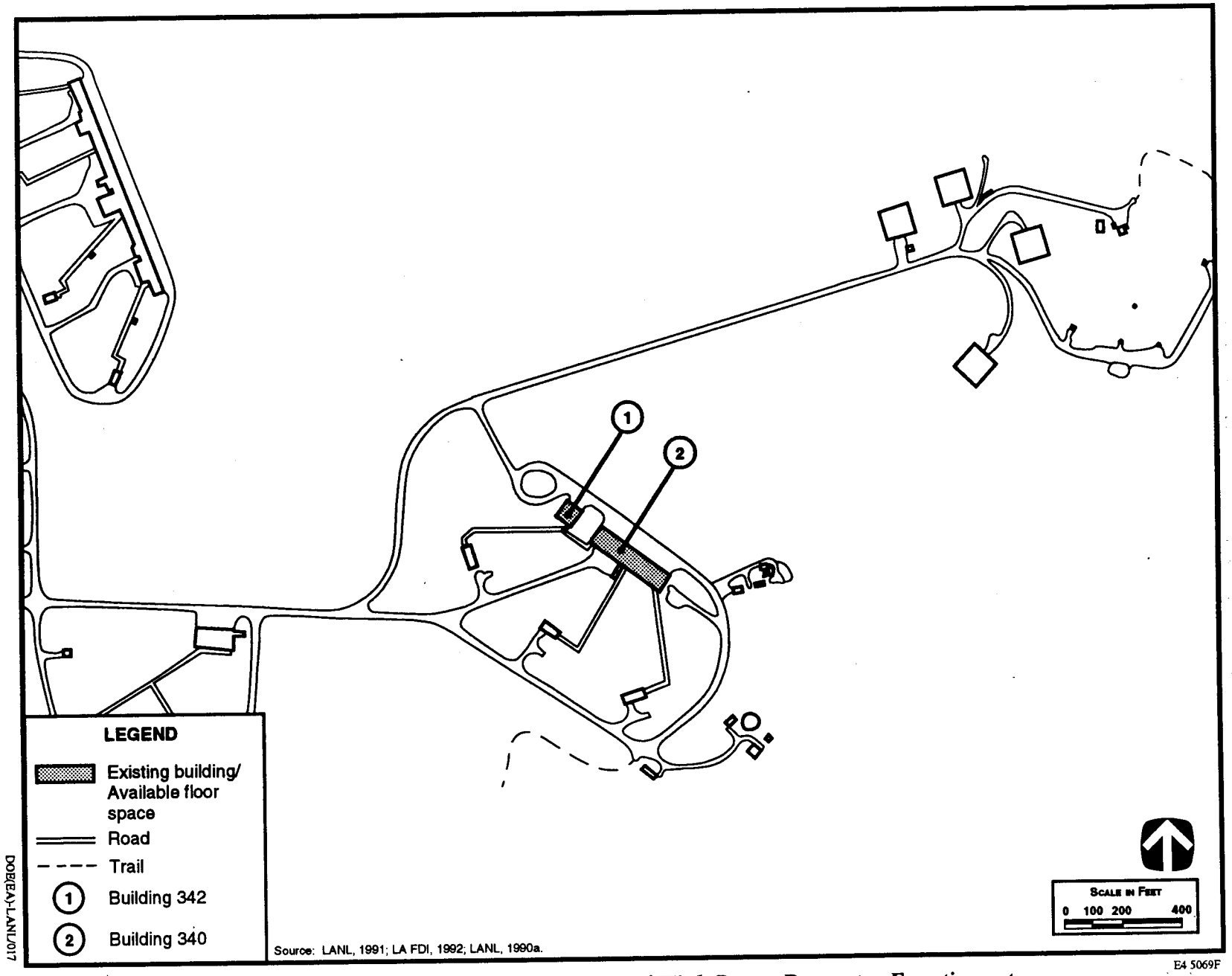

FIGURE 3.3.3–1b.—*Proposed Location of High Power Detonator Functions at Los Alamos National Laboratory, TA-16 Northeast.*

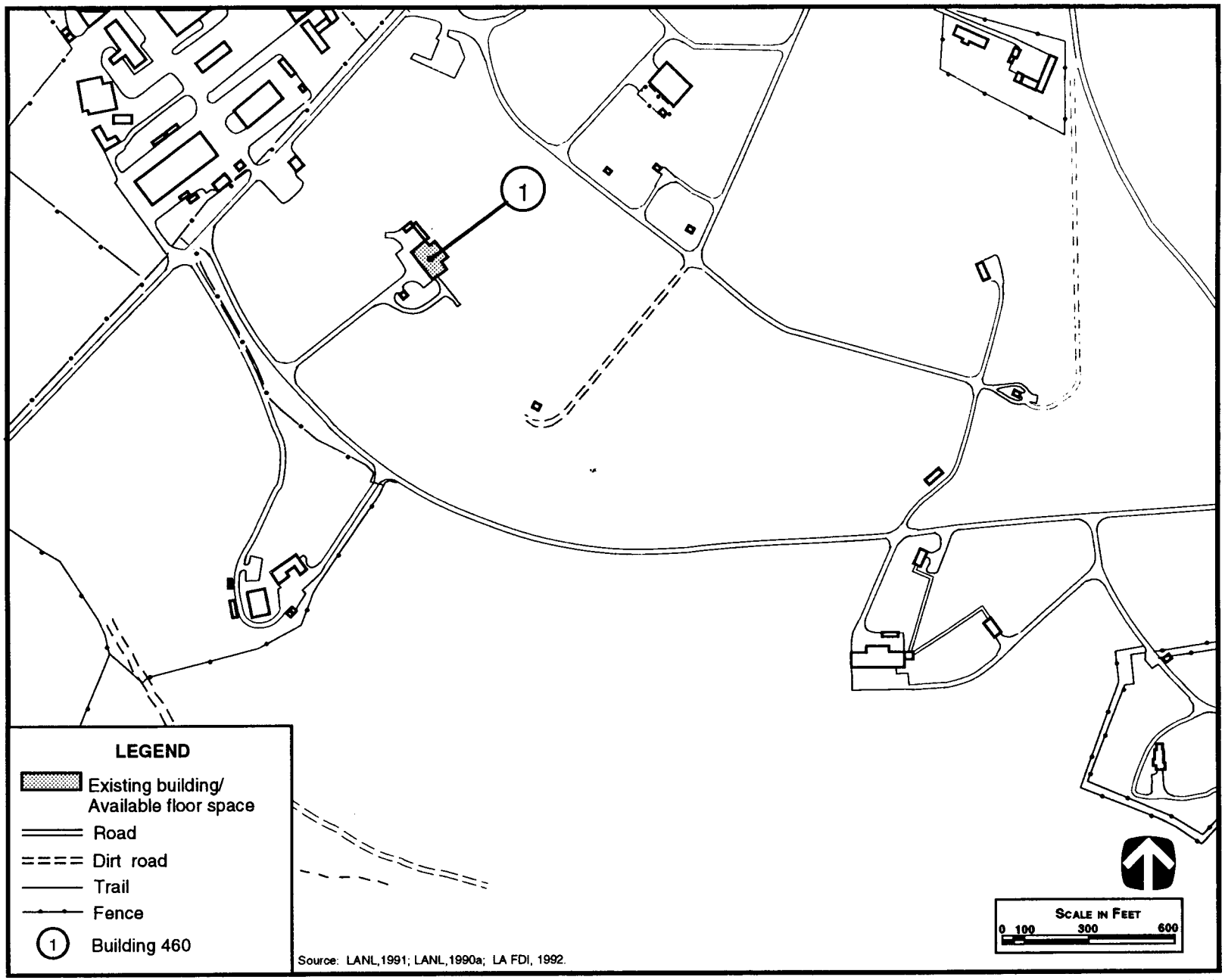

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FIGURE 3.3.3–1c.—*Proposed Location of High Power Detonator Functions at Los Alamos National Laboratory, TA-16 Southwest.*

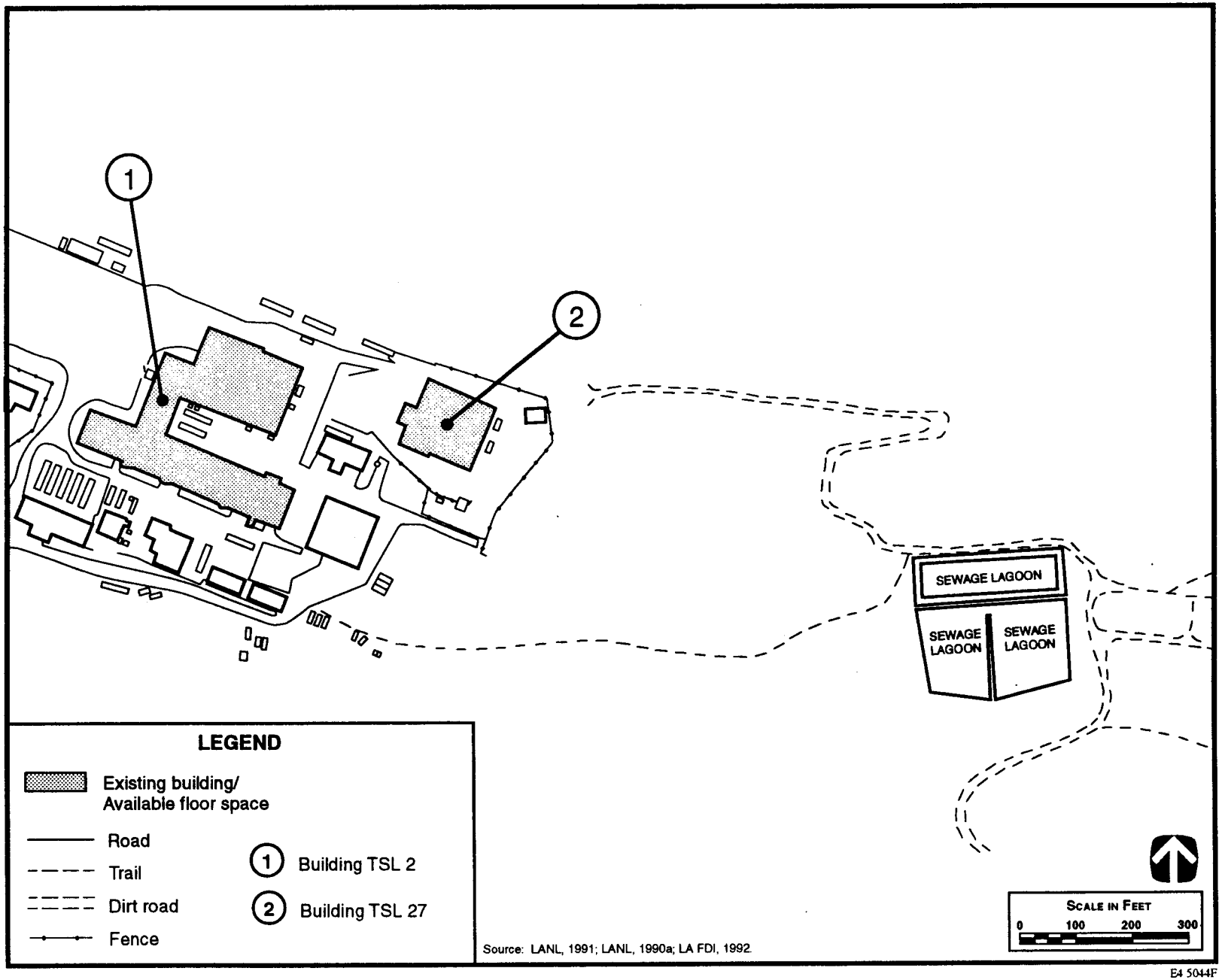

FIGURE 3.3.3–1d.—*Proposed Location of Calorimeter Operations at Los Alamos National Laboratory, TA-35 East.*

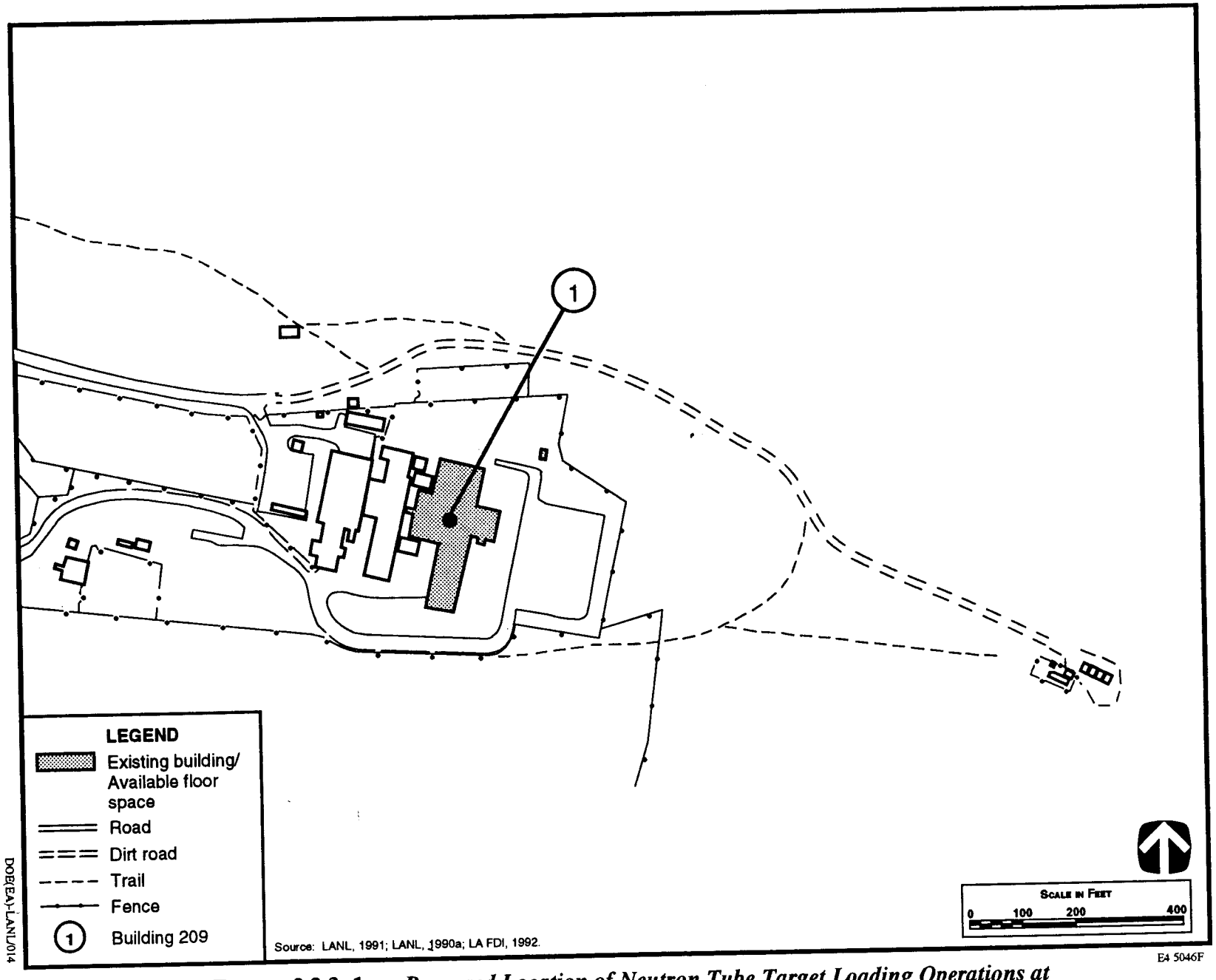

FIGURE 3.3.3–1e.—*Proposed Location of Neutron Tube Target Loading Operations at Los Alamos National Laboratory, TA-21 East.*

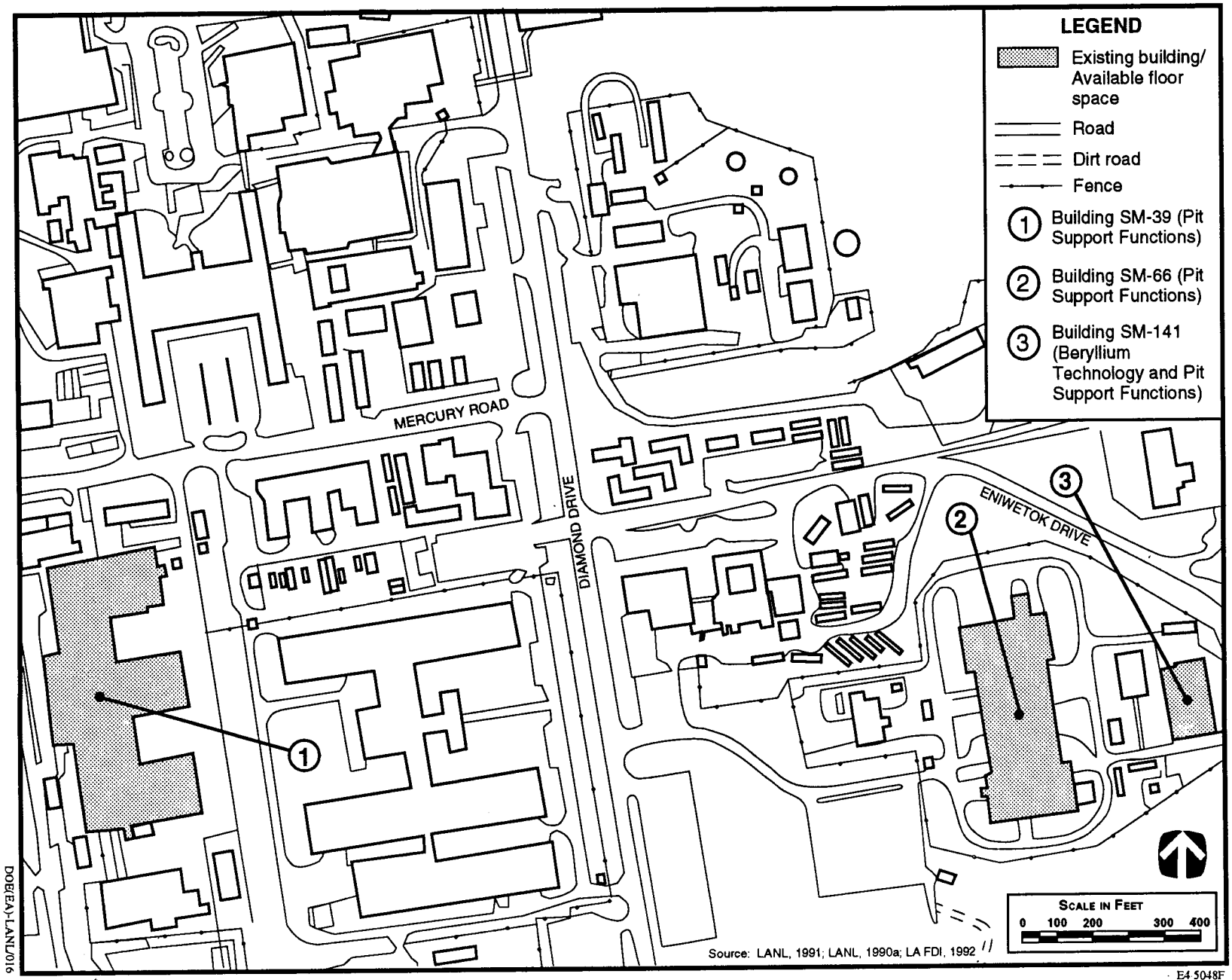

FIGURE 3.3.3–1f.—*Proposed Location of Beryllium Technology and Pit Support Functions at Los Alamos National Laboratory, TA-3 Southeast.*

TABLE 3.3.3–2.—*Los Alamos National Laboratory: Interior Construction/Modification Requirements–Proposed Action*

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
High-Power Detonators This activity would be moved into Buildings 34 and 93 in TA 22, and Buildings 340, 342 and 460 in TA 16. Existing occupants of Building 34 would be relocated to Building 23 in TA 40. Building 23 would require remodeling to accommodate the new occupants. No major modifications to Buildings 93, 340, 342 and 460.	Extensive interior modifications of Building 34. Demolition of steps, landing, walls, HVAC, floors, plumbing, utilities and electrical systems, windows and roofing. Construct seismic upgrades, concrete ramps, steps and dock areas, walls and floors. Install new doors, interior walls, plumbing and utility systems. Extensive interior modifications of Building 23. Demolition of masonry walls, stairs, floor, windows, doors, HVAC, plumbing, utility, and electrical systems and existing roofing. Construct and install seismic upgrades, floors, walls, plumbing, and utilities.	Asbestos abatement	Extensive electrical and mechanical modifications for both Buildings 34 and 23; install additional power and lighting, fire protection and HVAC systems.
Calorimeters This activity would be moved into Buildings 2 and 27 in TA 35.	No major interior modifications/ construction required.	None	None
Neutron Tube Target Loading This activity would be located in Building 209 in TA 21.	Demolition of interior block masonry wall, metal partitions, and doors. Construction of new walls, partitions and doors.	Asbestos abatement and removal of tritium contaminated equipment.	Modification of HVAC, plumbing, utility and electrical systems.
Beryllium Technology This activity would be moved into Building 141 in TA 3.	Expand existing space; interior modifications include demolition of masonry walls, doors, windows, HVAC, electrical systems, stairway, stack and roofing; construct and install seismic upgrades, walls, doors, roof and utilities; install new HVAC equipment room; rearrange existing equipment; construct liquid waste holding tank.	Asbestos abatement	Modify existing HVAC and utilities; install new additional HVAC system; install additional power and lighting.
Pit Support Functions This activity would be moved into Buildings 39, 66 and 141 in TA 3. No modifications to Buildings 39 and 141 are necessary for this activity.	Expand existing space in Building 66; some interior modifications; rearrange existing equipment; construct new drywall and framing.	None	None

E4 3932

Source: LA FDI, 1992 and 1993.

functions would generate 508 gallons per year of liquid hazardous waste and 100 ft^3/yr of solid hazardous wastes. There would be no beryllium-contaminated effluent discharged from the beryllium function. Beryllium-contaminated wastewater will be collected and shipped offsite using DOT-certified transporters.

Other than modifying utilities in existing buildings, no new utility services or support facilities are required.

Table 3.3.3-5 provides estimates of additional anticipated operations resource requirements.

TABLE 3.3.3–3.—*Los Alamos National Laboratory: Estimated Construction Material/ Resource Requirements–Proposed Action*

Materials/Resources	Requirement
Utilities:	
Electricity	1,750 kWh [a]
Water	5,200 gal [a]
Solids:	
Concrete	264 yd^3
Steel (structural, rebar, ductwork, and piping)	23 tons
Liquid Fuels	18,200 gal
Gases	48,000 ft^3

E4 3766

a Average daily consumption.

Source: LA FDI, 1993.

TABLE 3.3.3–4.—*Los Alamos National Laboratory: Estimated Additional Annual Waste Generation–Proposed Action*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	7,508 gal
Solid	305 ft^3
Nonhazardous	
Liquid	442,000 gal
Solid	10,680 ft^3
LLW	
Liquid	30 gal
Solid	200 ft^3
Mixed	
Liquid	None
Solid	20 ft^3

E4 3933

Source: LA FDI, 1993b; LA DOE, 1992.

TABLE 3.3.3–5.—*Los Alamos National Laboratory: Estimated Additional Operations Resource Requirements–Proposed Action*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	3,960 kWh	500 kW
Natural Gas	0 ft^3	0 ft^3/hr
Water	1,000 gal	40 gpm

Chemical Resources	Annual Consumption
Nitrogen	0 gal
Argon	10,000 ft^3
Helium	2,160 ft^3
Hydrogen	0 ft^3
Deionized Water	1,000 gal

E4 3480

Source: Y-12 DOE, 1992b.

3.3.4 Y-12 Plant

The beryllium technology and pit support functions to be collocated at Y-12 as an option to the Proposed Action would be situated within existing buildings on the ORR as shown in figure 3.3.4-1. Table 3.3.4-1 provides estimated space requirements and specifies location for the relocated beryllium technology and pit support activities. Interior construction/modification requirements at Y-12 are addressed in table 3.3.4-2. Anticipated construction material/resource requirements are presented in table 3.3.4-3.

Beryllium and pit support waste streams are discussed in section 3.3.3. Table 3.3.4-4 presents a summary of waste streams at Y-12 from relocated products. A detailed description of the waste streams and waste management and disposal of the wastes is provided in appendix B, section B.4. A discussion of effluents can also be found in the same section, while air emissions are covered in appendix D.

As a result of this consolidation, certain hazardous chemicals are of particular concern because of their possible release during potential accidents (discussed in detail in appendix F and included in table F-3) would be used in activities transferred to Y-12. These chemicals are beryllium compounds (beryllium oxide and beryllium sulfate) used in coating graphite crucibles and molds to prevent exothermic reaction of molten beryllium with graphite in the vacuum induction melting and gas atomization melting processes. The maximum increase in beryllium compounds as a result of consolidation would be less than 1 percent of the quantity presently handled and stored at Y-12. The impacts of chemicals associated with normal operations are discussed in section 4.1.4.9.

No onsite utility (water, electricity, etc.) upgrade requirements are anticipated. Existing support facilities would be utilized to provide specialized services (such as testing, coating, industrial hygiene, maintenance, etc.) for the relocated activities.

Anticipated resource requirements resulting from the relocation of beryllium technology and pit support activities to ORR's Y-12 facility are presented in table 3.3.4-5.

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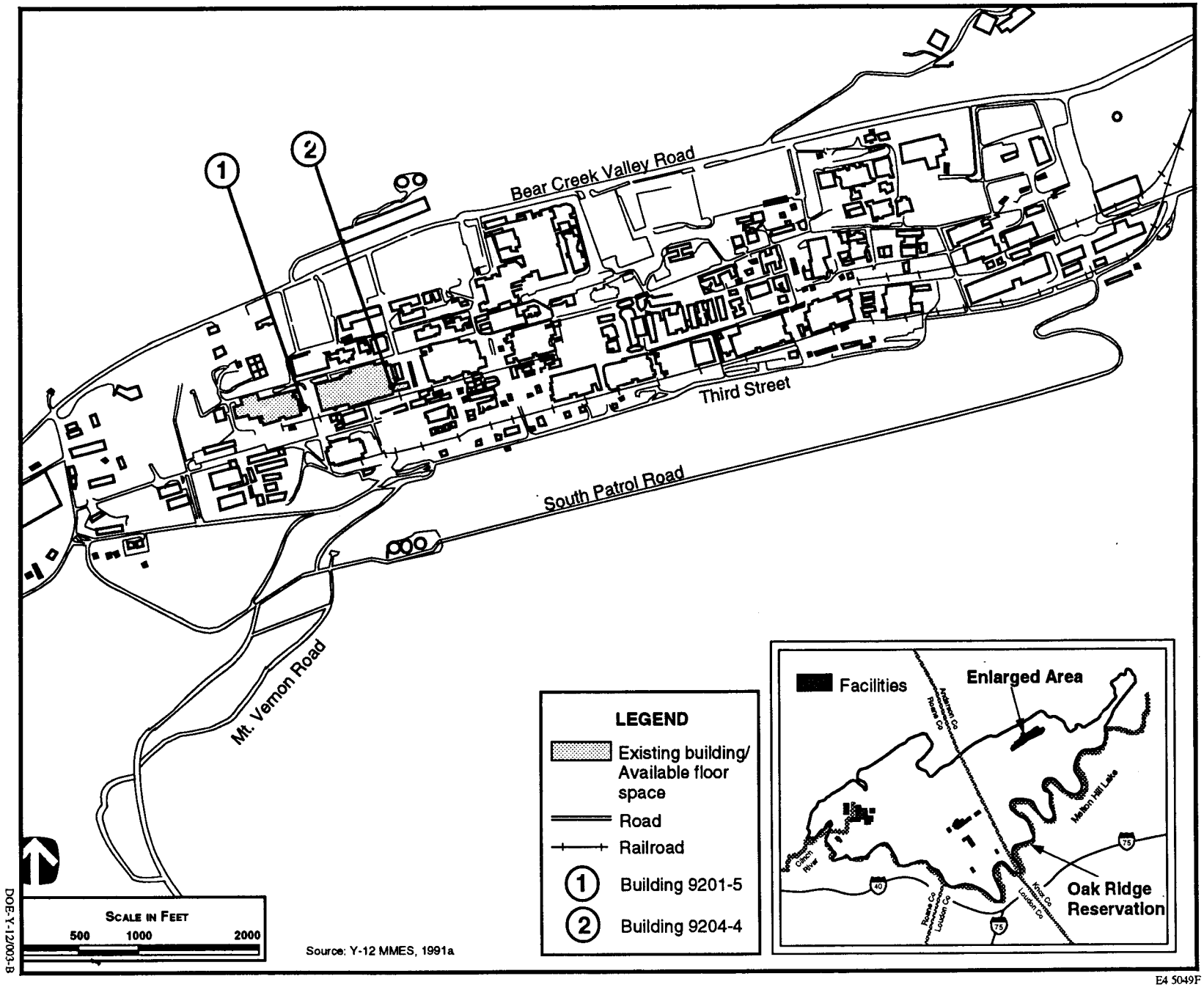

FIGURE 3.3.4–1.—*Proposed Location of New Operations at the Oak Ridge Reservation, Y-12 Plant.*

TABLE 3.3.4–1.—*Oak Ridge Reservation, Y-12 Plant: Proposed Action*

Activity	Space Req. (ft^2)	Location	Donor Site
Beryllium Technology	8,890	Bldg. 9201-5	Rocky Flats
Pit Support Functions	730	Bldg. 9204-4	Rocky Flats
Total	9,620		

E4 3256

Source: Y-12 MMES, 1992b.

TABLE 3.3.4.–2.—*Oak Ridge Reservation, Y-12 Plant: Interior Construction/Modification Requirements–Proposed Action*

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Beryllium Technology This activity would be located in Building 9201-5 which would require modifications necessary to accommodate the equipment that would be moved from RFP.	Remove and replace existing equipment, platforms, stairs, and support structures; relocate equipment from current location in preparation for vacuum furnace relocation; install walls and wall partitions; air lock entrances, gloveport windows; construct supports and platforms; construct new room to house gas atomization equipment; construct walls, doors, ceilings, windows. Construct new enclosure for ultrasonic cleaner to shield remaining work area from noise. Relocate vacuum furnace from within Y-12. Construct small enclosed room for cleaning beryllium contaminated items.	None	Remove and replace space heating, sump pump, utility piping and ductwork; modify existing large inert gas atmospheric glove box to provide an enclosed wash station with breakout chambers; install new HEPA filter system; install/modify sprinkler systems in atomization chamber, Hot Isostatic Press area, measuring machine area, and machining tools area; rearrange existing electrical services; modify existing vacuum chamber electricity services; install gasketed lighting fixtures for enclosed decontamination room; install additional power and lighting.
Pit Support Functions This activity would be located in Building 9204-4, which would require modifications necessary to accommodate the equipment that would be moved from RFP.	Remove existing equipment and piping; modify existing floor to allow for vibration isolation for forming machine.	None	Relocate and install auto spin machine, power supply cabinets, hydraulic unit, and control equipment; install piping for natural gas and tower water, instrument air and plant air. Remove and replace piping, raceway, conduit and wiring associated with equipment, power distribution system and route to forming machine equipment; install additional power and lighting.

E4 3797

Source: Y-12 MMES, 1992b.

TABLE 3.3.4–3.—*Oak Ridge Reservation, Y-12 Plant: Estimated Construction Material/ Resource Requirements–Proposed Action*

Materials/Resources	Requirement
Utilities:	
Electricity	5,600 kWh [a]
Water	200 gal [a]
Solids:	
Concrete	NA
Steel (structural, rebar, ductwork, and piping)	16.8 tons
Liquid Fuels	0 gal
Gases	0 ft^3

E4 3478

a Average daily consumption

Source: Y-12 MMES, 1992b.

TABLE 3.3.4–4.—*Oak Ridge Reservation, Y-12 Plant: Estimated Additional Annual Waste Generation–Proposed Action*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	4,310 gal
Solid	950 ft^3 [a]
Nonhazardous	
Liquid (treated H_2O)	3,579 gal
Solid	Negligible
LLW	
Liquid	None
Solid	22.2 ft^3
Mixed	
Liquid	None
Solid	None

E4 3798

a Includes solid sludges generated from treatment of aqueous waste streams–assumed to be 15% of treated water volume and other solids such as HEPA filters.

Source: Y-12 DOE, 1992b.

TABLE 3.3.4–5.—*Oak Ridge Reservation, Y-12 Plant: Estimated Additional Operations Resource Requirements–Proposed Action*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	3,960 kWh	500 kW
Natural Gas	0 ft^3	0 ft^3/hr
Water	1,000 gal	40 gpm

Chemical Resources	Annual Consumption
Nitrogen	0 gal
Argon	10,000 ft^3
Helium	2,160 ft^3
Hydrogen	0 ft^3
Deionized Water	1,000 gal

E4 3480

Source: Y-12 DOE, 1992b.

3.3.5 Sandia National Laboratories, New Mexico

Neutron generators, thermal batteries, and cap assemblies at Pinellas (discussed in section 3.2.3) and the milliwatt heat source surveillance function at Mound (discussed in section 3.2.2) would be relocated to SNL. These functions would be situated within existing buildings at SNL as shown in figure 3.3.5-1. The estimated space requirements and planned location of the relocated products are provided in table 3.3.5-1.

Relocated neutron generator manufacturing activities except tritium loading of the neutron tube targets would be performed at SNL. Tritium-loading operations would be performed at LANL, as already discussed in section 3.3.3. Building 870 at SNL would be modified to support the neutron generator by extensive modifications to include the addition of 10,000 ft^3 of floor space. The CDR conservatively estimated materials, resources, and costs for this project by adding a second story on the northern (oldest) part of the building.

Further design refinement could result in a building addition on to the paved area adjacent to Building 870. This area has no known areas of contamination, and because it is already disturbed, there would be no cultural or biological impacts. The one-story addition would require the same or smaller amount of materials, resources, and funds to complete and would not require the demolition and removal of the contaminated concrete foundation and floor slabs that are included in the current CDR estimates.

Shelf life-storage neutron generator units and other tritium inventory items would be stored in Building 6730 in Tech Area III where more adequate stand-off is available for the storage of larger tritium quantities than is allowable in Building 870.

Approximately 3,050 ft^2 of Building 841 would be modified to accommodate various processes used in cap assemblies. Machining operations would be performed in Building 840, while flame spraying and related operations would be done in Building 842. There would be some other minor accommodations made in the existing work spaces and building for cap assemblies.

The capability for backup manufacture of thermal batteries at SNL would be established by renovating portions of Building 894 and relocating necessary equipment. Approximately 400 ft^2 in Building 894 would be used for milliwatt heat source surveillance operations.

Construction/modification requirements at SNL are summarized in table 3.3.5-2. Anticipated construction material and resource requirements are in table 3.3.5-3.

As a result of this consolidation, certain hazardous chemicals would continue to be used in activities at SNL. These chemicals are methylene chloride, methylene dianiline, TCE, and toluene diisocyanate. In 1991, SNL used 119 lb of methylene chloride and 531 lb of TCE as cleaning solvents. Processes that would be transferred as a result of this consolidation would add 11 lb of methylene chloride and 61 lb of TCE per year. Both chemicals would be used as cleaning solvents. The impacts of chemicals associated with normal operations are discussed in section 4.1.5.9.

Table 3.3.5-4 presents the anticipated additional waste generation volume at SNL. A partial list of waste items from the relocated functions is discussed below. Waste management and effluents are discussed in greater detail in appendix B, section B.5. Air emissions are covered in appendix D.

- *Neutron Generators*—Manufacture of neutron generators would generate additional waste streams, consisting principally of laboratory wastes and flammable liquids. Tritiated wastewater and solid LLW would be generated, as shown in table 3.3.5-4; the bulk of these additional waste streams would contain hazardous and nonhazardous materials.

Wherever possible, the use of hazardous solvents would be kept to a minimum.

- *Thermal Batteries*—The manufacture of thermal batteries would result in a minor addition to SNL waste streams. Solid hazardous waste would be generated in small quantities and stored in local accumulation areas before transfer to the hazardous waste storage area.

- *Cap Assemblies*—Cap assemblies would also result in a minor addition to the SNL mixed, nonhazardous, and hazardous waste.

- *Milliwatt Heat Source Surveillance*—These operations would generate only very small amounts (less than 55 ft^3 per year) of hazardous and nonhazardous waste.

Other than modifying utilities in existing buildings, no new utility services or support facilities are required. Anticipated resource requirements for the relocation of the new functions to SNL are provided in table 3.3.5-5.

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TABLE 3.3.5–1.—*Sandia National Laboratories, New Mexico: Proposed Action*

Activity	Space Req. (ft^2)	Location	Donor Site
Neutron Generators	84,210	Bldgs. 807, 842, 860, 870, 878, 882, 891, 905, 957, 6730	Pinellas
Cap Assemblies	12,020	Bldgs. 805, 840, 841, 860, 864, 870, 878, 891, and 957	Pinellas
Thermal Batteries and Milliwatt Heat Source Surveillance	9,200	Bldg. 894	Pinellas and Mound
Total	105,430		

E4 3795

Source: SNL, 1992.

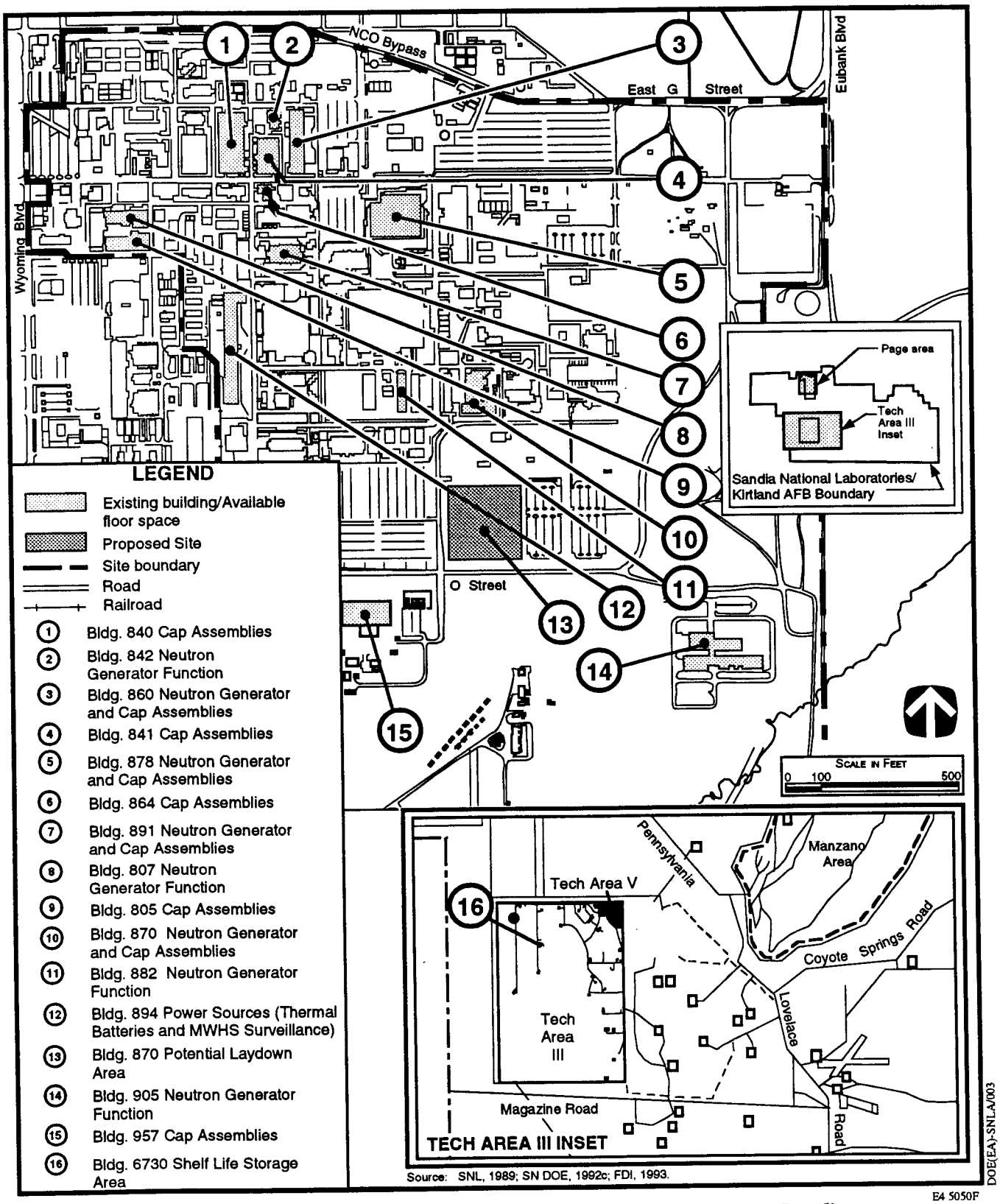

FIGURE 3.3.5–1.—*Proposed Location of New Operations at Sandia National Laboratories, New Mexico.*

TABLE 3.3.5–2.—*Sandia National Laboratories, New Mexico: Interior Construction/Modification Requirements–Proposed Action*

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Neutron Generators This activity would be located in Buildings 807, 842, 860, 870, 878, 891, 905, 957, and 6730. Building 882 would be modified to support equipment staging for new and transferred equipment during renovations to Building 870.	Remove existing liquid nitrogen and oxygen tanks; demolish north wing, foundations, floor slabs, superstructure, and exterior walls and reconstruct north wing and second story; construct new Class 10,000 to Class 100 cleanrooms; and install new walkways at Building 870; modify Buildings 842, 860, 878; selective demolition, new partitions, repair floor and ceiling materials in Building 891; and relocate existing bridgecrane, force and pressure test frame, and 3 pressure chambers to another building and install a 30,000-gallon tank for potentially contaminated firewater runoff for Building 6730. No modifications to existing space in Buildings 807, 905, and 957.	Remove asbsestos and contaminated concrete.	Install new liquid nitrogen, argon storage tanks at Building 870; install new piping and gas manifolds to connect to hydrogen gas cylinders; install new HVAC, electrical & plumbing utility systems; new power and lighting in all buildings except 891.
Cap Assemblies This activity would be moved into Buildings, 805, 840, 841 (mostly vacant), 860, 864, 870, 878, 891, and 957. Existing facilities in Building 860 will be used for high pressure testing.	Install new fire resistant walls and ceiling and strengthen floor foundation in Building 840; install Class 1,000 clean room in Building 841; minor facility modifications such as installation of wall partitions and 1-hour-rated walls in Buildings 860 and 864. No modifications to existing space in Buildings 805, 870, 878, 891 and 957.	Remove asbsestos and contaminated concrete.	Install additional or replacement equipment in Building 840. Install hydrogen gas storage manifold or gas pipeline at Buildings 841 and 864. No upgrades to onsite utilities would be required in Buildings 805, 830, 878, 891 and 957.
Thermal Batteries and Milliwatt Heat Source Surveillance These activities would be moved into Building 894. An existing dry room in Building 894 will be utilized for thermal battery R&D and backup production capability. Building 882 would be modified to support staging for new and transferred equipment during renovations to Building 894.	Demolish interior partitions, ceilings, mechanical and electrical equipment. Remove argon and nitrogen tanks and concrete pads. Install new wall partitions, ceilings, concrete loading dock, stairs, ramp and hazardous materials storage room.	Remove asbsestos and contaminated concrete.	Modify HVAC systems; install new exhaust ductwork and roof-mounted exhaust fans; install new domestic water and sewage lines and gas piping system; install new fire protection systems.

E4 3800

Source: SN DOE, 1992d.

TABLE 3.3.5–3.—*Sandia National Laboratories, New Mexico: Estimated Construction Material/ Resource Requirements–Proposed Action*

Materials/Resources	Requirement
Utilities:	
Electricity	692 kWh[a]
Water	3,928 gal[a]
Solids:	
Concrete	2,820 yd^3
Steel (structural, rebar, ductwork, and piping)	702 tons
Liquid Fuels	54,000 gal
Gases	155,000 ft^3

E4 3481

[a] Average daily consumption.

Source: SN DOE, 1992d.

TABLE 3.3.5–4.—*Sandia National Laboratories, New Mexico: Estimated Additional Annual Waste Generation–Proposed Action*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	1,252 gal
Solid	209 ft^3
Nonhazardous	
Liquid	3,216,000 gal
Solid	9,340 ft^3
LLW	
Liquid	100 gal
Solid	294 ft^3
Mixed	
Liquid	None
Solid	0.005 ft^3

E4 3803

Source: SN DOE, 1992d.

TABLE 3.3.5–5.—*Sandia National Laboratories, New Mexico: Estimated Additional Operations Resource Requirements–Proposed Action*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	90 kWh	5,000 kW
Natural Gas	30,000 ft^3	4,000 ft^3/hr
Water	25,000 gal	150 gpm

Chemical Resources	Annual Consumption
Nitrogen	167,500 gal
Argon	65,000 gal
Helium	5,000 ft^3
Hydrogen	1,152,000 ft^3
Oxygen	40,000 ft^3

E4 3483

Source: SN DOE, 1992d.

3.4 OTHER ALTERNATIVES

This section describes consolidation at the alternative sites Mound, Pinellas, and RFP. Although these alternatives are essentially the same as those described in the NCP, some minor changes have been made as a result of the more detailed planning that was done for the Proposed Action, consolidation at KCP as described in section 3.3. The data being used to evaluate these sites is based on the CDRs prepared for the Proposed Action by the receiver sites and the work done by the Activity Transfer Groups in support of the Nonnuclear Consolidation Implementation Plan being prepared by the Albuquerque Field Office. This data incorporates all the latest workload guidance as described in section 1.6.2.

As a result of the work done for the Proposed Action, it was determined that the total floor space required at KCP to accommodate the existing and transferred activities would be 2,777,000 ft^2. In addition to this space at KCP, 159,000 ft^2 would be required at other sites (LANL, SNL, and SRS) to accommodate additional transferred activities. Thus the total space required for the consolidation of all nonnuclear activities would be 2,936,000 ft^2, the sum of these two figures. With this as the basis for the space required and the current available nonnuclear manufacturing space at the alternative sites, the additional space requirements at these sites can be determined. Table 3.4-1 shows these space requirements and table 3.4-2 shows the anticipated workforce requirements for these actions.

TABLE 3.4–1.—*Total Nonnuclear Space Requirements (ft^2)*

	Mound Alternative	Pinellas Alternative	Rocky Flats Alternative
Total space required	2,936,000	2,936,000	2,936,000
Space at other sites	126,000	49,000	143,000
Space needed at alternative site	2,810,000	2,887,000	2,793,000
Current nonnuclear space	1,400,000	700,000	445,000
Additional space required	1,410,000	2,187,000	2,348,000

E4 4194

Source: DOE, 1993b.

TABLE 3.4–2.—*Estimated Peak Additional Construction/Operations Workforce Requirements–Proposed Alternatives*

Site	Mound Alternative		Pinellas Alternative		RFP Alternative	
	Const.	Ops.	Const.	Ops.	Const.	Ops.
Mound Plant	775	3,120				
Pinellas Plant			1,149	3,995		
Rocky Flats Plant					958	3,710
Savannah River Site			100	45	100	45
LANL	30	20	45	75	30	75
SNL	90	385	0	0	95	385
Total	895	3,525	1,294	4,115	1,183	4,215

E4 3873

Source: DOE, 1993b; FDI, 1993.

Ongoing implementation planning by DOE and refinement of the CDRs prepared for the Proposed Action indicate that changes to these workforce numbers may occur. The Socioeconomics and Community Services sections of chapter 4 discuss the impact of these potential changes on the analysis of the workforce numbers presented in table 3.4-2 as appropriate.

3.4.1 Mound Plant Alternative

The Mound alternative is similar to the Proposed Action in that neutron tube target loading from Pinellas and beryllium technology and pit support functions from RFP would be relocated to LANL (section 3.3.3); and neutron generators, cap assemblies, and thermal batteries from Pinellas would be relocated to SNL (section 3.3.5).

This alternative differs from the Proposed Action in that milliwatt heat source surveillance, high-power detonators, and tritium-handling functions from Mound would not be transferred to SNL, LANL, and SRS, respectively, and the remaining electrical/mechanical and special product functions would be consolidated at Mound rather than at KCP.

With Mound as the consolidation site for nonnuclear manufacturing, the KCP, Pinellas, and RFP nonnuclear manufacturing functions would be terminated. Figure 3.4.1-1 illustrates the consolidation alternative of transferring the electrical and mechanical nonnuclear manufacturing activities to Mound.

Electrical/mechanical functions that would be consolidated at Mound under this alternative would be situated within existing, as well as newly constructed, buildings. The construction would consist of five new buildings, one office expansion, new parking areas, and one new storage pad. The proposed locations of new facilities at Mound are shown in figure 3.4.1-2.

Under this alternative, all current operations at Mound, including electrical/mechanical functions, tritium-handling functions, and detonator functions, would continue at Mound. In addition, electrical/mechanical functions would be transferred from KCP, Pinellas, and RFP to Mound. The activities that would be transferred to Mound are shown in figure 3.4.1-1. Descriptions of the activities to be consolidated under the Mound alternative are provided earlier in this chapter in sections 3.2.1, 3.2.3, and 3.2.4; these represent current operations at KCP, Pinellas, and RFP, respectively.

As shown in table 3.4-1, this alternative would require approximately 2,810,000 ft^2 at Mound to house operations related to the consolidation of electrical/mechanical functions. Mound currently has 1,400,000 ft^2 of space available for these activities. Therefore, approximately 1,410,000 ft^2 of additional facility space would have to be constructed at Mound under this alternative. Additional land area requirements for the consolidation of nonnuclear manufacturing activities at Mound, including construction laydown area and additional parking, are listed in table 3.4.1-1. Anticipated construction materials/resource requirements are listed in table 3.4.1-2.

Primary products to be transferred from KCP to Mound would include: electrical and electronics items such as radars, firing systems, timers, telemetry, unique signal generators, cables, printed wiring boards, field test equipment, microelectronics, large-scale integrated circuits, arming and fuzing systems, and depth sensors; mechanical devices such as coded switches, squib valves, case parts, fins, strong link switches, inertial sensing devices, battery actuators, structural supports, handling equipment, locking tapes, command disable devices, and assembly hardware; and plastics items such as compression pads, membranes, cushions, foam supports, composite structures, metal-filled polymers, insulators, radomes, shock mitigators, molded rigid plastics, desiccants, and hydrogen getters.

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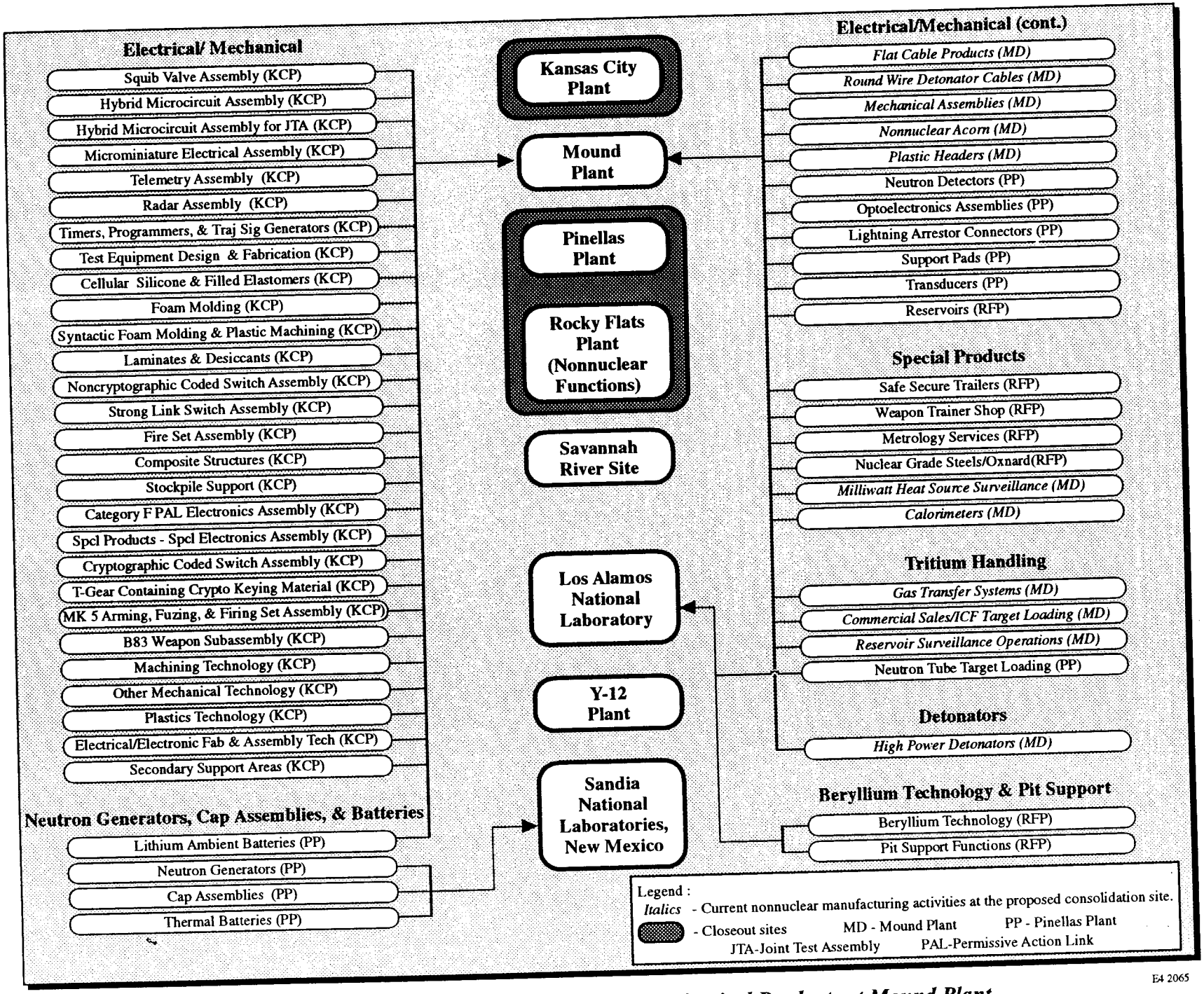

FIGURE 3.4.1–1.—*Consolidation of Electrical/Mechanical Products at Mound Plant.*

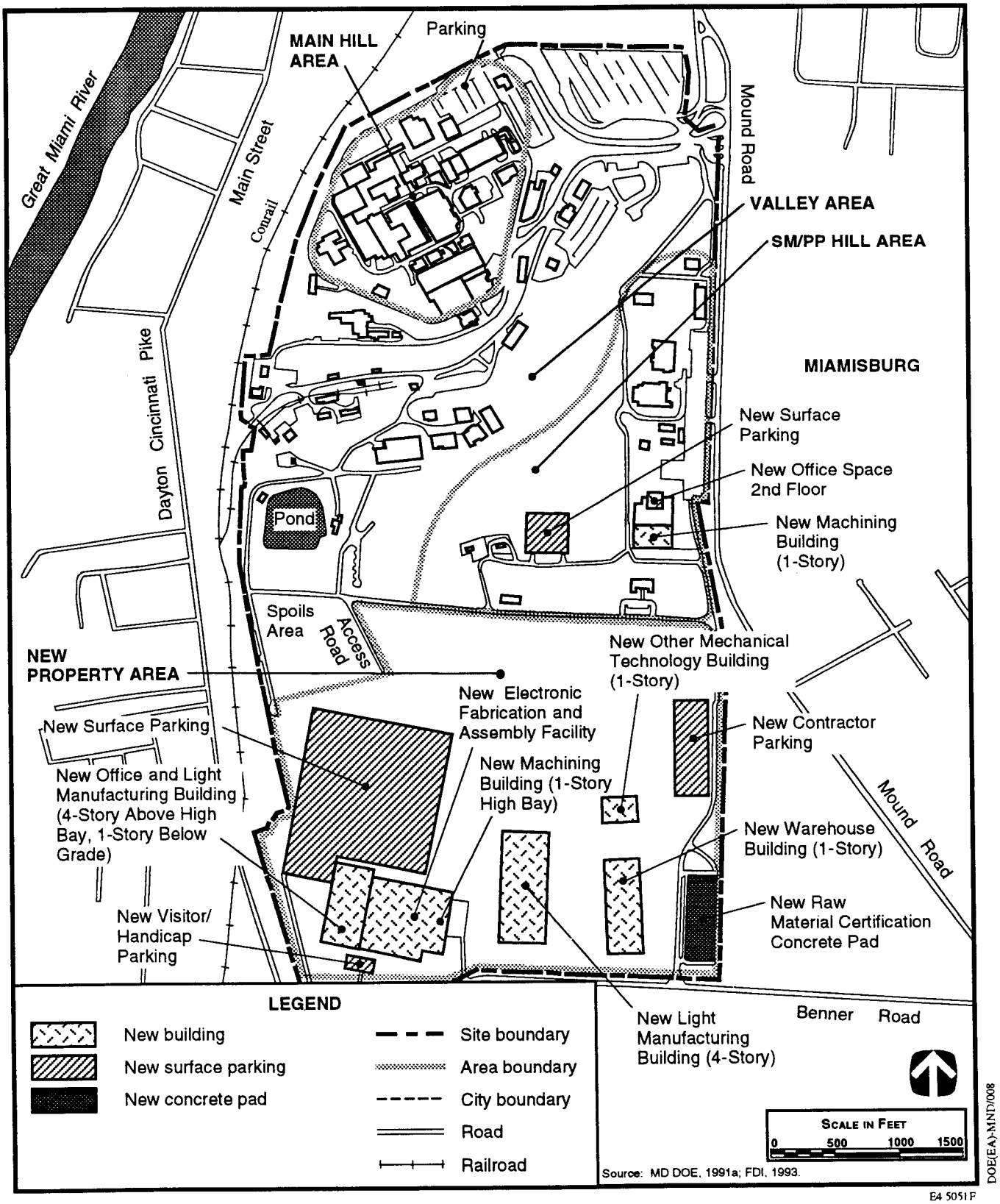

FIGURE 3.4.1–2.—*Proposed Location of New Facilities at the Mound Plant.*

Products to be transferred from Pinellas to Mound would include optoelectronics assemblies, neutron detectors, support pads, lightning arrestor connectors, transducers, and lithium ambient batteries.

Products to be transferred from RFP to Mound would include reservoirs, nuclear grade steels/ Oxnard, safe secure trailers, weapons trainer shop, and metrology services.

The consolidation of activities at Mound would involve the generation of additional hazardous wastes and nonhazardous wastes. The additional hazardous waste volume of Mound due to consolidation could require revision of existing hazardous waste permits, because new facilities must be added to handle the additional volume. Table 3.4.1-3 provides a summary of anticipated additional annual waste generation. A discussion of the wastes, effluents, and emissions and discussions related to their treatment/management can be found in appendix C, section C.1.

Additional support facilities would provide for the balance of plant functions, which include at a minimum administration, cafeteria service, medical services, fire protection, security, all maintenance functions, environmental monitoring, utility services, Emergency Operations Center, and parts warehousing and storage.

Additional utility upgrade requirements for consolidation at Mound include water, power consumption, natural gas, and steam. Water and steam are produced on the plant site; natural gas and electricity are provided by local utility companies.

The anticipated additional resource requirements for nonnuclear manufacturing electrical/mechanical consolidation at Mound are shown in table 3.4.1-4.

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TABLE 3.4.1–1.—*Mound Plant Alternative: Additional Land Area Requirements at Mound Plant*

Land Use	Total Area	
	Square Feet	Acres
Building(s) footprint(s)	685,575	16
Additional parking	693,925	16
Construction laydown area	1,133,600	26
Construction parking	174,400	4
Total	2,687,500	62

E4 3862

Source: FDI, 1993.

TABLE 3.4.1–2.—*Mound Plant Alternative: Estimated Construction Materials/Resource Requirements at Mound Plant*

Materials/Resources	Requirement
Utilities:	
Electricity	2,800 kWh[a]
Water	18,000 gal[a]
Solids:	
Concrete	96,500 yd^3
Steel (structural, rebar, ductwork, and piping)	14,000 tons
Other (paving)	12,600 tons
Liquid Fuels	484,000 gal
Gases	2,030,000 ft^3

E4 3493

[a] Average daily consumption.

Source: FDI, 1993.

TABLE 3.4.1–3.—*Mound Plant Alternative: Estimated Additional Annual Waste Generation at Mound Plant*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	47,600 gal
Solid	12,300 ft^3
Nonhazardous	
Liquid	132 million gal
Solid	359,000 ft^3
LLW	
Liquid	None
Solid	15 ft^3
Mixed	
Liquid	None
Solid	None

E4 3494

Source: FDI, 1993.

TABLE 3.4.1–4.—*Mound Plant Alternative: Estimated Additional Operations Resource Requirements at Mound Plant*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	272,000 kWh	28,000 kW
Natural Gas	988,000 ft^3	133,000 ft^3/hr
Water	909,000 gal	1,120 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,431,000 gal
Argon	26,800 gal
Helium	761,000 ft^3
Hydrogen	10,000 ft^3
Carbon Dioxide	5,912,000 ft^3

E4 3495

Table assumes Mound operates 365 days per year.

Source: FDI, 1993.

3.4.2 Pinellas Plant Alternative

The Pinellas alternative is similar to the Proposed Action in that tritium-handling functions from Mound would be relocated to SRS (section 3.3.2); calorimeters and high power detonators from Mound and beryllium technology and pit support functions from RFP would be relocated to LANL (section 3.3.3); and milliwatt heat source surveillance functions from Mound would be transferred to SNL (section 3.3.5).

This alternative differs from the Proposed Action in that neutron tube target loading from Pinellas would not be transferred to LANL; neutron generators, cap assemblies, and thermal batteries from Pinellas would not be transferred to SNL; and the remaining electrical/mechanical and special product functions would be consolidated at Pinellas rather than at KCP.

With Pinellas as the consolidation site for nonnuclear manufacturing, the KCP, Mound, and RFP nonnuclear manufacturing functions would be terminated. Figure 3.4.2-1 illustrates the consolidation alternative of transferring the electrical and mechanical nonnuclear manufacturing activities to Pinellas.

Electrical/mechanical functions that would be consolidated at Pinellas under this alternative would be situated within existing as well as newly constructed buildings. The construction consists of three new buildings, a large four-story office/production facility, and two multilevel parking structures. The proposed locations of new facilities at Pinellas are shown in figure 3.4.2-2.

Under this alternative, all current operations at Pinellas including electrical/mechanical functions, tritium-handling functions, and neutron generators, cap assemblies and batteries would continue at Pinellas. In addition, electrical/mechanical functions at KCP, Mound, and RFP would be transferred to Pinellas. The activities to be transferred to Pinellas are shown in figure 3.4.2-1. Descriptions of the activities to be consolidated under the Pinellas alternative are provided earlier in this chapter in sections 3.2.1, 3.2.2, and 3.2.4; these represent current operations at KCP, Mound, and RFP, respectively.

As shown in table 3.4-1, this alternative would require approximately 2,887,000 ft^2 at Pinellas to house operations related to the consolidation of electrical/mechanical functions. Pinellas currently has 700,000 ft^2 space available for these activities. Therefore, approximately 2,187,000 ft^2 of additional facility space would have to be constructed at Pinellas under this alternative. Additional land area requirements for the consolidation of nonnuclear manufacturing activities at Pinellas, including construction laydown area and additional parking, are listed in table 3.4.2-1. Anticipated construction materials/resource requirements are listed in table 3.4.2-2.

Primary products to be transferred from KCP to Pinellas would include: electrical and electronics items such as radars, firing systems, timers, telemetry, unique signal generators, cables, printed wiring boards, field test equipment, microelectronics, large scale integrated circuits, arming and fuzing systems, and depth sensors; mechanical devices such as coded switches, squib valves, case parts, fins, strong link switches, inertial sensing devices, battery actuators, structural supports, handling equipment, locking tapes, command disable devices, and assembly hardware; and plastic items such as compression pads, membranes, cushions, foam supports, composite structures, metal-filled polymers, insulators, radomes, shock mitigators, molded rigid plastics, desiccants, and hydrogen getters.

Products to be transferred from Mound to Pinellas would include electrical/mechanical products such as flat cable products, mechanical assemblies and detonator safing strong links, round wire detonator cables, nonnuclear Acorn, and plastic headers.

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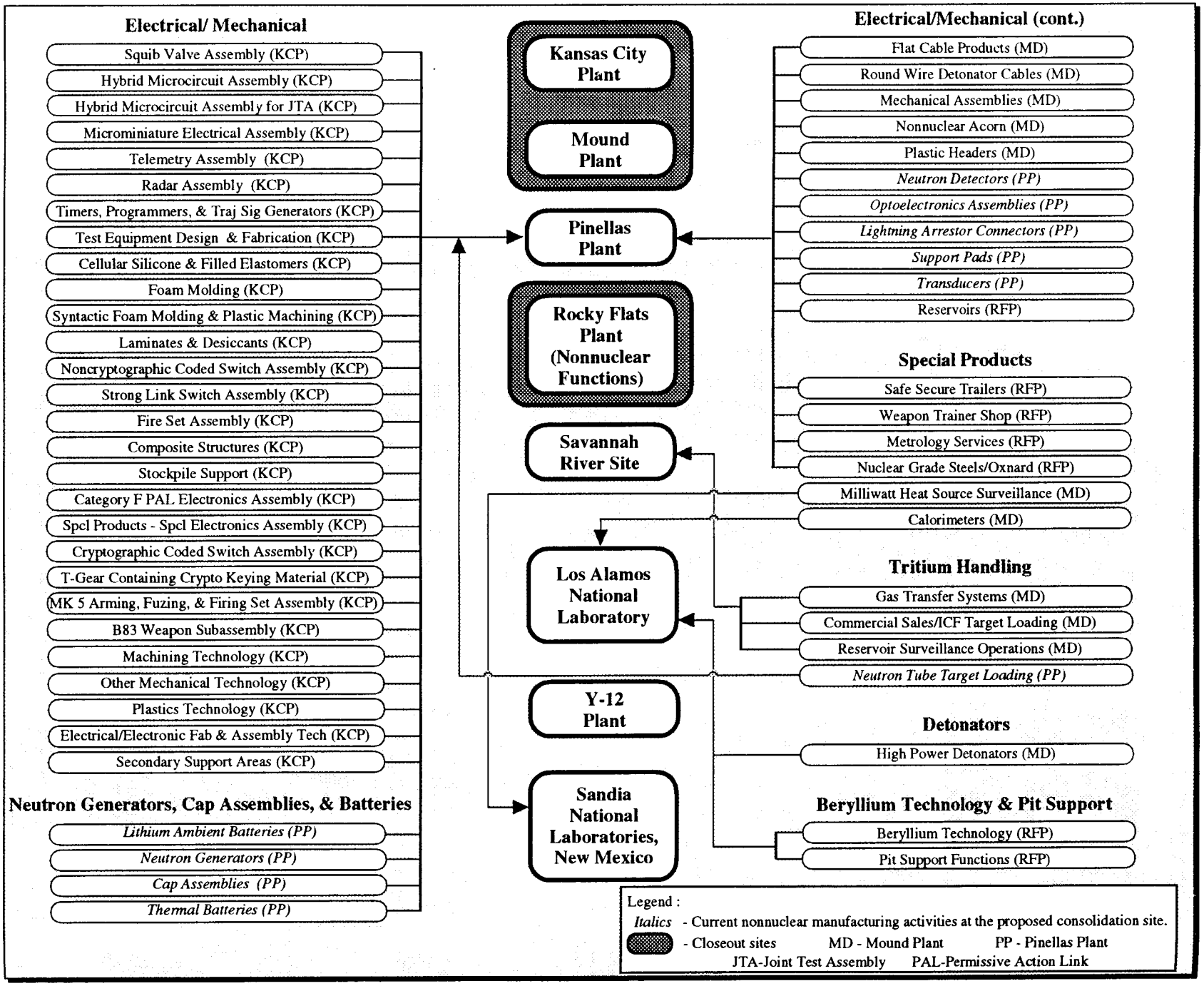
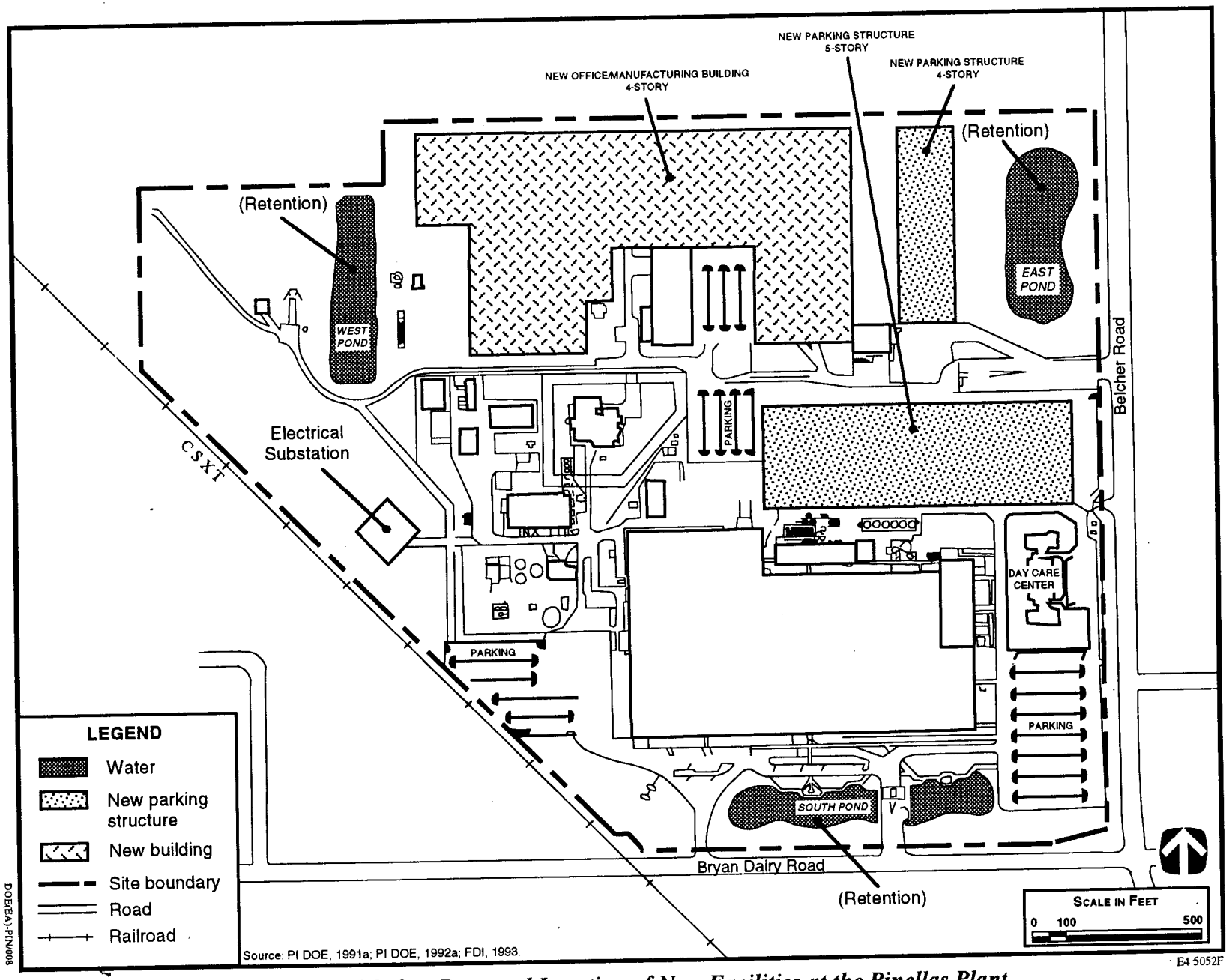

Electrical/ Mechanical
Squib Valve Assembly (KCP)
Hybrid Microcircuit Assembly (KCP)
Hybrid Microcircuit Assembly for JTA (KCP)
Microminiature Electrical Assembly (KCP)
Telemetry Assembly (KCP)
Radar Assembly (KCP)
Timers, Programmers, & Traj Sig Generators (KCP)
Test Equipment Design & Fabrication (KCP)
Cellular Silicone & Filled Elastomers (KCP)
Foam Molding (KCP)
Syntactic Foam Molding & Plastic Machining (KCP)
Laminates & Desiccants (KCP)
Noncryptographic Coded Switch Assembly (KCP)
Strong Link Switch Assembly (KCP)
Fire Set Assembly (KCP)
Composite Structures (KCP)
Stockpile Support (KCP)
Category F PAL Electronics Assembly (KCP)
Spcl Products - Spcl Electronics Assembly (KCP)
Cryptographic Coded Switch Assembly (KCP)
T-Gear Containing Crypto Keying Material (KCP)
MK 5 Arming, Fuzing, & Firing Set Assembly (KCP)
B83 Weapon Subassembly (KCP)
Machining Technology (KCP)
Other Mechanical Technology (KCP)
Plastics Technology (KCP)
Electrical/Electronic Fab & Assembly Tech (KCP)
Secondary Support Areas (KCP)
Neutron Generators, Cap Assemblies, & Batteries
Lithium Ambient Batteries (PP)
Neutron Generators (PP)
Cap Assemblies (PP)
Thermal Batteries (PP)
Kansas City Plant
Mound Plant
Pinellas Plant
Rocky Flats Plant (Nonnuclear Functions)
Savannah River Site
Los Alamos National Laboratory
Y-12 Plant
Sandia National Laboratories, New Mexico
Electrical/Mechanical (cont.)
Flat Cable Products (MD)
Round Wire Detonator Cables (MD)
Mechanical Assemblies (MD)
Nonnuclear Acorn (MD)
Plastic Headers (MD)
Neutron Detectors (PP)
Optoelectronics Assemblies (PP)
Lightning Arrestor Connectors (PP)
Support Pads (PP)
Transducers (PP)
Reservoirs (RFP)
Special Products
Safe Secure Trailers (RFP)
Weapon Trainer Shop (RFP)
Metrology Services (RFP)
Nuclear Grade Steels/Oxnard (RFP)
Milliwatt Heat Source Surveillance (MD)
Calorimeters (MD)
Tritium Handling
Gas Transfer Systems (MD)
Commercial Sales/ICF Target Loading (MD)
Reservoir Surveillance Operations (MD)
Neutron Tube Target Loading (PP)
Detonators
High Power Detonators (MD)
Beryllium Technology & Pit Support
Beryllium Technology (RFP)
Pit Support Functions (RFP)
Legend :
Italics - Current nonnuclear manufacturing activities at the proposed consolidation site.
- Closeout sites MD - Mound Plant PP - Pinellas Plant
JTA-Joint Test Assembly PAL-Permissive Action Link

E4 2066



Source: PI DOE, 1991a; PI DOE, 1992a; FDI, 1993.

FIGURE 3.4.2–2.—*Proposed Location of New Facilities at the Pinellas Plant.*

TABLE 3.4.2–1.—*Pinellas Plant Alternative: Additional Land Area Requirements at Pinellas Plant*

Land Use	Total Area	
	Square Feet	Acres
Building(s) footprint(s)	546,750	13
Additional parking	326,425	8
Construction laydown area	1,526,000	35
Construction parking	305,200	7
Total	2,704,375	63

E4 3863

Source: FDI, 1993.

Products to be transferred from RFP to Pinellas would include reservoirs, nuclear grade steels/ Oxnard, safe secure trailers, weapons trainer shop, and metrology services.

The consolidation of functions at Pinellas would require the transfer of the following processes from KCP, Mound, and RFP: soldering, welding, bonding, lasers, robotics, cleaning, wire/sleeving, preparation, encapsulation, wafer fabrication, semiconductor packing, machining, plating and surface finishing, painting and special coatings, molding, manufacture of special chemicals, and assembly.

The consolidation of activities at Pinellas would involve the generation of additional hazardous and nonhazardous wastes. The additional hazardous waste volume of Pinellas due to consolidation could require revision of existing hazardous waste permits, because new facilities would be added to handle the additional volume. Table 3.4.2-3 presents a summary of anticipated additional annual waste generation. A discussion of the wastes, effluents, emissions, and information related to their treatment and management can be found in appendix C, section C.2.

Onsite utility upgrades required for consolidation at Pinellas would include water, power consumption, natural gas, and steam. Water and steam are produced on the plant site. Natural gas and electricity are provided by the local utility companies. Table 3.4.2-4 describes the anticipated additional resource requirements for consolidation at Pinellas.

Under the Pinellas alternative, additional bulk chemical inventory would be required. However, no centralized storage and distribution systems are planned for these materials due to the limited number of facilities supplied. All of these materials are assumed to be brought to the site by tank truck. Facilities for receiving, unloading, and distributing these liquids are included at the plant buildings where the materials are consumed. See table 3.4.2-4 for a list of bulk chemical resource requirements identified for this consolidation activity.

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TABLE 3.4.2–2.—*Pinellas Plant Alternative: Estimated Construction Material/Resource Requirements at Pinellas Plant*

Materials/Resources	Requirement
Utilities:	
Electricity	3,900 kWh[a]
Water	22,000 gal[a]
Solids:	
Concrete	131,300 yd^3
Steel (structural, rebar, ductwork, and piping)	21,800 tons
Other	
Liquid Fuels	1,018,000 gal
Gases	2,926,000 ft^3

E4 3496

[a] Average daily consumption.

Source: FDI, 1993.

TABLE 3.4.2–3.—*Pinellas Plant Alternative: Estimated Additional Annual Waste Generation at Pinellas Plant*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	51,500 gal
Solid	12,300 ft^3
Nonhazardous	
Liquid	153 million gal
Solid	473,000 ft^3
LLW	
Liquid	None
Solid	15 ft^3
Mixed	
Liquid	None
Solid	None

E4 3762

Source: FDI, 1993.

TABLE 3.4.2–4.—*Pinellas Plant Alternative: Estimated Additional Operations Resource Requirements at Pinellas Plant*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	273,000 kWh	29,000 kW
Natural Gas	1,519,000 ft^3	203,000 ft^3/hr
Water	980,000 gal	1,200 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,423,000 gal
Argon	26,000 gal
Helium	762,000 ft^3
Hydrogen	3 gal
Carbon Dioxide	5,912,000 ft^3

E4 3498

Note: Table assumes Pinellas operates 365 days per year.

Source: FDI, 1993.

3.4.3 Rocky Flats Plant Alternative

The RFP alternative is similar to the Proposed Action in that tritium-handling functions from Mound would be relocated to SRS (section 3.3.2); calorimeters and high power detonators from Mound and neutron tube target loading from Pinellas would be relocated to LANL (section 3.3.3); and neutron generators, cap assemblies, and thermal batteries from Pinellas, and milliwatt heat source surveillance from Mound, would be transferred to SNL (section 3.3.5).

This alternative differs from the Proposed Action in that beryllium technology and pit support functions from RFP would not be relocated to LANL and the remaining electrical/mechanical and special product functions would be consolidated at RFP rather than at KCP.

With RFP as the consolidation site for nonnuclear manufacturing, the KCP, Mound, and Pinellas nonnuclear manufacturing functions would be terminated. Figure 3.4.3-1 illustrates the consolidation alternative of transferring the electrical/mechanical nonnuclear manufacturing activities to RFP.

Electrical/mechanical functions that would be consolidated at RFP under this alternative would be situated within existing as well as newly constructed buildings. The new construction would consist of two new 3-story office/manufacturing buildings, two new 2-level parking garages, and new surface parking. The proposed locations of the new facilities at RFP are shown in figure 3.4.3-2. Descriptions of the activities to be consolidated under the RFP alternative are provided earlier in this chapter in sections 3.2.1, 3.2.2, and 3.2.3; these represent current operations at KCP, Mound, and Pinellas, respectively.

Under the RFP alternative, all current operations and missions, including the special products functions and beryllium technology and pit support functions, would continue at RFP. In addition, electrical/mechanical functions would be transferred from KCP, Mound, and Pinellas to RFP. The activities to be transferred to RFP are shown in figure 3.4.3-1.

As shown in table 3.4-1, the RFP alternative would require approximately 2,793,000 ft^2 at RFP to house operations related to consolidation of electrical/mechanical functions. RFP currently has 445,000 ft^2 available for these activities. Therefore, approximately 2,348,000 ft^2 of additional facility space would have to be constructed at RFP under this alternative. Additional land area requirements for the consolidation of nonnuclear manufacturing activities at RFP, including construction laydown area and additional parking, are listed in table 3.4.3-1. Material and resources requirements during construction of the consolidated RFP can be found in table 3.4.3-2.

Additional space for nonnuclear manufacturing activities may be made available in existing buildings declared as surplus in the Rocky Flats Transition Plan (RF DOE, 1992b). If this is confirmed as a result of more detailed planning, then the amount of new construction would be decreased accordingly.

Primary products to be transferred from KCP to RFP would include: electrical and electronics items such as radars, firing systems, timers, telemetry, unique signal generators, cables, printed wiring boards, field test equipment, microelectronics, large-scale integrated circuits, arming and fuzing systems, and depth sensors; mechanical devices such as coded switches, squib valves, case parts, fins, strong link switches, inertial sensing devices, battery actuators, structural supports, handling equipment, locking tapes, command disable devices, and assembly hardware; and plastic items such as compression pads, membranes, cushions, foam supports, composite structures, metal-filled polymers, insulators, radomes, shock mitigators, molded rigid plastics, desiccants, and hydrogen getters. Descriptions of the nonnuclear electrical/mechanical functions to be transferred from KCP to RFP can be found in section 3.2.1.

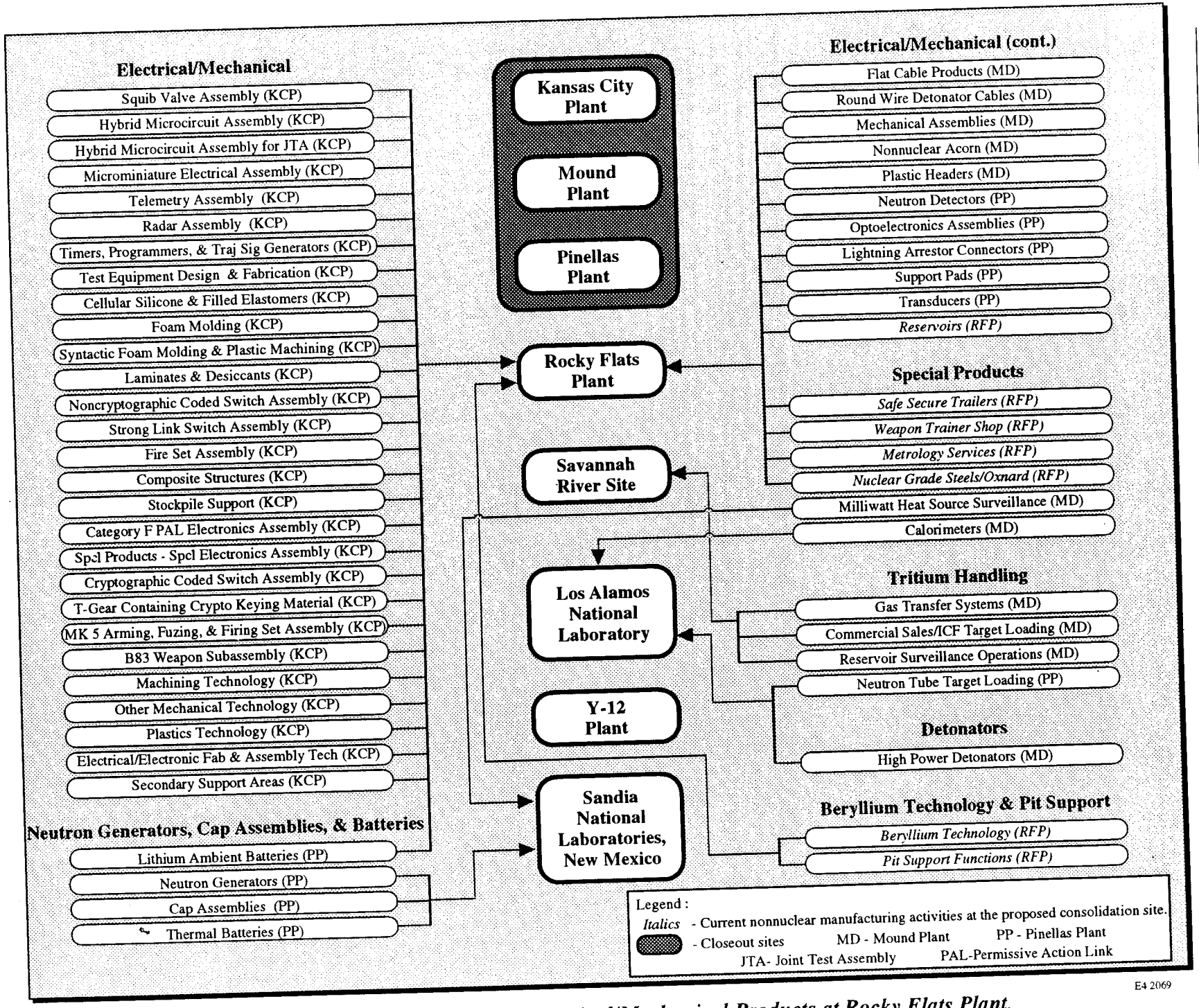
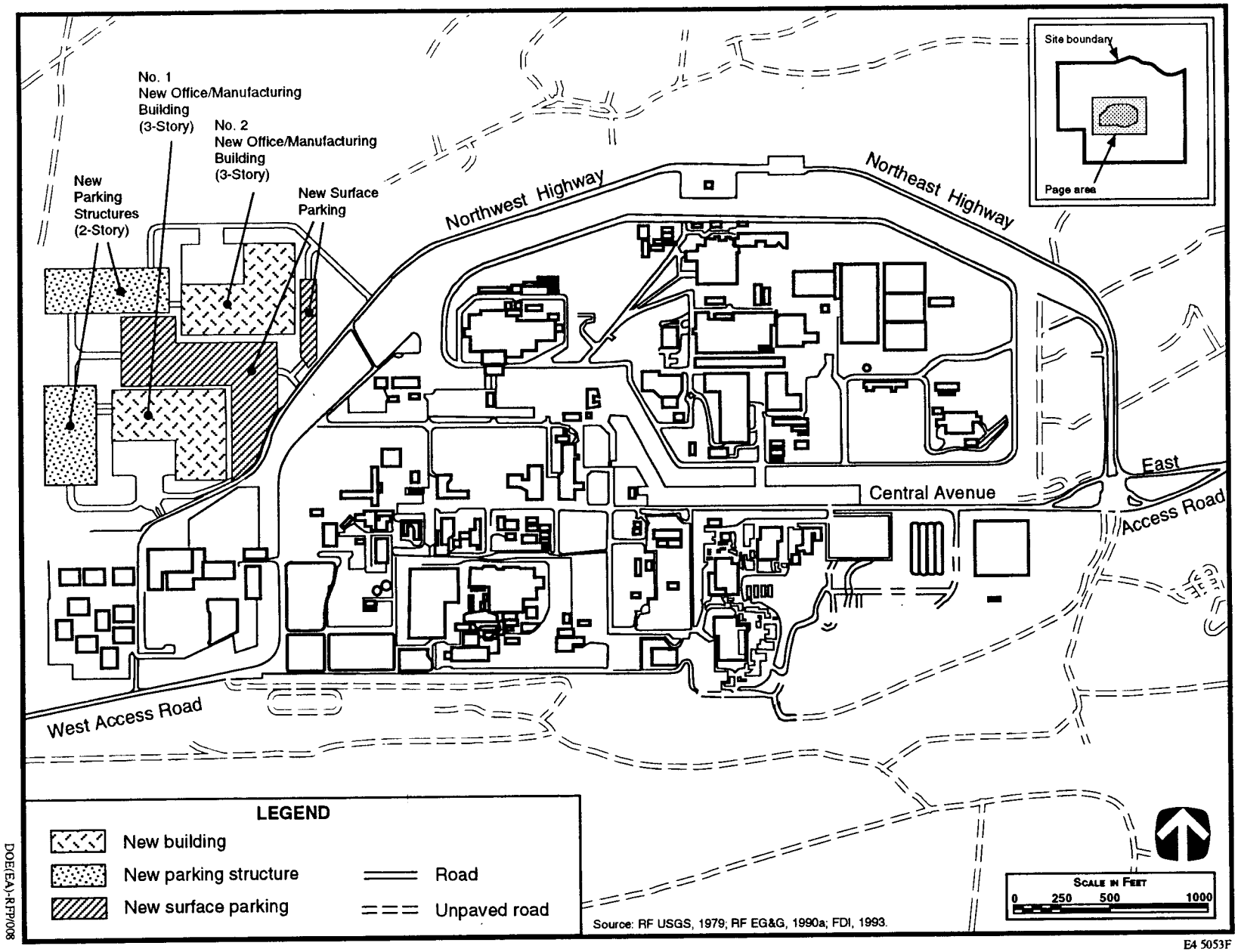


FIGURE 4.3-1 Consolidation of Electrical/Mechanical Products at Rocky Flats Plant.



E4 5053F

DOE(EA)-RFP/008

FIGURE 3.4.3–2.—*Proposed Location of New Facilities at the Rocky Flats Plant.*

TABLE 3.4.3–1.—*Rocky Flats Plant Alternative: Additional Land Area Requirement at Rocky Flats Plant*

Land Use	Total Area	
	Square Feet	Acres
Building(s) footprint(s)	782,700	18
Additional parking	1,111,600	26
Construction lay down area	959,200	22
Construction parking	261,600	6
Total	3,115,100	72

E4 3864

Source: FDI, 1993.

Products to be transferred from Mound to RFP would include flat cable products and mechanical assemblies, detonator safing strong links, round wire detonator cables, nonnuclear Acorn, and plastic headers. Descriptions of the nonnuclear electrical/mechanical functions to be transferred from Mound to RFP can be found in section 3.2.2.

Products to be transferred from Pinellas to RFP would include optoelectronics assembly, neutron detectors, support pads, lightning arrestor connectors, and transducers. Descriptions of the nonnuclear electrical/mechanical functions to be transferred from Pinellas to RFP can be found in section 3.2.3.

The transfer of all of the activities from KCP to RFP would involve the generation of additional hazardous wastes and nonhazardous wastes. The additional hazardous waste volume at RFP due to consolidation could require revision of existing hazardous waste storage permits, because new facilities would have to be added to handle the additional volume. Table 3.4.3-3 presents a summary of the anticipated additional annual waste generation at RFP.

RFP is restricted by Federal regulations and operating permits regarding both the amounts of different types of waste that may be stored and the capacity constraints. In addition, RFP must maintain compliance with storage regulations in all of its storage facilities. Activities necessary to address the generation of additional hazardous wastes would include improvements and/or expansion of storage facilities and certification of wastes to meet disposal criteria at offsite disposal facilities.

RFP must operate all waste packaging, treatment, and storage facilities in compliance with applicable regulations. The requirements of the Colorado Department of Health/DOE Agreement in Principle and the Federal Facility Compliance Agreement for land-disposal restricted waste must be considered for the additional wastes associated with this alternative.

A summary of the wastes, effluents, and emissions and discussions related to their treatment/management can be found in appendix C, section C.3.

Existing RFP support facilities would provide for the balance of plant functions to support consolidation, which includes at a minimum administration, cafeteria service, medical services, fire protection, security, all maintenance functions, environmental monitoring, utility services, Emergency Operations Center, and parts warehousing and storage.

Utility upgrade requirements for consolidation at RFP include water, power consumption, natural gas, and steam. Water is obtained and treated on RFP; steam is produced on the plant site; natural gas and electricity are provided by local utility companies.

The anticipated additional resource requirements for nonnuclear manufacturing electrical/mechanical consolidation at RFP can be found in table 3.4.3-4.

TABLE 3.4.3–2.—*Rocky Flats Plant Alternative: Estimated Construction Material/Resource Requirements at Rocky Flats Plant*

Materials/Resources	Requirement
Utilities:	
Electricity	3,400 kWh[a]
Water	22,000 gal[a]
Solids:	
Concrete	93,300 yd^3
Steel (structural, rebar, ductwork, and piping)	22,200 tons
Other (paving)	10,500 tons
Liquid Fuels	848,000 gal
Gases	2,438,000 ft^3

E4 3499

[a] Average daily consumption.

Source: FDI, 1993.

TABLE 3.4.3–3.—*Rocky Flats Plant Alternative: Estimated Additional Annual Waste Generation at Rocky Flats Plant*

Waste Type	Quantity
Hazardous/Toxic	
Liquid	43,300 gal
Solid	12,300 ft^3
Nonhazardous	
Liquid	148 million gal
Solid	430,000 ft^3
LLW	
Liquid	None
Solid	15 ft^3
Mixed	
Liquid	None
Solid	None

E4 3491

Source: FDI, 1993.

TABLE 3.4.3–4.—*Rocky Flats Plant: Estimated Additional Operations Resource Requirements at Rocky Flats Plant*

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	260,000 kWh	24,000 kW
Natural Gas	1,639,000 ft^3	220,000 ft^3/hr
Water	972,000 gal	1,200 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,425,000 gal
Argon	1,198,000 ft^3
Helium	10,000 ft^3
Hydrogen	11,000 ft^3
Carbon Dioxide	5,912,000 ft^3

E4 3492

Table assumes that Rocky Flats operates 365 days per year.

Source: FDI, 1993.

CHAPTER 4

CHAPTER 4: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter Four describes the affected environment and environmental consequences associated with nonnuclear consolidation. The chapter begins with a brief introduction that includes an overview of environmental assessment methodologies, followed by a discussion of the affected environment and environmental consequences of the Proposed Action. Discussions are provided for each potentially affected site: the principal consolidation site (Kansas City Plant), other consolidation sites, and sites where Complex missions are being closed out. The affected environment discussions include the effects of continued operation at each site; that is, the impacts of the No Action alternative. The chapter also includes discussions of the affected environment and environmental consequences of each of the three consolidation alternatives (Mound, Pinellas, and Rocky Flats Plants). The chapter concludes with a summary and comparison of the environmental consequences of the Proposed Action and alternatives, and discussions of decontamination and decommissioning and intersite transportation issues.

The affected environment consists of the existing conditions at each of the eight sites that are affected by the Proposed Action and any reasonably foreseeable changes independent of the Proposed Action that may occur throughout the expected operating lifetime of the facilities. Environmental consequences are the potential adverse impacts of the project as well as its beneficial effects. Environmental consequences have been assessed for the No Action alternative, the Proposed Action, and alternatives. Where applicable, and depending on the resource or issue involved, cumulative impacts at sites receiving relocated functions are discussed as the additional or incremental effects of the Proposed Action over the baseline or No Action. Each alternative involves seven or eight sites: a principal consolidation site, three or four other receiver sites, and three sites where the Nuclear Weapons Complex (Complex) missions will be closed out. For each site, a description of each environmental resource that may be affected by the project is presented: land resources, air quality and acoustics, water resources, geology and soils, biotic resources, cultural resources, and socioeconomics. In addition, waste management and human health effects are discussed.

The environmental consequences of the No Action alternative are equivalent to existing environmental conditions, plus reasonably foreseeable changes to the existing situation that would occur with or without consolidation, such as reduced plant workloads. Reasonably foreseeable future baseline changes, including population forecasts, have been projected for socioeconomic conditions. For resource issues such as air quality, water resources, and waste management that are subject to regulatory standards, the future baseline assumes the facilities would be in compliance with those standards. Facilities currently out of compliance, or that may be out of compliance in the future due to regulatory changes, would submit and implement plans, and corrective measures to meet applicable compliance standards. For land resources, geology and soils, biotic resources, cultural resources, and human health, it was assumed that current conditions adequately represent the future baseline. The best available data have been used to represent existing

conditions. In some cases, information that is several years old represents the best available data regarding design or upper-bound operating conditions of facilities that are now functioning at reduced capacities due to lower workloads.

At each site, the study area evaluated for each resource is consistent with the requirements of the resource. In all cases, the area is large enough to include possible direct and indirect impacts of consolidation activities. For each environmental resource, the study area depends on the nature of the resource and the manner in which it may be affected by the project.

The period for building modification and relocation of functions for the nonnuclear consolidation would be from 1993 to 1995. Depending on the relocated function, operations would be phased in beginning in late 1994 with full operations achieved around 1997 and continuing until the middle of the 21st century.

Overview of Environmental Assessment Methodologies. Brief descriptions of the approaches used in the analyses of land resources, air quality and acoustics, water resources, geology and soils, biotic resources, cultural resources, socioeconomics, waste management, and human health are provided below. More detailed discussions of methodologies and analyses of air quality and acoustics, socioeconomics, and human health are presented in appendixes D, E, and F, respectively.

Land Resources. Land resource analyses included assessments of land use, recreation, and visual resources. The land use analysis was based on assessment of potential impacts to land ownership patterns, potential disturbance of prime farmlands, and future compatibility with local land use plans and policies. The land use analysis included assessments of direct impacts which could result from future project-related activities during the implementation and operation phases, and indirect impacts which could result from land use changes caused by project-induced population growth or decline.

Local-level impacts on urban land use were evaluated for those communities where project in-migrants would reside as determined by the socioeconomic analysis. The construction of new housing on vacant land in the urban areas would be the predominant land use impact. Any increased business, commerce, industrial, or other related activities generated as a result of the proposed program would be absorbed through the utilization of existing office, store, and building space, together with land already platted to accommodate new construction. The analytical methods utilized to evaluate program-induced impacts are similar to those used to determine projected conditions. The amount of land needed to accommodate the project-induced in-migrant population was projected to determine whether project-related impacts can be absorbed under the existing zoning ordinances and be consistent with the adopted city-county comprehensive plans. The land use analysis was predicated on the premise that local decision-makers would enforce existing plans, policies, and ordinances; therefore, future development would be compatible with existing plans, policies, and ordinances.

Land required for future residential offsite use was estimated using the following methods: the acreage requirements (gross) of residential housing needed for project-related in-migration was determined by combining and averaging density factors of residential types found in the *Residential Development Handbook* by the Urban Land Institute (1990). This resulted in a single factor (6.9 dwelling units per acre) used with the projected in-migration estimates.

For example, 100 in-migrating employees divided by 6.9 dwelling units per acre equals 14.49 acres of space estimated to accommodate these in-migrating employees in offsite housing. The number of in-migrating employees was based on housing projections for each phase of the project developed

by the socioeconomic analysis. Offsite impacts of out-migration were not predicted since, although housing and rental units may become vacant, this would not change the land use classification.

Evaluations of impacts on recreational facilities were based on qualitative assessments of potential changes in the use of available Federal, state, and local recreation sites.

Visual resource assessments were based on the Bureau of Land Management Visual Resource Management (VRM) methodology (BLM, 1980). The existing landscape at each site was given a VRM classification ranging from 1 (applied to wilderness areas, wild and scenic rivers, and other similar situations) to 5 (applied to areas where the aesthetic character of the landscape has been destroyed). Landform, vegetation, water features, color, adjacent scenery, scarcity, and cultural modifications were key factors used to determine VRM classification. Visual impacts were assessed based on the potential of the project to alter or conflict with this classification.

Visual impact was determined by assessing the degree of visual contrast that the proposed activities and/or facilities would create with the existing landscape character as seen from viewpoints accessible to the public, such as public roadways, parks, and residential areas. If the contrast would demand attention, and if the degree of contrast would conflict with the VRM classification by exceeding accepted standards, the contrast would be considered an impact. Sensitivity levels of representative key viewpoints, based on the number and concerns of observers and the distance from viewpoints to the affected area, were also taken into consideration.

Air Quality and Acoustics. The assumptions used in the modeling analysis were selected to ensure that the overall assessment was conservative. Assessments of environmental consequences for air quality were based on comparison of project effects with applicable standards and guidelines. The assessment consisted of determining the potential of additions to ambient levels of criteria air pollutants, hazardous air pollutants (HAP), and other toxic compounds, and comparing the total quantities to Federal and state ambient air quality standards and guidelines. The criteria pollutants are the pollutants for which National Ambient Air Quality Standards (NAAQS) exist, as defined in 40 CFR 50. These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), nitrogen oxides (NO_x), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter less than 10 micrometers in diameter (PM_{10}). The 189 HAPs include: those listed under Title III of the 1990 *Clean Air Act* (CAA), as amended through May 1992; those regulated by the National Emissions Standards for Hazardous Air Pollutants (NESHAP); and, those that may have been proposed or adopted in regulations or are listed as guidelines by the respective states.

Available ambient air monitoring data were used to determine maximum background concentrations of pollutants for each site. Results from modeling site emission rates for criteria pollutants, HAPs, and toxic air pollutants were used to estimate the No Action alternative air quality. The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state criteria pollutant, HAP, and toxic pollutant guidelines and regulations to provide an estimate of the effects of the No Action alternative on air quality. Because the maximum background concentration may already include a portion of the pollutant emissions from the site, summation of the maximum background concentration and the No Action concentration may overpredict pollutant concentrations.

The methodology used in modeling the site-specific emissions meets the guidelines of the Environmental Protection Agency's (EPA) *Guideline on Air Quality Models* (EPA, 1986b). The EPA-recommended Industrial Source Complex Short Term (ISCST) Model (EPA, 1987) was chosen as the most appropriate model to perform the air dispersion

modeling analysis because it allows for the estimation of dispersion from a combination of point, area, and volume sources. Required input data for the model were provided by each of the sites. The input parameters include emissions inventories (release rates) and source characteristics (stack height, stack diameter, and effluent velocity), meteorological data, source locations, and distances to the site boundary and critical receptors. Modeling was performed for all compounds that had projected emission rates greater then 100 lb/yr. However, modeling was performed for compounds at emission rates less than 100 lb/yr if emissions at these rates could cause an exceedance of Federal or state air quality standards or guidelines. This was accomplished by obtaining the maximum concentration at or beyond the site boundary for a representative compound emitted at 100 lb/yr. Since the resulting concentration would be the same for any compound emitted at 100 lb/yr, this concentration was compared to applicable air quality standards for all other regulated compounds. If the air quality standard of a regulated compound could be exceeded by emissions below 100 lb/yr, then information on emission rates for the compound were requested from the appropriate DOE field office or from the architecture and engineering contractor. The concentration of the compound was then calculated and compared to applicable air quality standards. All exceedances of quality standards are discussed.

EPA guidelines were conservatively applied while performing the air quality assessment. The "highest-high" concentration was selected for comparison to applicable standards and guidelines, instead of the "highest second-high" concentration as recommended by EPA. This concentration was the maximum occurring at or beyond the site boundary. It was also assumed that the HAP emissions for each site originated from a single point source located in the approximate center of the site. This assumption generally results in higher concentrations than would actually occur, because emission sources are commonly geographically separated from one another.

Terrain data for the modeling assessment were input for the sites considered to be other than "flat." These include the Kansas City Plant (KCP), the Mound Plant (Mound), the Oak Ridge Reservation Y-12 Plant (Y-12), the Los Alamos National Laboratory (LANL), and the Rocky Flats Plant (RFP). The use of site terrain data in the ISCST model provides more representative results for those sites located in areas not considered "flat."

The emission rates for each pollutant were provided by each site or by the Architect/Engineer which furnished the design information. For most sources, data were provided on an annual emission rate basis in units of tons per year or pounds per year. The model requires units in pounds per hour, assuming that the source was operated for the entire year, or 8,760 hours (the number of hours in a year). Data were generally not available to determine actual operating hours.

The assessment of impacts of the Proposed Action and alternatives involved the addition of baseline concentrations of pollutants to concentrations determined through modeling, which represent emissions during the implementation and operation phases of the project. The sum of baseline concentrations and concentrations attributed to the Proposed Action or alternatives was then compared with state and/or Federal standards and guidelines to determine compliance and the potential significance of impacts.

Acoustic assessments involved evaluating noise emissions from traffic on major routes leading to the sites using the Federal Highway Administration Traffic Noise Prediction model as discussed in appendix D. The assessment of noise impacts of the Proposed Action and alternatives during the implementation and operation phases is based on changes in traffic volumes as a function of changes in employees required during these phases. The EPA guidelines recommend a day-night sound level (DNL) of 55 decibels, A-weighted (dBA), which is sufficient to protect the public from the effect of broadband environmental noise in typically quiet

outdoor and residential areas (EPA, 1974). For protection against hearing loss in the general population from nonimpulsive noise, the EPA guideline recommends an equivalent sound level (L_{eq}) of 70 dBA or less over a 40-year period. The *Noise Control Act* of 1972 (P. L. 92-574), with its subsequent amendments (P. L. 95-609), allows states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. The No Action baseline includes results from site sound-level measurements, if available, and/or ranges of typical DNL for each location. These sound levels were then compared to local community noise statutes, regulations, and guidelines to determine the acoustic impacts.

Workers at each site are exposed to varying levels of equipment noise. Department of Energy (DOE) Order 5480.4 requires compliance with Department of Labor Occupational Noise Exposure Standard (29 CFR 1910.95) for DOE and contractor employees. This standard requires that an effective hearing protection program be administered whenever employee noise exposures equal or exceed an 8-hr time weighted average (TWA) sound level of 85 dBA, where noise levels exceed an exposure to an 8-hr level of 90 dBA or other levels and duration as specified by the regulations. Protection against noise would be provided in the form of administrative or engineering control, where feasible, or as personal hearing protection equipment. At a minimum, these requirements are met at each site.

Water Resources. The environmental impacts on surface water and groundwater resources from the Proposed Action and alternatives were assessed by determining the potential degree of change in baseline conditions as a result of the implementation and operation of the Proposed Action or alternatives.

The baseline characterization reflects conditions at the sites as they currently exist. Conditions at the sites used in the analysis of the No Action alternative were considered to be the same as the baseline conditions. The affected environment sections include a brief overview of the following key hydrological features: water availability, usage, rights, and allocations; floodplains and drainage basins; and, water quality with regard to compliance with regulatory authority requirements.

Surface Water. For the baseline environment, surface water flow, water rights, and water quality were studied. An assessment of water availability was made in light of the potential change in demand caused by consolidation activities. The change in the average annual flow of surface water resulting from proposed withdrawals and discharges was determined. The change in stream flow was compared with the average annual flow to determine the impact. Impacts from consolidation activities were predicted if the change in water demand or use exceeded the available water supply, exceeded water allocations, or would be in violation of current water rights agreements. Furthermore, a decrease in stream flow was determined to have an impact if the diminished flow resulted in the alteration of the physical and chemical characteristics of the stream such that the assimilative capacity of the stream was substantially reduced. A reduced assimilative stream capacity could potentially result in the need to revise the *Clean Water Act's* (CWA) National Pollutant Discharge Elimination System (NPDES) permit, in addition to changing the characteristics of the stream. An increase in stream flow could have an impact if the stream were to overflow stream banks or erode stream channels.

In accordance with Executive Order 11988, "Floodplain Management," and 10 CFR 1022, "Compliance with Floodplain/Wetland Environmental Review Requirements," the effects of proposed actions on floodplains were considered. Federal agencies are required to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development whenever there is a practical alternative.

The locations for the Proposed Action or alternatives were compared to known floodplain areas. Floodplains exist in low-lying areas adjoining inland or coastal waters and are measured as having either a 0.2 percent chance (500-year floodplain) or a 1.0 percent chance (100-year floodplain) of being inundated by a flood in any given year. Activities for which even a slight chance of flooding would be intolerable are "critical actions" and cannot be located within a 500-year floodplain. Reconfigured activities constituting "critical actions" that would be relocated to an area within a 500-year floodplain or any actions modifying areas within the 100-year floodplain would require a floodplains assessment.

The potential impact of reconfigured activities on water quality was evaluated. Baseline water quality was assessed by reviewing the monitoring data for surface water supplies and identifying any individual parameters that exceeded water quality criteria. The water quality criteria are presented to provide an understanding of an undesirable concentration and are not enforceable limits. Although water quality criteria do not directly affect plant activities or discharges, they can be translated into end-of-pipe effluent limitations through the permitting process. As such, any concentrations exceeding water quality criteria were noted and the NPDES permit reviewed to determine whether monitoring for those parameters was required. Relationships between surface water and groundwater quality were also described, as appropriate.

NPDES-permitted discharge outfalls are identified and described. Typical NPDES discharges include: stormwater, one-pass cooling water, and pretreated industrial, sanitary, or a combined pretreated industrial/sanitary effluent flow. Discharges of wastewater to municipal wastewater treatment facilities are also identified and described. Discharges to municipal wastewater treatment facilities are generally regulated by the municipal authority having jurisdiction over the treatment plant. Discharges to municipal wastewater treatment facilities may be required to meet pretreatment standards limiting the volume and character of the waste stream similar to NPDES discharge limits.

Monitoring results for discharges permitted under the NPDES or municipal wastewater treatment facility program were examined to ascertain whether any permit limits were exceeded and if permit requirements were satisfied. Discharge permits set discharge limits and monitoring requirements for discharges. The site compliance history with the permit requirements is presented in the discussion. Any actions taken by the site to identify and/or rectify the cause of the noncompliance were noted. At some sites, the NPDES permit requires the plant to notify the regulatory authority if discharge monitoring identified unpermitted parameters at concentrations above a predetermined level. Although notifications were required, the discharges were not considered violations of the permit. The notification process serves to guide the regulatory authority in the renewal and reissuing of permits. NPDES permits are issued for a maximum period of five years. At sites where a notification requirement is in effect, the compliance activities were noted. Municipal wastewater treatment facility discharge permits are issued for varying lengths of time depending upon the municipality.

Consequences of the site operating in non-compliance with NPDES permit requirements or discharging to a receiving water with poor water quality could include more stringent discharge limitations when the NPDES permit is reissued. Parameters for which a change in future permit requirements may be a possibility are presented. Particular significance was attached to those parameters identified at concentrations exceeding water quality criteria and not complying with NPDES permit limitations. Future NPDES permits will take into consideration the existing water quality, the sites' NPDES monitoring record, and current site activities including the transferred technologies.

Consequences of the site operating in non-compliance with municipal wastewater treatment

facility pretreatment requirements could result in fines, the revocation of the permit, or the requirement for additional pretreatment operations.

Groundwater. The analysis considers effects of groundwater usage on aquifers and groundwater quality within the regions-of-influence (ROI) for groundwater resources. Groundwater resources are defined as the aquifers underlying the site and their extensions down the hydraulic gradients to, and including, discharge points and/or the first major users. In the affected environment discussion, local aquifers are described in terms of the extent, thicknesses, and quality of the groundwater.

Current facility groundwater usage is described in each discussion. Cases in which projected groundwater use would exceed locally developed sources of groundwater supply were identified. Existing water rights for the major water users, as well as contractual agreements for water supply to the sites from support communities, were summarized. Impacts associated with construction and operations withdrawal were estimated if available data indicated that serious drawdown problems would occur.

Current groundwater quality conditions were analyzed. The results were compared to Federal and state groundwater quality criteria and drinking water standards to assess current conditions. Impacts of groundwater withdrawals on existing contamination plumes were assessed to determine the potential for changes in their rates of migration. Impacts were assessed by the degree to which drawdown of groundwater levels, groundwater availability, and groundwater quality would be affected by the Proposed Action or alternatives.

Geology and Soils. Analyses of environmental consequences on geology and soils were based on the location and extent (new construction and/or building renovation) of proposed project activities and the local geologic and soils setting. In general, impacts to the geological environment may include destruction of or damage to unique geological features, landslides or shifting caused by loading or removal of supporting rock or soil, and removal or covering of mineral resources. The descriptions of the individual settings emphasize, as appropriate, the aspects of the local geology that could affect or be affected by project alternatives including geomorphology, faults and seismicity, and general foundation conditions. The degree to which any of the above factors would be affected by the project was an indication of geologic impacts.

Assessments of soil impacts, including soil erosion and contamination, were based on evaluations of implementation and operation activities associated with the Proposed Action and alternatives. Soil impacts during the implementation phase were assessed according to the type of renovation and/or construction activities and the amount of disturbed area. Erosion prevention and control measures are described, as necessary, and their effectiveness is considered. Soil contamination potential was assessed by determining current and future waste management and material-handling practices due to expected operations activities. Spill prevention and control measures are described as appropriate and their effectiveness is considered.

Biotic Resources. Potential impacts to terrestrial resources, aquatic resources, wetlands, and threatened and endangered species were evaluated. In general, potential impacts were based on the degree to which various habitats of species would be affected by the project. Where appropriate, impacts were evaluated with respect to Federal and state protection regulations and standards.

Potential impacts to terrestrial resources, wetlands, aquatic resources, and threatened and endangered species include loss and disturbance of wildlife and wildlife habitats, as well as exposure of flora and fauna to air and water emissions. Impacts on terrestrial plant communities were evaluated by comparing data on site vegetation to proposed land requirements. Impacts to wildlife were based to a large extent on plant community loss, which is closely related to animal habitat. Effects on wetlands

were addressed similarly to terrestrial plant communities. Project impacts on aquatic resources considered whether water withdrawal or discharge would affect site streams onsite. Impacts to threatened and endangered species were addressed in a manner similar to that for terrestrial and aquatic resources because the sources of potential impacts are similar.

Cultural Resources. Impact analyses for cultural resources focused on three major elements: prehistoric, historic, and Native American resources. The affected environment sections include a brief overview by element type; the number and type of resources in the project areas, if known; their status on both the National Register of Historic Places (NRHP) and appropriate state registers; and the importance of traditional resources to Native American groups with historical ties to the project areas.

Assessments for prehistoric and historic resources focus mainly on those properties likely to be eligible for the NRHP. In addition to identifying the numbers and kinds of prehistoric and historic resources to be affected, the following issues were also considered: evaluation of the relative importance of a resource type in the regional context, the depositional integrity of a given resource, and the relative degree of protection afforded similar resources in nonproject areas in the region. The individual resource type, the proximity of impact areas to the resources, and the likely duration of impacts were considered in the analysis of Native American resources. Impacts to prehistoric and historic resources were predicted if the proposed project could substantially add to existing disturbance of resources in the project areas or if the project could adversely affect NRHP-eligible resources, or cause loss or destruction of important scientific, cultural, or historic resources. Impacts to Native American resources were predicted if the project had the potential to affect sites important for their position in the Native American physical universe or belief system, or to reduce access to traditional use areas or sacred sites.

Socioeconomics. A detailed description of the assumptions, data, methodologies, and models used for the assessment of environmental consequences is provided in appendix E. Environmental consequences for socioeconomics and community services were assessed for an ROI surrounding each site. The ROIs were determined to be those areas in which approximately 90 percent of the current DOE and contractor employees reside. Population growth projections were developed for each site to establish a No Action population baseline from which other baseline estimates for employment, housing, and community services were projected for each county, city, and special purpose jurisdiction in the ROI. This No Action baseline was used as a comparison against the effects that the Proposed Action and alternatives might have on the conditions of each county, city, and special purpose jurisdiction in the ROI. The results of the socioeconomics analysis for cities, counties, and special purpose jurisdictions with impacts greater than 1 percent are identified in the text.

The assessment of impacts associated with the Proposed Action and alternatives was based on the additional employees the project would require during the construction and operations periods. These directly created jobs would also lead to indirectly created jobs. A labor analysis was performed to ascertain the amount of appropriate labor available in the region to fulfill the employment requirements created by the project and the number of workers that would be expected to in-migrate with their families. This project-related population increase was compared to the No Action population growth baseline to determine additional housing and community services that would be needed to accommodate the new growth. In addition to assessing the effects of population increases, the effects of decreasing population caused by out-migrations from job losses at the sites where there would be workforce reductions were also analyzed. Projections for population losses are conservative because they are estimated on the assumption that all the jobs lost will occur in the single year 2000.

Projected housing needs were based on current housing unit and population data and were developed by estimating the household size from current population and housing unit ratios. These ratios were applied to the estimated future population trends to obtain the number of housing units needed to accommodate the projected No Action baseline population and the population created by the project. Estimates of additional housing unit vacancies created directly and indirectly by a project alternative as a result of out-migrations were also developed from current population and household size ratios.

The major water supply and wastewater treatment systems providing service in each ROI were identified and information was collected on their current capacities and average daily demands. The effects of any future population on the average daily demands and capacities of these systems were then evaluated.

Statistics on public school enrollments, school capacities, and the number of teachers were collected for all school districts in each ROI. The percentage of school-age children in the population was applied to future population trends to project the number of enrollments with the No Action future baseline and the number of future students as a result of the project. Estimates of the number of teachers needed in the future were based on current pupil-to-teacher ratios and were developed by applying future enrollment trends to these ratios.

Projected population data were applied to current hospital occupancy rates and capacities to determine the number of additional hospital beds in excess of capacity, if any, that would be needed to accommodate future population with the No Action baseline or as a result of the project. Current level-of-service ratios for physicians were applied to projected population trends to estimate the number of physicians needed in the future.

Statistics on current levels of service (LOS) for police and fire protection were applied to future population trends to estimate the number of additional personnel, if any, that would be needed with the No Action baseline or as a result of the project.

Local transportation impacts were assessed in terms of the changes to roadway traffic volumes and service levels associated with consolidation activity employment changes and commercial trucking requirements. Projected vehicle accident and fatality levels were also assessed relative to baseline conditions.

Waste Management. Waste management assessments were based on projected waste types and waste volumes due to the implementation and operation of the Proposed Action and alternatives; the waste storage, treatment, and disposal facilities required to manage these wastes; the current waste types and waste volumes generated; and the existing and planned storage, treatment, and disposal facilities. Data for projected wastes were derived from conceptual design reports, other environmental reports, or site contacts. Existing annual waste generation data and existing onsite storage, treatment, and disposal capacities were obtained directly from each of the facilities.

The impact assessment for the Proposed Action and alternatives considered the additional waste types and waste volumes generated by the Proposed Action and alternatives, compared to the No Action baseline at each of the affected sites. Impacts to the existing storage, treatment, and disposal facilities due to changes in waste type volumes could consist of incremental or substantial increases (or decreases) to onsite waste volumes that could cause current design capacities to be exceeded (or underutilized). The result could produce minor or no impacts on the operational waste management functions or identify the need to either upgrade or construct new waste management facilities to handle the additional waste types or waste volumes.

Human Health. Human health effects were assessed for normal operations and potential accidents. Information contained in the site environmental reports and received directly from the sites was used

to evaluate No Action conditions as well as the Proposed Action and alternative conditions. The air and water concentrations of hazardous chemicals and radioactive material were compared to applicable permit, regulatory, and DOE operational limits. These concentrations were also compared to cancer potency factors for carcinogenic compounds and the Hazard Index for noncarcinogenic compounds. Additionally, each operation was examined for the use of hazardous and radioactive materials in the manufacturing process. When available, monitoring data were compared to DOE, Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health limits for worker exposure. The results of these comparisons were used to assess the human health effects.

The hazardous chemicals and radioactive materials associated with each of the activities proposed for transfer were also assessed for their potential to affect human health in the event of an accident. An inventory of hazardous/toxic chemicals was conducted to generate a list of toxicants and the processes with which they are associated. In addition, quantitative hazard assessments that had been previously performed and documented were reviewed to determine the accidents that had been assessed or analyzed. Accidents at donor and receiver sites that involved hazardous or radioactive materials and processes similar to the functions that may be relocated to the receiver sites were assessed to make qualitative comparisons. Because of decreased workloads, the time period of the review (1986-1990) was chosen as being more representative of maximum future activity levels at the various sites because the activity levels for the last two years have been uncharacteristically low.

Baseline Conditions Common to All Sites. Current operations at each Complex site result in the emission of pollutants to the atmosphere, discharge of pollutants in wastewater, and the generation of wastes. DOE orders require that site operations be conducted in accordance with all regulatory standards and provide for protection of the public and the environment. Monitoring is conducted at each site to determine compliance with these standards. Where monitoring indicates noncompliance, DOE orders require that appropriate corrective action(s) and follow-up be performed. Monitoring activities conducted at DOE sites are reported in accordance with permit, regulatory, and DOE operational requirements. Additionally, monitoring results and analyses are included in the sites' annual environmental reports, which are available to the public as required by DOE Order 5400.1, *General Environmental Protection Program.*

At all sites, applicable waste management regulatory requirements and guidelines for hazardous/toxic wastes include the *Resource Conservation and Recovery Act* (RCRA) Permit, RCRA Subtitle C Standards and *Toxic Substance Control Act* (TSCA) regulations. Nonhazardous (sanitary) solid wastes are governed by RCRA Subtitle D Standards. All radioactive and mixed waste management activities at the sites are conducted primarily under DOE Order 5400.3, *Hazardous and Radioactive Mixed Waste Program*, and DOE Order 5820.2A, Chapter III, which defines the requirements for handling, storage, and shipment of low-level and mixed waste. All mixed waste storage areas must meet RCRA containment system requirements of 40 CFR 175. The recent *Federal Facilities Compliance Act* (October 6, 1992) requires DOE to submit site-specific plans to EPA and the states containing schedules for providing treatment capacity for mixed waste streams at DOE sites. DOE is proposing to develop the site-specific plans based on decisions made in the National Compliance Plan for DOE Mixed Wastes and the Office of Environmental Restoration and Waste Management (EM) Programmatic Environmental Impact Statement (PEIS). Due to the small quantities of mixed wastes associated with the relocated nonnuclear activities, the Proposed Action will not affect DOE's ability to comply with the *Federal Facilities Compliance Act.*

In accordance with RCRA, as amended, the *Pollution Prevention Act of 1990*, and DOE Order 5400.1, all sites have an active pollution prevention and waste minimization program to reduce the volume and toxicity of waste generated to the extent that is economically practical. The site programs are an organized and continual effort to systematically reduce waste generation. The overall focus of these programs is aimed at pollution prevention, which involves the elimination/ minimization of pollutant releases to all environmental media from all aspects of site operations. This includes air emissions and water discharges to sewer systems, as well as the offsite disposal of solid waste.

Many of the solvents used in the Complex and proposed to be used in the reconfigured nonnuclear facilities have been identified as ozone depleting pollutants. Attempts are being made, both internationally and nationally, to reduce ozone-depleting gases. In September 1987, 27 nations, including the United States, signed an agreement called the Montreal Protocol, to limit the production of chlorofluorocarbons (CFC) and halogens. A second meeting regarding the Montreal Protocol was held in June 1990. The participants agreed to a total phaseout of CFCs, halogens, and carbon tetrachloride (CCl_4) by the year 2000. A third meeting of the Montreal Protocol extended the phasing-out of ozone-depleting gases into the early 21st century due to the slow development of CFC alternatives. Schedules contained in Title VI of the CAA Amendments (November 1990) call for the phaseout of all CFCs and halogens between 2015 and 2030. All DOE sites have, or are developing, site-specific plans to meet the CAA-mandated phaseout schedule. Potential ozone depleting chemicals identified in 40 CFR 82 and discussed in this Environmental Assessment (EA) include 1,1,1-trichloroethane (TCA), CCl_4, chlorodifluoromethane (HCFC-22), dichlorodifluoromethane (CFC-12), and trichlorotrifluoroethane (CFC-113).

Workplace Safety and Accidents. Operations at all DOE sites expose workers to occupational hazards during the normal conduct of their work activities. Accidents and injuries that occur on the job can be minimized but not entirely avoided. Public Law 91-596, *Occupational Safety and Health Act of 1970*, establishes Federal requirements for assuring occupational safety and health protection for employees. The general industry safety and health standards pursuant to Public Law 91-596 are established at 29 CFR 1910, *Occupational Safety and Health Standards*. The Department has adopted this regulation and standards and provided implementation guidance in DOE Order 3790.1B *Federal Employee Occupational Safety and Health Program*. The policy set forth in the Occupational Safety and Health Program for the Department of Energy is to:

- Provide places and conditions of employment that are as free as possible from recognized hazards that cause or are likely to cause illness or physical harm.

- Assure that employees and employee representatives shall have the opportunity to participate in the Federal Employee Occupational Safety and Health Program.

- Establish programs in safety and health training for all levels of Federal employees.

- Consider all *Occupational Safety and Health Administration* (OSHA) and 29 CFR 1960 requirements to be the minimum standards for Federal employees.

As part of a comprehensive nuclear and occupational safety and health initiative announced by the Secretary on May 5, 1993, the Department intends to initiate consultation with OSHA with the aim of establishing regulation of all DOE facilities by OSHA.

Occupational safety and health training is provided for all employees at DOE facilities and includes specialized job safety and health training appropriate to the work performed. Such training also includes informing employees of their rights and responsibilities under section 19 of the *Occupational Safety and Health Act of 1970*, Executive Order 12196, 29 CFR 1960, and the DOE's Federal Employee Occupational Safety and Health Program. DOE Order 3790.1B also includes the requirements and guidelines for the Federal Employee Industrial Hygiene Program for the Department of Energy.

Operations at each site also present the potential for exposures of workers to hazardous constituents. DOE orders require that site operations provide for protection of workers, including having programs in place to protect workers. DOE Orders 5480.11, *Radiation Protection for Occupational Workers,* and 5483.1A, *Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities,* establish protection of workers against radiological and hazardous materials, respectively. Should an exposure occur, the incident would be reported in accordance with DOE Order 5000.3A, *Occurrence Reporting and Processing of Operations Information,* which would include appropriate corrective action(s) and follow-up.

As with any facility, operations at each site have the potential for accidents. DOE orders require the review of all planned and existing construction and operations for the potential for accidents and the assessment of the associated human health and environmental consequences, should an accident occur. The results of these reviews are used as the basis for determining the need for controls or other mitigative actions to eliminate or greatly reduce the potential for, and consequences of, an accident. These reviews are required before authorization of construction or start of operations. The orders that require review include, but are not limited to, the following: DOE Order 5440.1E, *National Environmental Policy Act* (NEPA); DOE Order 6430.1A, *General Design Criteria*; DOE Order 5481.1B, *Safety Analysis and Review System*; DOE Order 5480.23, *Nuclear Safety Analysis Reports* (which canceled 5481.1B on 4/30/92); and DOE Order 5480.1B, *Environment, Safety, and Health* (ES&H) *Program for Department of Energy Operations.* The reviews involve the identification of hazards and an analysis of normal, abnormal, and accident conditions. This includes consideration of natural and man-made external events including fires, floods, tornadoes, earthquakes, other severe weather events, human errors, and explosions. The sites associated with the Proposed Action have complied with applicable DOE orders. KCP has contracted for a site Safety Assessment which is currently under review by DOE. The Savannah River Site (SRS) is currently reviewing the need for, and update of, Safety Analysis Reports (SAR).

In accordance with DOE Order 5500.1B, *Emergency Management System,* emergency response planning and training are provided to mitigate the consequences of potential accidents. Additionally, should an accident occur, the incident would be reported in accordance with DOE Orders 5000.3A, *Occurrence Reporting and Processing of Operations Information,* and 5400.4, *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), which would also include appropriate corrective action(s) and follow-up.

Consequences of the Proposed Action Common to All Sites. Consolidating or relocating nonnuclear functions to a site could result in increases in the emissions of pollutants to the atmosphere, discharges of pollutants in wastewater, and the generation of wastes. Members of the public could be exposed to pollutants that are released to the environment. Additionally, these functions, as with all industrial processes, would have the potential for exposing workers to hazardous constituents and accidents.

The monitoring currently conducted at each Proposed Action site will be reviewed to ensure that monitoring activities are adequate to assess whether new operations and site conditions are adversely affecting members of the public, workers, or the

environment. At each site, modifications to monitoring activities would be made, as appropriate. Any modifications, as well as the bases for the modifications, would be documented in the sites' Environmental Monitoring Reports, as required by DOE Order 5400.1, *General Environmental Protection Program.* The results of these monitoring activities and the potential for exposures to the public and workers would be reviewed, processed, and reported, as discussed earlier.

In many cases, the nonnuclear functions proposed for relocation are similar to or the same as activities currently being performed at the receiver site. In addition, the processes and materials associated with relocated functions are similar to or the same as those currently performed and used at the receiver sites. These processes and materials have been previously reviewed and analyzed in accordance with applicable regulatory and DOE order requirements and documented in various forms, including memoranda, safety assessments, and various NEPA documents. In all cases, current activities at these sites have received the appropriate authorization to operate.

The human health impacts of relocating a nonnuclear function to a receiver site were assessed in the following manner for each site: from an operational perspective, the additional impacts associated with that activity and the cumulative impacts after relocation were determined and presented; from an accident perspective, the processes to be transferred and the potential hazards they present were assessed. This assessment included the review of NEPA documents, SARs, and other applicable documents.

Additionally, all proposed nonnuclear functions to be consolidated or relocated are currently being performed at existing DOE sites and do not constitute new activities within the Complex.

Workplace Safety and Accidents. Construction and operation of relocated functions at each Proposed Action site would result in increased exposure of site workers to industrial-type work hazards and accidents. Before implementation of the Proposed Action at any site, however, notification would be made to the site's environmental, safety, and health staff that a new process or facility is being planned, or that an existing process is being considered for change or modification to allow the impact of the anticipated change on the work environment to be evaluated. Appropriate measures would be implemented to minimize work hazards and accidents based on this early evaluation. Once operational, as part of the Occupational Safety and Health Program at each site, ongoing surveillance of the new or modified processes or activities would be performed to identify potential health hazards. If potential health hazards are identified, a hazard evaluation would be conducted to determine the extent of the hazard and if required, the recommended control measures. Where feasible, engineering controls would be used to protect worker health and safety. Administrative controls and personal protective equipment would supplement engineering controls as appropriate.

4.1 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

This section discusses the affected environment and environmental consequences of the Proposed Action. Sites discussed include existing nonnuclear facilities of the DOE Complex and potential Complex sites not currently performing nonnuclear functions, but which are candidates for such functions with the Proposed Action and alternatives.

The affected environment discussion includes an analysis of the consequences of continued operation at each of the sites that may be affected by the Proposed Action: the principal consolidation site–KCP; other consolidation sites–SRS, LANL, Y-12, Sandia National Laboratories, New Mexico (SNL); and sites where the Complex mission would be closed out–Mound, the Pinellas Plant (Pinellas), and RFP (nonnuclear functions only). Because the affected environment discussions include the consequences of continued operations at each site,

they represent the impacts of the No Action alternative. The discussions of the affected environment reflect each site's expected reduced workload projections. For Mound, Pinellas, and RFP, this means that they would continue to have the same manufacturing missions; however, the anticipated lower workloads would require some facilities to be placed in a standby mode.

The analysis of environmental consequences of the Proposed Action at each site includes the effects of all nonnuclear functions proposed for relocation (see figure 3.3-1). The discussion of environmental consequences addresses consolidation of electrical/mechanical functions at KCP; most tritium-handling functions at SRS; detonators, calorimeters, neutron tube target loading, and beryllium technology and pit support functions at LANL; beryllium technology and pit support functions as an option at Y-12; and neutron generators, cap assemblies, thermal batteries, and milliwatt heat source surveillance functions at SNL.

Impacts associated with implementation and operations activities are described for each resource at each site that would receive new missions. Following these discussions, the impacts associated with transition activities and decontamination and decommissioning (D&D) due to closing out the Complex missions at Mound, Pinellas, and RFP (nonnuclear functions only) are described for each resource.

A limited capability currently exists at Lawrence Livermore National Laboratory (LLNL) to perform beryllium technology and other metal machining work now performed at RFP. This would not require analysis of impacts of this type of work at LLNL, nor inclusion of LLNL as a site analyzed in this EA, because existing capabilities are already in place.

4.1.1 Kansas City Plant

Detailed discussion of KCP's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.1. The functions and processes associated with the Proposed Action to be consolidated at KCP and the proposed facility modifications required to support each relocated function are discussed in section 3.3.1. Discussions of the assumptions used in this EA for determining the affected environment and environmental consequences at KCP and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action that supports the following discussion on KCP is also provided in the chapter 4 introduction and section 4.1.

4.1.1.1 *Land Resources*

Affected Environment. KCP consists of 141 acres and is located within the boundaries of the 300-acre Bannister Federal Complex. The Bannister Federal Complex is located approximately 12 miles south of the downtown area of Kansas City, MO (figure 3.2.1-1). Generalized land uses at the Bannister Federal Complex and vicinity (including KCP) are shown in figure 4.1.1.1-1. KCP currently contains approximately 3.2 million ft^2 of floorspace, with approximately 82 percent located within the large Federal office/industrial building that dominates the site. KCP, as well as the remainder of the Bannister Federal Complex, is compactly developed with limited open space. Residential distribution of KCP employees is discussed in section 4.1.1.7.

No residential structures are within the Bannister Federal Complex. The General Services Administration operates a child care center onsite with a capacity of 160 children, 400 feet north of the main DOE building and west of the DOE-controlled parking area. The center currently has approximately 150 children enrolled and a staff of 25 (KC ASAC, 1991c). Kansas City has zoned the Bannister Federal Complex, including KCP, heavy industrial. It is city policy to plan for space for existing and new

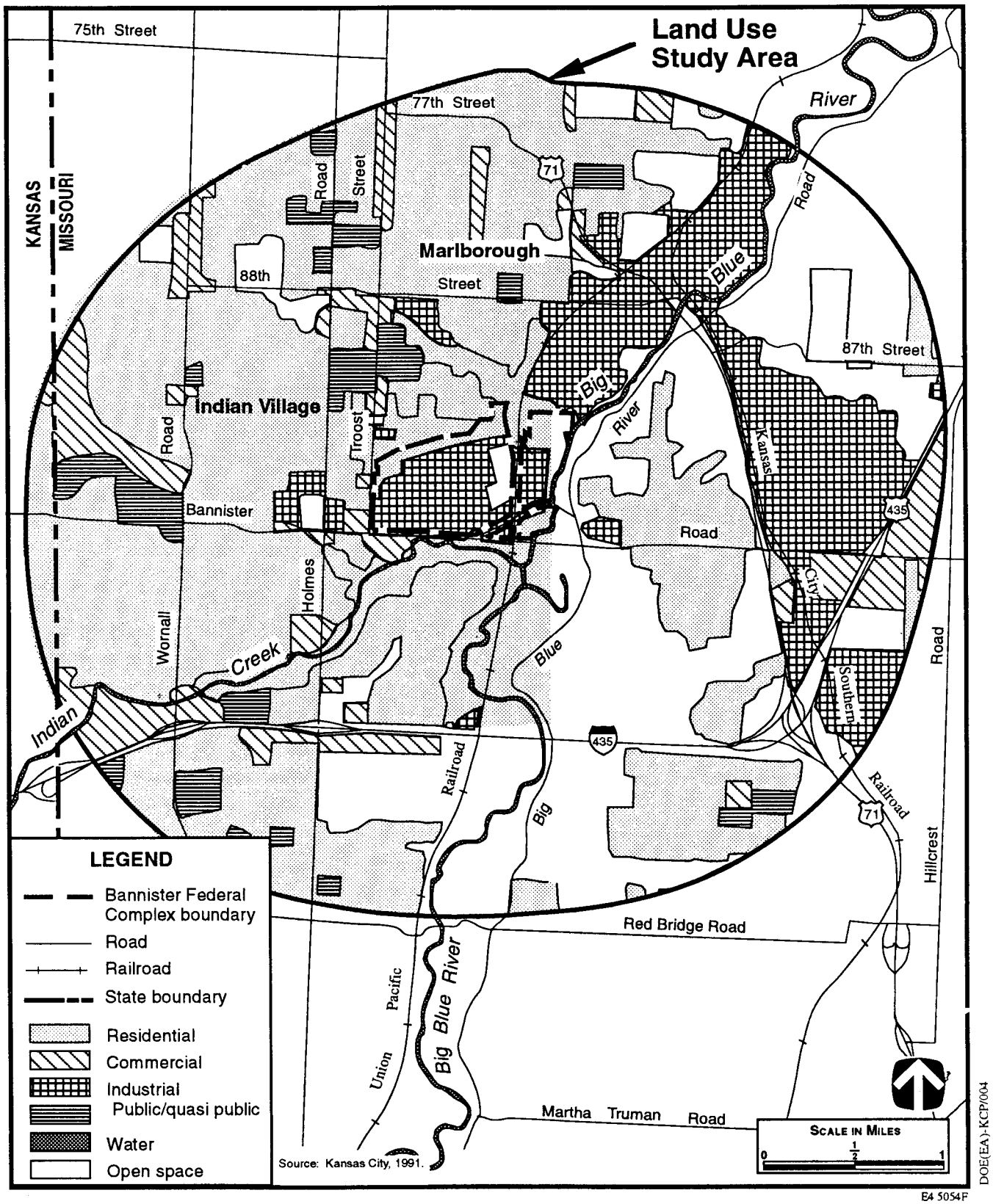


FIGURE 4.1.1.1–1.—***Generalized Land Use at the Bannister Federal Complex/Kansas City Plant and Vicinity.***

industries by expansion rather than relocation (Kansas City, 1990).

Land use within a 2-mile radius of the Bannister Federal Complex is urban, consisting of 41 percent residential (containing 15,164 dwelling units), 42 percent open space (25 percent consists of city-owned recreational lands; the remainder is vacant property), 6 percent commercial, 6 percent publicly owned (Federal, state, and local government), and 5 percent industrial (Kansas City, 1992). The closest residence to the Bannister Federal Complex is 20 feet away at its northernmost boundary; however, this residence is 540 feet northwest of the closest DOE-controlled property. A multi-family development west of the Bannister Federal Complex is 409 feet away from the nearest DOE-controlled property.

The city proposes to expand the Indian Creek Greenway through future acquisition of vacant private property, which would increase the amount of permanent open space around the Bannister Federal Complex (Kansas City Board, 1983). There are no prime farmlands on the Bannister Federal Complex.

The Bannister Federal Complex does not contain any public recreation facilities. A U.S. Marine Corps baseball diamond and the General Services Administration child care center playground are located at the northwest corner.

Human modifications to the natural landscape of the Bannister Federal Complex and vicinity are consistent with that of the Kansas City urban area. The Bannister Federal Complex presents a view of a typical industrial facility with most of the structures lower than 35 feet. The landscape of the Federal property, consisting of office/industrial uses, is applicable to VRM Class 5.

Environmental Consequences. The relocated functions would be incorporated into existing buildings at KCP through the rearrangement of existing activities and the use of vacant space. No building additions or major disturbances of land are proposed. The relocated functions would be compatible with existing KCP missions. The Proposed Action would maintain employment at KCP close to current levels (see section 4.1.1.7). Offsite land requirements for residential development as a result of project related in-migration would be approximately 4 acres during implementation and 47 acres during operations. The extensive public and private recreational facilities in the region could easily absorb the anticipated demand. Because relocated facilities would be placed in existing structures, the impacts on visual resources would be negligible and would not affect VRM classifications.

4.1.1.2 *Air Quality and Acoustics*

Affected Environment. The climate at the Bannister Federal Complex and in the surrounding region is characterized as humid, continental, with warm summers, moderately cold winters, and moderate annual precipitation evenly distributed throughout the year (Trewartha, 1954). The annual average temperature in the area, as measured at the Kansas City National Weather Service (NWS) station, is 54.1 °F; temperatures vary from an average daily minimum of 17.2 °F in January to an average daily maximum of 88.5 °F in July. Annual average precipitation is 35 inches with most occurring between April and October. About 20 inches of snowfall are typically recorded per year. Maximum monthly precipitation measured at the Kansas City NWS station ranged from 2.66 inches in January to 11.34 inches in September (NOAA, 1991c).

Ambient Air Quality. The Bannister Federal Complex is located in the Metropolitan Kansas City Intrastate Air Quality Control Region (AQCR). This AQCR is designated as attainment by the EPA for all criteria pollutants (40 CFR 81.326). The Missouri state ambient air quality standards for criteria pollutants, which are the same as the NAAQS, are listed in table D2.1.1-1.

Missouri has standards for the HAPs regulated by NESHAP. The Missouri Department of Natural

Resources has guidelines for acceptable ambient air levels of the 189 HAPs specified in the CAA, as amended. The HAPs/toxics described in this section are those currently used at KCP or those anticipated to be used with the Proposed Action.

Ambient air quality within and near the Bannister Federal Complex is monitored at three perimeter locations for each of the criteria pollutants. The data from each of these monitoring stations for 1990 are presented in table D2.1.1-2. To achieve a conservative estimate, the maximum background concentrations, as measured from the monitoring stations, were used in this analysis. With the exception of the ozone (1-hour) standard, the ambient air quality in the Bannister Federal Complex area does not exceed applicable guidelines or regulations. The ozone standard is exceeded primarily due to chemical reactions that involve vehicle emissions.

The principal sources of criteria air pollutants are the four boilers serving the Bannister Federal Complex. Table D2.1.1-3 presents an emissions inventory of these sources. Volatile organic compounds (VOC) emission sources include fugitive emissions and fuel storage tanks (KC ABA, 1987). Hazardous/toxic air pollutants are emitted from various process sources at the Bannister Federal Complex. Analytical data from a stack monitoring project (KC ASAC, 1992b) detail quantities of hazardous/toxic air pollutants released (table D2.1.1-5). Because radioactive materials are not processed at KCP, no radioactive materials are released to the atmosphere at KCP.

Air quality under ambient and No Action conditions at KCP is shown in table 4.1.1.2-1. Ambient air quality monitoring data are listed as "maximum background concentration," and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and the averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of the ozone (1-hour) standard, and the proposed Missouri state guidelines for hydrogen chloride, phosphoric acid, and sulfuric acid, baseline air quality concentrations in the Bannister Federal Complex area do not exceed, and are not expected to exceed, applicable guidelines or regulations. The maximum measured ozone background concentration is approximately 110 percent of the 1-hour standard. The hydrogen chloride and phosphoric acid concentrations are approximately 130 and 220 percent, respectively, of their proposed 24-hour standards. The sulfuric acid concentration is approximately 170 percent of the proposed 24-hour standard. The majority of the ozone concentrations is attributed to chemical reactions involving vehicular traffic and not emissions from KCP.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources within the Bannister Federal Complex include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Sound-level measurements were made around the west boilerhouse and at the western site boundary of the Bannister Federal Complex. The maximum measured sound level at the western site boundary along Troost Avenue was 69 dBA (KC ASAC, 1991e). The contribution from the plant to noise levels at the other site boundaries is minimal. Traffic is the primary source of noise (other than the steam plant) at the site boundaries. The acoustic environment in residential areas near the Bannister Federal Complex away from major roads was assumed to be that of a typical suburban or urban location, with DNL in the range of 53 to 62 dBA (EPA, 1974). The Kansas City community regulations limit noise levels in residential areas to an L_{eq}

TABLE 4.1.1.2–1.—*KCP Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines* [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline Level (μg/m³)	Maximum Background Concentration (μg/m³)[d]	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[e]
Carbon Monoxide (CO)	8-hour	10,000[a]	5.2[b]	73.8	78.9
	1-hour	40,000[a]	81.3[b]	148.8	230.1
Lead (Pb)	Calendar Quarter	1.5[a]	j	c	h
Nitrogen Dioxide (NO_2)	Annual	100[a]	24.9[b]	43.5	68.4
Ozone (O_3)	1-hour	235[a]	263.1	c	263.1
Particulate Matter (PM_{10})	Annual	50[a]	27.8[b]	6.9	34.7
	24-hour	150[a]	54.7[b]	73.6	128.3
Sulfur Dioxide (SO_2)	Annual	80[a]	3.8[b]	24.7	28.5
	24-hour	365[a]	18.8[b]	286.3	305.1
	3-hour	1,300[a]	63.7[b]	949.8	1,013.5
Hazardous Air Pollutants and Other Toxic Compounds[f]					
1,1,1-Trichloroethane	24-hour	1,040[g]	h	20.3	≥20.3
1,4-Dioxane	24-hour	24.5[g]	h	0.6	≥0.6
Acetic Acid	8-hour	i	h	0.7	≥0.7
Acetone	24-hour	161[g]	h	6.3	≥6.3
Chlorodifluoroethane	8-hour	i	h	0.7	≥0.7
Chlorodifluoromethane	8-hour	i	h	0.4	≥0.4
Dichlorodifluoromethane	8-hour	i	h	9.0	≥9.0
Dimethyl Formamide	24-hour	8.13[g]	h	0.2	≥0.2
Ethyl Alcohol	8-hour	i	h	0.4	≥0.4
Ethyl Benzene	24-hour	118[g]	h	0.4	≥0.4
Fluoboric Acid	8-hour	i	h	0.7	≥0.7
Fluorine End-capped Homopolymers	8-hour	i	h	6.1	≥6.1
Fluoroaliphatic Polymeric Esters	8-hour	i	h	0.4	≥0.4
Fluorobenzene	8-hour	i	h	4.3	≥4.3
Fluorotelomer	8-hour	i	h	0.4	≥0.4
Glycol Ethers	8-hour	i	h	26.0	≥26.0
Hexane	8-hour	2,400[g]	h	1.1	≥1.1
Hydrogen Chloride	24-hour	2.03[g]	h	2.6	≥2.6
Isopropyl Alcohol	8-hour	13,066.7[g]	h	22.0	≥22.0
Methyl Alcohol	24-hour	7.13[g]	h	0.2	≥0.2
Methyl Ethyl Ketone	24-hour	32.1[g]	h	0.6	≥0.6
Methyl Isobutyl Ketone	24-hour	55.7[g]	h	1.2	≥1.2
Methylene Chloride	8-hour	i	h	5.8	≥5.8

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Footnotes at end of table.

TABLE 4.1.1.2–1.—*KCP Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*—Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline Level (μg/m³)	Maximum Background Concentration (μg/m³)[d]	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[e]
Hazardous Air Pollutants and Other Toxic Compounds[f]					
Naphtha/Mineral Spirits	8-hour	i	h	5.4	≥5.4
Nitric Acid	8-hour	66.7[g]	h	13.7	≥13.7
Phosporic Acid	24-hour	0.27[g]	h	0.6	≥0.6
Sulfuric Acid	24-hour	2.72[g]	h	4.7	≥4.7
Tetrachloroethylene	24-hour	922[g]	h	0.4	≥0.4
Toluene	24-hour	10.2[g]	h	3.3	≥3.3
Trichloroethylene	24-hour	36.5[g]	h	34.9	≥34.9
Trichlorotrifluoroethane	8-hour	101,333[g]	h	40.9	≥40.9
Xylene	8-hour	5,800[g]	h	4.0	≥4.0

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a Federal standard (40 CFR 50).
b Ambient air quality monitoring data for 1990 (KC ASAC, 1991e).
c Not estimated because the potential release is less than 100 lb/yr (0.01 lb/hr).
d The maximum of the concentrations as measured from the Bannister Federal Complex ambient air monitoring stations.
e The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
f The compounds listed are the major pollutants of concern (FDI, 1993).
g State guideline (MO DNR, 1992).
h Data unavailable.
i No standard or guideline.
j Concentration is too low to be detected.

of 60 dBA during the daytime and to 55 dBA at night. In commercial and light industrial areas voice levels are limited to 80 dBA (Kansas City, 1982).

Sound levels at the Bannister Federal Complex boundaries are within applicable city and Federal guidelines and limits, except at the western boundary, due to the Bannister Federal Complex west boilerhouse and local traffic. A noise-dampening enclosure has been proposed and would be installed to reduce noise levels from the west boilerhouse cooling tower condenser pumps. This enclosure should reduce noise levels in the affected residential areas.

Environmental Consequences.

Air Quality. The consolidation of the electrical/mechanical operations at KCP would be accomplished by renovating and upgrading space in existing buildings (section 3.3.1). Renovation of these facilities would temporarily increase particulate matter emissions such as dust and dirt, and vehicle emissions. This increase is minor when compared to overall site emissions and is not expected to significantly contribute to existing air quality concentrations.

The potential emission rates for the consolidation of nonnuclear manufacturing activities at KCP are listed in table D3.1.1-1. The Proposed Action's contribution to ambient air quality is shown in table 4.1.1.2-2. The contributions from the Proposed Action are a very small percentage of the applicable regulations or guidelines. Consolidation of the nonnuclear activities at KCP would not result in the emission of radioactive materials from normal operations.

TABLE 4.1.1.2–2.—*Contribution to Air Quality from Proposed Action and Total Concentrations at KCP with Comparison to Applicable Regulations and Guidelines* [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[d]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Carbon Monoxide (CO)	8-hour	10,000[a]	78.9	f	78.9
	1-hour	40,000[a]	230.1	f	230.1
Lead (Pb)	Calendar Quarter	1.5[a]	e	f	e
Nitrogen Dioxide (NO_2)	Annual	100[a]	68.4	f	68.4
Ozone (O_3)	1-hour	235[a]	263.1	f	263.1
Particulate Matter (PM_{10})	Annual	50[a]	34.7	f	34.7
	24-hour	150[a]	128.3	f	128.3
Sulfur Dioxide (SO_2)	Annual	80[a]	28.5	f	28.5
	24-hour	365[a]	305.1	f	305.1
	3-hour	1,300[a]	1,013.5	f	1,013.5
Hazardous Air Pollutants and Other Toxic Compounds[g]					
1,1,1-Trichloroethane	24-hour	1,040[b]	≥20.3	f	≥20.3
1,4-Dioxane	24-hour	24.5[b]	≥0.6	f	≥0.6
Acetic Acid	8-hour	c	≥0.7	0.8	≥1.5
Acetone	24-hour	161[b]	≥6.3	0.3	≥6.6
Chlorodifluoroethane	8-hour	c	≥0.7	f	≥0.7
Chlorodifluoromethane	8-hour	c	≥0.4	f	≥0.4
D'Limonene	8-hour	c	e	1.2	≥1.2
Dichlorodifluoromethane	8-hour	c	≥9.0	f	≥9.0
Dimethyl Formamide	24-hour	8.13[b]	≥0.2	f	≥0.2
Ethyl Alcohol	8-hour	c	≥0.4	0.3	≥0.7
Ethyl Benzene	24-hour	118[b]	≥0.4	f	≥0.4
Fluoboric Acid	8-hour	c	≥0.7	f	≥0.7
Fluorine End-capped Homopolymers	8-hour	c	≥6.1	f	≥6.1
Fluoroaliphatic Polymeric Esters	8-hour	c	≥0.4	f	≥0.4
Fluorobenzene	8-hour	c	≥4.3	f	≥4.3
Fluorotelomer	8-hour	c	≥0.4	f	≥0.4
Glycol Ethers	8-hour	c	≥26.0	f	≥26.0
Hexane	8-hour	2,400[b]	e	1.1	≥1.1
Hydrogen Chloride	24-hour	2.03[b]	≥2.6	f	≥2.6
Isopropyl Alcohol	8-hour	13,100[b]	≥22.0	4.7	≥26.7
Methyl Alcohol	24-hour	7.13[b]	≥0.2	f	≥0.2
Methyl Ethyl Ketone	24-hour	32.1[b]	≥0.6	f	≥0.6
Methyl Isobutyl Ketone	24-hour	55.7[b]	≥1.2	f	≥1.2
Methylene Chloride	8-hour	c	≥5.8	f	≥5.8

Footnotes at end of table.

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Total pollutant concentrations are within applicable standards or guidelines except for O_3, hydrogen chloride, phosphoric acid, and sulfuric acid. As stated previously, the exceedance for O_3 is due to vehicular traffic in the Kansas City metropolitan area and not from site activities. The exceedances of the state proposed guidelines for hydrogen chloride, phosphoric acid, and sulfuric acid are due to current operations.

TABLE 4.1.1.2–2.—*Contribution to Air Quality from Proposed Action and Total Concentrations at KCP with Comparison to Applicable Regulations and Guidelines*—Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[d]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Naphtha/Mineral Spirits	8-hour	c	≥5.4	1.0	≥6.4
Nitric Acid	8-hour	66.7[b]	≥13.7	f	≥13.7
Phosphoric Acid	24-hour	0.27	≥0.6	f	≥0.6
Sulfuric Acid	24-hour	2.72[b]	≥4.7	f	≥4.7
Tetrachloroethylene	24-hour	922[b]	≥0.4	f	≥0.4
Toluene	24-hour	10.2[b]	≥3.3	f	≥3.3
Trichloroethylene	24-hour	36.5[b]	≥34.9	f	≥34.9
Trichlorotrifluoroethane	8-hour	101,333[b]	≥40.9	f	≥40.9
Xylene	8-hour	5,800[b]	≥4.0	f	≥4.0

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a Federal standard (40 CFR 50).
b State guideline (MO DNR, 1992).
c No state standard or guideline.
d Baseline Concentration values are from table 4.1.1.2-1.
e Data unavailable.
f Design report indicates that emissions for this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).
g Compounds listed are the major pollutants of concern (FDI, 1993).

Acoustic Conditions. Effects of the Proposed Action on noise levels during construction and operations have been evaluated for the major traffic routes around the Bannister Federal Complex. The changes in traffic volumes are expected to result in an increase of 2 decibels (dB) in peak-hour sound levels along Bannister Road and Troost Avenue. Changes in sound levels along other routes are expected to be less than 1 dB. The predicted rise in noise levels along the major access routes is expected to cause little or no increase in annoyance to the surrounding communities or individuals.

Noise generated by construction activities and onsite operation activities is not expected to increase offsite noise levels. Construction activities are limited primarily to interior renovation of existing buildings, resulting in few outdoor noise sources. Noise generated by renovation work and by operational facilities, equipment, and machines is not expected to cause ambient noise levels at the site boundary to exceed EPA guidelines.

Although no significant increase in noise is expected offsite from construction and operations, measures would be implemented onsite to protect workers' hearing including the use of standard silencing packages on construction equipment and providing workers in noisy environments with hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas, and a hearing protection program would be conducted.

4.1.1.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at KCP.

Surface Water. KCP is located near the confluence of the Big Blue River and Indian Creek. Individual drainage basins exist for each, but both the Big Blue River and Indian Creek are included in the Big Blue River basin. KCP lies on the divide between the

two drainage basins, both of which receive surface runoff and cooling water discharge from the plant. The Big Blue River drains 188 square miles upstream of KCP, with a mean annual flow of 159 cubic feet per second (ft^3/s) past the plant's eastern perimeter. Flow in Indian Creek during the summer is primarily effluent from the sewage treatment plant located on Indian Creek upstream of KCP (KC DOE, 1988, 1989). Indian Creek has a mean annual flow of 23 ft^3/s (KC ABA, 1986). Surface water channels near KCP are shown in figures 3.2.1-1 and 3.2.1-2.

No surface water is withdrawn at KCP (KC DOE, 1989). The Kansas City, MO, municipal water supply system provides all drinking and process water for KCP. The water usage at KCP averages approximately 1.4 million gallons per day (MGD) (table 3.2.1-3).

Four NPDES outfalls at KCP, numbered 001 through 004, discharge a combination of stormwater and one-pass cooling water. Outfall 001 discharges to the Big Blue River and outfalls 002, 003, and 004 discharge into Indian Creek. There are six unpermitted stormwater outfalls at the Federal complex under the responsibility of the General Services Administration. Two discharge to the Big Blue River and four discharge to Indian Creek.

Industrial wastewater is pretreated onsite at the 1.3 MGD-capacity industrial wastewater pretreatment facility. The site currently discharges approximately 0.2 MGD to the industrial wastewater pretreatment facility. Following pretreatment, effluent is monitored and discharged in combination with KCP sanitary wastewater to the Kansas City Municipal Wastewater Treatment Plant. Wastewater generation from KCP is estimated at 200 million gallons per year (MGY) (table 3.2.1-2).

The quality of the effluent discharged from KCP to the Kansas City Municipal Wastewater Treatment Plant is regulated by Kansas City, MO, Discharge Permit and city ordinances administered by the Kansas City, MO, Water and Pollution Control Department and by the U.S. EPA Pretreatment Standards for the metal-finishing category (40 CFR 433.17) (KC ASAC, 1992c). KCP discharges to the municipal wastewater treatment plant include untreated sanitary sewage and treated industrial wastewater effluent from the KCP Industrial Wastewater Pretreatment Facility. Regulatory compliance is monitored where these two flows are combined (KC ASAC, 1992c). Table 4.1.1.3–1 presents a summary of the parameters monitored, a comparison of the average concentrations discharged in 1991 with regulatory standards, and the estimated total quantity of each parameter discharged from KCP to the municipal wastewater treatment plant during both 1990 and 1991. As indicated in the table, the estimated quantity of constituents released in the plant effluent has decreased significantly between 1990 and 1991. In 1990, two exceedances of chlorinated solvents, one exceedance of boron, and one exceedance of total toxic organics occurred (KC ASAC, 1991a). No discharge limits were exceeded during the required monitoring periods in 1991. However, the metal finishing pretreatment standard was exceeded once for total toxic organics and lead and twice for cadmium (KC ASAC, 1992c). As required, the Kansas City Water and Pollution Control Department was notified in each case, source investigations were initiated, and follow-up sampling was conducted. In 1992, KCP maintained full compliance with city and Federal wastewater discharge standards without a single violation.

As part of KCP's Waste Minimization and Pollution Program, design work progressed on a Central Organics Removal System (KC ASAC, 1992c). This system will consist of new piping to route all chlorinated solvent and total toxic organics-contaminated wastewater at KCP to a new organics treatment facility which would treat it prior to discharge to the Kansas City Municipal Wastewater Treatment Plant (KC ASAC, 1991c). The Central Organics Removal System does not have NEPA approval and construction is not yet underway.

KCP lies within the floodplain of the Big Blue River and Indian Creek. A flood exceeding the protective capacity of the existing levee system, designed for

TABLE 4.1.1.3–1.—*Combined Sanitary Sewer Effluent Monitoring at Kansas City Plant*

Parameter	Regulatory Standards (mg/L)			KCP Annual Average (mg/L)	Total Estimated Quantity (lb) Released in:	
	Kansas City, MO Ordinance	Metal Finishing			1991	1990
		Average[b]	Daily Maximum			
Cyanide (G)	2.0	0.65	1.2	0.014	35	68
Cadmium	2.0[a]	0.005	0.009	0.004	9	11
Chromium (T)	10.0[a]	0.12	0.20	0.002	4	51
Copper	2.0[a]	0.15	0.25	0.009	22	161
Lead	0.1[a]	0.05	0.07	0.012	28	64
Mercury	*	*	*	0.0005	<2.2	2.2
Nickel	3.0[a]	0.18	0.29	<0.050	0	40
Silver	None	0.03	0.04	<0.030	<2.2	18
Zinc	2.0[a]	0.22	0.29	0.040	99	374
Total Toxic Organics	None		0.23	0.033	79	528
pH (G)	6.0-10.0 units	*	*	8.2	NA	NA
Temperature (G)	150°F	*	*	75	NA	NA
Biochemical Oxygen Demand (5 day)	300	*	*	110	267,258	467,199
Chlorinated Solvents (G)	0.160	*	*	0.042	101	431
Phenol (G)	10.0	*	*	0.023	55	123
Soluble Oil (G)	100.0	*	*	12.41	30,032	54,351
Total Suspended Solids	360.0	*	*	57	138,389	494,578
Boron	1.0[a]	*	*	0.181	264	1,258
Chromium (H)	5.0[a]	*	*	<0.010	4	0
Iron	15.0[a]	*	*	0.358	867	2,642
Sulfides	10.0[a]	*	*	0.1	242	0
PCBs	<0.0001[b]	*	*	0.0004	<2.2	NA

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[a] No city ordinance limit is available. Limit given is from the *Missouri Effluent Guidelines for Municipal Control of Industrial Wastes.*

[b] Metal finishing standards are recalculated every six months (40 CFR 433). Therefore, three different standards are applied to each parameter. The limits provided are the average of the three standards applicable to KCP during 1991.

* Standard has not been established.
NA Not Applicable
(G) Grab sample
(T) Total
(H) Hexavalant

Source: KC ASAC, 1991a, 1992c.

a once-every-70-years flood, poses a threat to the facilities (KC COE, 1990). Additional flood control works, providing protection against a 500-year flood, are under construction and scheduled for completion in December 1993. An environmental review of the levee construction project found no significant environmental impacts, and a Finding of No Significant Impact (FONSI) was prepared by DOE (KC COE, 1990). Upon completion of the levee, KCP will no longer be within floodplain areas.

Surface Water Quality. Water quality in Indian Creek and Big Blue River is affected by effluent introduced upstream of KCP from the Leawood, KS, Sewage Treatment Plant on Indian Creek, and runoff from the urbanized Big Blue River watershed. Water quality in the Big Blue River is monitored monthly at three locations and quarterly at three additional locations for the same parameters monitored at the NPDES-permitted outfalls (KC ASAC, 1991a). Water quality monitoring results for the Big Blue River near KCP in 1990 are presented in table 4.1.1.3-2. The monitoring results reflect the water quality of the river . Water quality would be taken into consideration in future NPDES permitting of all upstream and downstream dischargers, including KCP.

As indicated in table 4.1.1.3-2, the average concentration of silver downstream of all KCP outfalls exceeds Missouri chronic water quality standards. Identical results were found upstream of KCP on the Big Blue River, indicating that the source of contamination is upstream. Similarly, the average concentration of aluminum, nitrate, thallium, and total dissolved solids exceeded Federal drinking water regulations. However, these parameters were measured at similar levels upstream of KCP, again indicating the source of contamination is upstream. Although the average concentration of iron was within Missouri water quality standards, the maximum concentrations exceeded these standards. The maximum upstream and downstream concentrations exceed standards, and the difference between the upstream and downstream concentrations also exceeds standards.

Monthly monitoring of Indian Creek, conducted at two locations downstream of KCP, indicates that average silver and lead (Pb) concentrations exceeded applicable Missouri water quality standards in 1990. Similar concentrations observed upstream of KCP and low concentrations in KCP outfalls indicate that the source of these constituents is upstream of the plant.

NPDES permitted outfall 001, one of the three outfalls discharging to the Big Blue River, has a flow of approximately 0.7 MGD (KC ASAC, 1991c). 1,2-dichloroethylene (DCE) from contaminated groundwater infiltrating into the storm sewer system has been found in Outfall 001 effluent. Sewer rehabilitation projects have reduced DCE levels at Outfall 001 to an average of 5 to 7 micrograms per liter (µg/L) (KC ASAC, 1991a). For 1992, the annual average concentration of solvent in outfall 001 was 4 µg/L, and efforts to further reduce the discharge are continuing. DCE concentrations for all monitoring stations in the Big Blue River and Indian Creek were below the detection limits of the analysis (KC ASAC, 1993b). The two other outfalls emptying to the Big Blue River discharge only stormwater from non-industrial areas of the Bannister Federal Complex.

Seven outfalls empty into Indian Creek from the Bannister Federal Complex. Three of these (002, 003, and 004), which discharge a total of approximately 0.8 MGD of stormwater and one-pass cooling water, are covered by an NPDES permit (KC ASAC, 1991c). The remaining four outfalls discharge only stormwater from non-industrial areas of the Bannister Federal Complex.

All average effluent concentrations were within NPDES limits in 1990. Past violations for polychlorinated biphenyls (PCB) led to the reconstruction of Outfall 002, resulting in compliance in 1989 and 1990 (KC ASAC, 1991a). Zinc concentrations exceeded notification levels nine times in 1990, although concentrations in the receiving water bodies remained within applicable standards (table 4.1.1.3-1). It is important to note that the exceedance of a notification level is not considered a permit violation (KC ASAC, 1991a). A zinc source report was prepared and issued in March 1991. This report associated elevated levels of zinc with rainwater runoff from vehicle parking areas, and from galvanized equipment and fencing on roofs and grounds of the facility (KC ASAC, 1993b).

TABLE 4.1.1.3–2.—*Summary of Surface Water Quality Monitoring at Kansas City Plant*

Receiving Water: Big Blue River—1990				
Parameter	Unit of Measure	Water Quality Criteria	Existing Water Body Concentration[a]	
			Average	Maximum
Aluminum[f]	mg/L	0.05-0.2[d]	0.87	3.11
Ammonia[e]	mg/L	0.9[b]	0.53	3.97
Arsenic	mg/L	0.02[b]	< 0.001	0.003
Barium	mg/L	1[c]	0.093	0.138
Beryllium	mg/L	0.004[b]	< 0.001	0.001
Biochemical Oxygen Demand	mg/L	NA	8	21
Boron	mg/L	NA	0.115	0.2460
Cadmium[e]	mg/L	0.013[b]	0.004	0.019
Chemical Oxygen Demand	mg/L	NA	21	40
Chloride	mg/L	250[d]	82	201
Chromium, total	mg/L	0.042[b]	0.007	0.032
Copper[e]	mg/L	0.029[b]	0.009	0.039
Cyanide[e]	mg/L	0.005[b]	0.001	0.021
Iron	mg/L	1[b]	0.858	3.33
Lead[e]	mg/L	0.02[b]	0.018	0.032
Nickel	mg/L	0.1[b]	0.004	0.029
Nitrate[f]	mg/L	10[c]	20.68	154
Oil & Grease	mg/L	NA	1.1	8.2
pH	pH units	6.5–8.5[d]	8.1	
Phenol	mg/L	0.1[b]	0.007	0.018
Phosphorus	mg/L	NA	2.17	9.2
Silver[f]	mg/L	0.00012[b]	0.002	0.003
Sulfate	mg/L	250[d]	102	183
Strontium	mg/L	NA	0.291	0.388
Tantalum	mg/L	NA	0.012	0.067
Temperature	Fahrenheit	NA	59	
Thallium[f]	mg/L	0.002[c]	0.015	0.075
Titanium	mg/L	NA	0.003	0.015
Total Dissolved Solids[f]	mg/L	500[d]	531	787
Total Suspended Solids	mg/L	NA	38	133
Tungsten	mg/L	NA	0.013	0.107
Zinc	mg/L	0.345[b]	0.019	0.053

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a Average values are taken from the monitoring station on the Big Blue River, downstream of all KCP outfalls. Maximum value used is the highest value from all monitoring stations downstream of the confluence of the Big Blue River and Indian Creek. More parameters than are listed were sampled for; less than symbol (<) indicates concentration below the analysis detection limit. However, only those parameters having average or maximum concentrations greater than the instrument detection level are presented.

b Specific state standards for Indian Creek and Big Blue River. If both chronic and acute standards apply, chronic is listed.

c Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).

d Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).

e Although chronic standards are listed for comparison with average concentrations, the State of Missouri has acute standards which apply to maximum concentrations. The maximum concentration for the following parameters did not exceed the acute listed standards: ammonia, 4.4 mg/L; cadmium, 0.052 mg/L; copper, 0.045 mg/L; cyanide, 0.022 mg/L; lead, 0.13 mg/L.

f Average concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards–they do not constitute an enforceable limit.

NA None Applicable

Source: KC ASAC, 1991a.

Groundwater. KCP lies on alluvium consisting of a complex of continuous and discontinuous units of clayey silt, sand, and gravel. Two separate water-bearing units are present within the alluvium. The basal gravel unit is less than 1 foot to 6 feet thick (KC ASAC, 1993b), continuous throughout the site, and lies at a depth of 37 to 45 feet below the ground surface. The upper sand-clay-silt unit has a thickness of approximately 10 feet and lies at a depth of 10 to 15 feet below the ground surface. The two are separated in some areas by a layer of silty clay. The alluvial aquifer is considered a Class II aquifer having current and potential sources of drinking water and water having other beneficial uses.

Groundwater Quality. Groundwater quality in the alluvial aquifer is generally good. However, four separate contaminated groundwater sites have been identified within the KCP boundaries. These are related to past activities and include the Trichloroethylene (TCE) Still Area, the Underground Tank Farm, and the Northeast Area (figure 4.1.1.3-1). In addition, an abandoned landfill south of the Internal Revenue Service parking lot is a contributing source of contamination to the groundwater. This landfill is not under the authority or control of DOE.

The primary contaminant at these sites is TCE and its degradation products: DCE and vinyl chloride. Other organic solvents and VOCs are also present. The contamination exists solely in the upper portion of the alluvial aquifer. The groundwater quality for the Tank Farm Area, Northeast Area, TCE Still RFI (RCRA Facility Investigation), and TCE Still Area plume is summarized in table 4.1.1.3-3. Remediation activities include treating an average of approximately 40,000 gallons of solvent-contaminated groundwater per day (KC ASAC, 1993b).

The main contamination plume from the former underground Tank Farm Area lies beneath Building 73, an outlying storage building. This plume is moving to the south-southeast.

The Northeast Area plume and the Internal Revenue Service plume are not located near buildings that house DOE Defense Program (DP) activities. The source of the contamination is unknown.

The TCE Still was used for the recovery of used solvent. A portion of the contamination plume from the TCE Still RFI Area lies beneath the Main Manufacturing Building and the Manufacturing Support Building and is moving in an overall southerly direction.

Groundwater Use. No groundwater is withdrawn for water supply use at KCP. Water is supplied to KCP from the city of Kansas City, MO, potable water distribution system. This water is obtained from the Missouri River and wells in the Missouri River alluvium 15 miles north of the plant (KC DOE, 1991a). Water use at KCP averages about 1.4 MGD (table 3.2.1-3). The Kansas City, MO, potable water distribution system currently supplies its users with approximately 115 MGD. The capacity of the KCP system is approximately 32 MGD (table 3.2.1-3).

Groundwater Rights. KCP is able to purchase unlimited amounts of water from Kansas City, MO. Missouri operates under the Riparian Doctrine where landowners have unrestricted rights to use the water contained on the land.

Environmental Consequences. No new buildings would be constructed at KCP as part of consolidation activities. Some modification would take place within existing facilities. A description of the functions to be transferred to KCP and the facility locations selected to house these activities is presented in section 3.3.1.

Surface Water. Process and sanitary wastewater from transferred operations would be discharged to the Kansas City Wastewater Treatment Plant. The additional sanitary wastewater generated by the transferred processes would be approximately 1.7 MGY (table 3.3.1-4). This represents a less-than-1-percent increase over the current sanitary

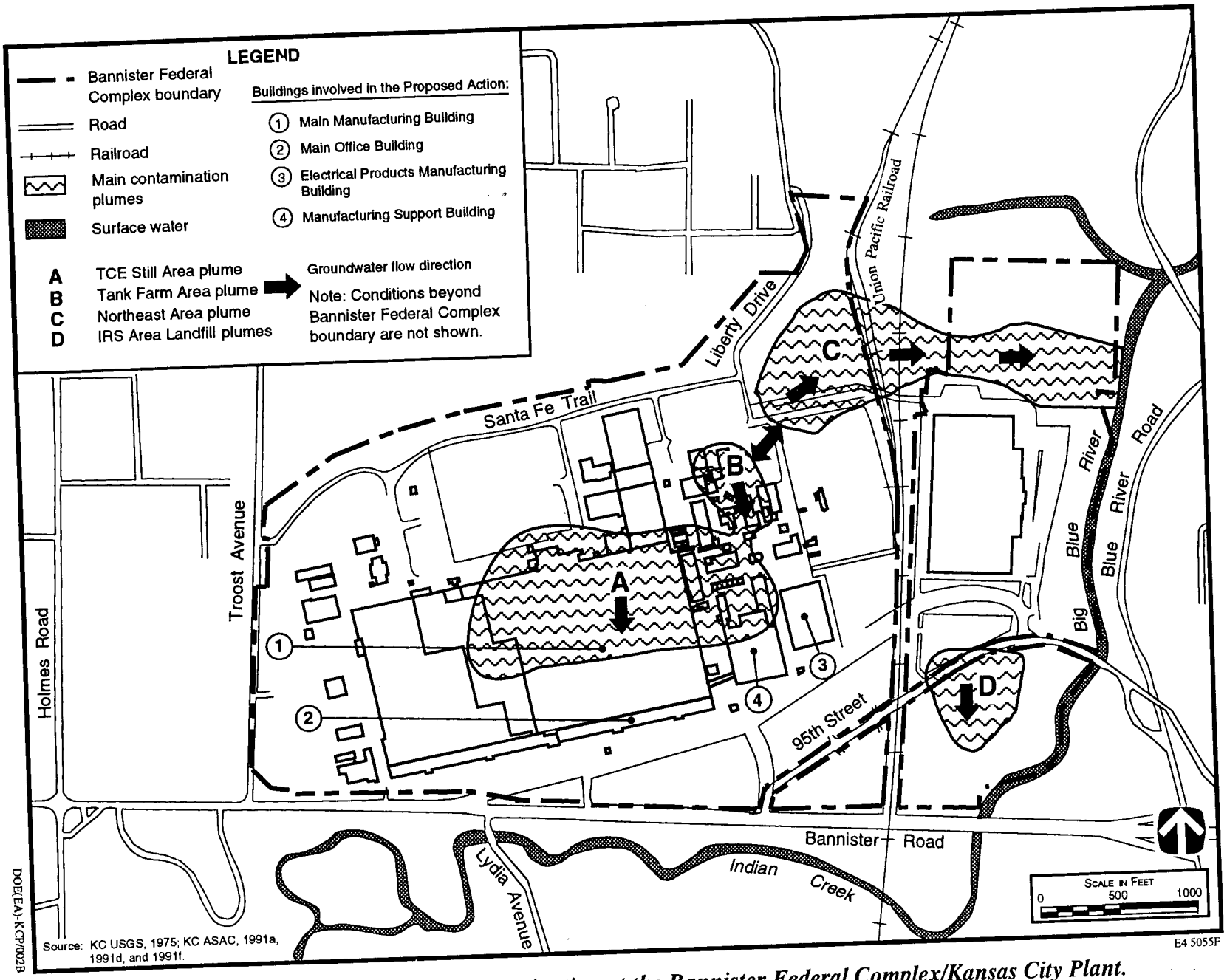

FIGURE 4.1.1.3–1.—*Groundwater Contamination at the Bannister Federal Complex/Kansas City Plant.*

TABLE 4.1.1.3–3.—*Summary of Groundwater Quality Monitoring at Kansas City Plant*

Parameter	Unit of Measure	Water Quality Criteria	1991—Existing Conditions			
			TCE Still Area[c]	Northeast Area[d]	Tank Farm Area[e]	TCE Still RFI Area[f]
Vinyl Chloride	mg/L	0.002[a]	0.049	0.39	0.10	0.052
1,1-Dichloroethylene	mg/L	0.007[a]	0.061	0.029	0.016	g
1,1-Dichloroethane	mg/L	h	0.012	0.080	0.011	g
1,2-Dichloroethylene (total)	mg/L	0.007[b]	11	2	2.1	0.016
Trichloroethylene	mg/L	0.005[a]	g	g	0.64	g
Tetrachloroethylene	mg/L	0.005[a]	g	g	0.065	g

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[a] Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).
[b] Missouri Division 60-Public Drinking Water Program.
[c] Well KC-87-G9L.
[d] Well KC-84-18L.
[e] Well KC-89-97L.
[f] Well KC-89-125U.
[g] Below detection level.
[h] No specified limit.

Source: KC DOE, 1991a.

wastewater generation rate of 200 MGY (table 3.2.1–2). All industrial wastewater would be pretreated to meet all applicable regulatory standards before discharge to the Kansas City Wastewater Treatment Plant. There would be no increase in cooling water discharge to the Big Blue River and Indian Creek from the transferred operations.

With improved flood control works scheduled for completion before the initiation of nonnuclear consolidation, the transferred operations would be protected from flooding events up to and including a flood with a 500-year recurrence interval. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Surface Water Quality. KCP was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. As described in section B.1, the relocated functions would affect the volume of plant waste streams. There would be no new waste streams added or special waste-handling capability required. Existing capabilities would be used to handle the incremental increase in wastewater generated. Most of the additional process wastewater is acidic and alkaline wastewater requiring pH adjustment, and is readily amenable for treatment at the Industrial Wastewater Pretreatment facility prior to discharge to the Kansas City municipal sewer system. Further, the addition of less than 5,000 GPD of relatively "clean" wastewater, as compared to metal finishing operations wastewater, would be beneficial to pretreatment facility operations. The KCP Industrial Wastewater Pretreatment Facility, having a design capacity of approximately 1.3 MGD, has sufficient available capacity to treat the incremental increase in wastewater from the Proposed Action. There would be no impact to surface water quality due to increased sanitary or process wastewater. There would be no increase in cooling water discharge from the transferred operations. In addition, significant changes in stormwater runoff from KCP are not anticipated due to the Proposed Action. As such, the reconfiguration activities would not require a new NPDES permit (KC ASAC, 1991c).

Groundwater. Water for construction activities is supplied by the Kansas City municipal system. Water required for construction at KCP would be supplied from the existing plant distribution system

(table 3.3.1-3) and is not a significant increase over the current water use of 1.4 MGD.

The water requirements for operations of the relocated activities would be approximately 1,200 gallons per day (GPD) (table 3.3.1-5). This would be less than 1 percent of the current use of 1.4 MGD. This is even a smaller percentage of the 11.6 billion gallons per year (BGY) capacity of the system, and would not affect groundwater levels or water supply in the area.

Groundwater Quality. Plumes of organic solvents and VOCs are present beneath the buildings proposed to contain nonnuclear consolidation functions. Groundwater corrective actions conducted in 1991 consisted of continued operation of the tank farm and interceptor well, and preparation for complete operation and testing of the TCE Still Area and Northeast Area plumes. These corrective actions should not affect nonnuclear consolidation activities. However, because no groundwater beneath KCP would be used and no discharge of waste materials to groundwater is planned, no additional impacts to groundwater quality are expected to result from the Proposed Action: The Proposed Action is not expected to affect groundwater remediation efforts.

4.1.1.4 *Geology and Soils*

Affected Environment. KCP is located on the Central Stable Interior Platform of the Great Plains Province and rests on the southeastern flank of the Forest City Basin as it rises toward the Ozark Uplift. The plant lies on approximately 45 feet of alluvium of the Big Blue River floodplain, which is bordered by outcrops of Pennsylvanian limestones and shales (KC USDA, 1984).

No capable faults are present within or near KCP. A capable fault is one that has had movement at, or near, the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years (10 CFR 100, appendix A).

The Kansas City area is seismically stable. It is located on the boundary between Seismic Zone 2-A and Zone 1 (ICBO, 1991). Since 1867, Kansas has experienced 27 earthquakes of magnitude 3 or greater (KC DuBois, 1978).

Several large earthquakes greater than magnitude 8 occurred in 1811 and 1812 along the New Madrid Fault Zone, 350 miles southeast of Kansas City. The Kansas City area was affected by Modified Mercalli Intensity (MMI) values estimated at VII or less during these events (Nuttli, 1990). An earthquake with a MMI of VII is felt by everyone and causes negligible damage to structures of good design and construction.

No geological hazards are known in the immediate area of KCP. The plant does not lie within 80 miles of any known capable faults, nor does it lie in areas of subsidence, landsliding, active volcanism, rapid erosion, or sedimentation.

KCP is underlain by Urban bottomland and Udifluvents. Urban bottomland consists of areas where more than 85 percent of the surface is covered by concrete, asphalt, buildings, or other impervious material. Udifluvents consist of nearly level fill areas and are located adjacent to the Big Blue River. These soils present no erosion hazard or shrink-swell problems (KC USDA, 1984). No agricultural or prime farmland soils are present.

Environmental Consequences. The Proposed Action would cause no significant alteration of geologic features, such as slopes, rock outcrops, or drainages.

Renovation and facility modifications to accommodate the relocated functions would be performed according to seismic design building code requirements appropriate to the facility and to regional seismicity; therefore, earthquake activity hazards would not increase.

The Proposed Action would have no adverse impact on KCP soils because the entire area has been

disturbed to accommodate existing facilities and operations.

4.1.1.5 *Biotic Resources*

Affected Environment. Tracts within and surrounding DOE-controlled areas in the Bannister Federal Complex are of limited value to terrestrial wildlife due to intensive human activity and the lack of large areas of natural habitat. A 1.2-acre remnant of riparian woodland occurs near the southern boundary of the Bannister Federal Complex, where a bend of Indian Creek was cut off from the rerouted channel by construction of Bannister Road. The Bannister Federal Complex is bordered on the north by a bluff supporting a relatively undisturbed oak-hickory woodland designated as Legacy Park. Riparian forests, dominated by cottonwoods (*Populus deltoides*) and willow (*Salix nigra*), and disturbed by human activities, border the Big Blue River and Indian Creek east and south of the Bannister Federal Complex (KC DOE, 1989). Flora and fauna of various natural habitats in and around the Bannister Federal Complex are described in a recent EA prepared by the U.S. Army Corps of Engineers (KC COE, 1990).

No wetlands occur within DOE-controlled areas in the Bannister Federal Complex. The Corps of Engineers has determined that the 1.2-acre remnant of riparian forest near the southern boundary does not contain wetlands under jurisdiction of the CWA (KC DOE, 1989). Current plans call for this area to be excavated, capped, and grassed in 1993 as part of a hazardous waste remediation effort. An area of potential wetlands supporting a cover of narrow-leafed cattail (*Typha angustifolia*) and a mixture of bulrushes (*Scirpus* sp.) and sedges (*Carex* sp.) is located in a low area north of the Internal Revenue Service building near the northeastern corner of the Bannister Federal Complex (KC COE, 1990).

No aquatic habitats occur within the Bannister Federal Complex. Beyond the KCP boundary, aquatic habitats associated with the Big Blue River and Indian Creek receive discharges of stormwater and one-pass cooling water generated on the Bannister Federal Complex. Four fish kills have occurred in the Big Blue River in the five years preceding 1992; however, the Missouri Department of Conservation has not attributed any of those kills to activities conducted at KCP (KC ASAC, 1991g).

The U.S. Fish and Wildlife Service (FWS) has indicated that the bald eagle (*Haliaeetus leucocephalus*) (a Federally-listed endangered species) is the only Federally-protected, threatened, or endangered species present in the vicinity of the Bannister Federal Complex (KC COE, 1990). Because of the nearly complete development of the Bannister Federal Complex, suitable habitat for the bald eagle does not likely occur. The Missouri Department of Conservation's records do not indicate that any sensitive species or communities exist within the Bannister Federal Complex or the surrounding area (KC DOE, 1989).

Environmental Consequences. Temporary land disturbance from renovating KCP facilities would be limited to construction laydown areas on lawns and paved areas within the already intensively developed KCP. Because these areas have been previously developed, they have minimal habitat value for terrestrial wildlife. No undeveloped land would be disturbed by the Proposed Action.

No wetlands occur on the DOE-controlled areas of the Bannister Federal Complex, and any renovation activities would be limited to previously developed areas in KCP. Therefore, no impacts to wetlands would result from the Proposed Action.

The Proposed Action would not affect aquatic biota or aquatic habitats in the vicinity of KCP. Renovation for, and operation of, the consolidation facilities would not involve water withdrawal from aquatic habitats. As described in the water resources section, effects of discharges into surface waters would not be significant; therefore, aquatic habitats would not be affected.

No terrestrial or aquatic areas potentially providing habitat to Federally- or Missouri-listed threatened or endangered species would be affected by the Proposed Action. DOE has initiated discussions with the United States Fish and Wildlife Service (FWS) and the Missouri Department of Conservation to ensure that renovation or operation of the facilities would not result in impacts to any listed or special status species in the vicinity.

4.1.1.6 *Cultural Resources*

Affected Environment. The prehistoric chronology of the KCP area consists of five broad time periods: Paleoindian (12,000-8000 B.C.), Dalton (8000-7000 B.C.), Archaic (7000-1000 B.C.), Woodland (1000 B.C.-A.D. 900), and Mississippian (A.D. 900-1700) (KC Chapman, 1975, 1980; KC Weston, 1987). Site types that may occur in the area include villages, campsites, limited-activity sites, and burial mounds. Two prehistoric sites and a multi-component site have been previously recorded along the terraces of the Big Blue River (KC Ziegler, 1990b). All of the KCP area has been either developed or disturbed, mainly as a result of flood protection construction. No surveys have been conducted at KCP. However, one cultural resource survey was conducted on areas adjacent to KCP; no prehistoric resources were identified (KC Ziegler, 1990a and b).

The history of the KCP region has been previously documented (KC Brown, 1963; KC Zeigler, 1990a and b). The main building was built in 1942 for the manufacture of Pratt & Whitney aircraft engines for the U.S. Navy. After World War II, production ceased, and the plant was declared excess. The Atomic Energy Commission (AEC) began production at the plant in 1949. The facilities at KCP lack architectural integrity, are not representative of a particular style, and are not considered contributing features to the broad themes of World War II defense production, the Manhattan Project, or initial nuclear production. Consequently, the facilities are not likely to be considered eligible for the NRHP.

Three Native American groups occupied or traversed the KCP area: the Osage, the Missouri, and the Kansas (KC Henning, 1970; KC Unrau, 1971; KC Chapman, 1983). The Great and Little Osage Indians occupied the region when French explorers and trappers arrived in the early 1700's. The Missouri Indians occupied the area along the Missouri River between the Grand and Chariton rivers in central Missouri. The Kansas moved along the Missouri River from St. Louis toward St. Joseph, MO, from the late 1600's to around 1800. By 1827, they were living along the Kansas River in northern Kansas. Native American resources in the KCP area may include villages, trails, and sacred areas such as springs, vision quest sites, and burial sites. However, most of the historic Indian villages were not located in the KCP area, but south on the Osage River or north and east along the Missouri River.

Environmental Consequences. All electrical/mechanical functions at KCP would be accommodated within existing structures with no new construction. The existing facilities are not likely to be considered NRHP-eligible. Therefore, no NRHP-eligible prehistoric or historic resources or important Native American resources would be affected by either renovation or operations activities.

4.1.1.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at KCP is based on an ROI where 93 percent of the KCP employees lived in 1991. The ROI includes Cass (14 percent) and Jackson (60 percent) counties in Missouri, and Johnson (17 percent) and Wyandotte (3 percent) counties in Kansas. Within these counties, the following key cities have been included in the analysis: Belton, MO (4 percent); Harrisonville, MO (3 percent); Kansas City, MO (28 percent); Lee's Summit, MO (11 percent); and Overland Park, KS (7 percent) (see figure 3.2.1-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.1-1 through E3.1-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 42 percent, increasing from 471,743 in 1970 to 670,954 in 1990. Total employment increased from 455,781 to 637,550 between 1970 and 1990, an annual growth rate of 2 percent. The unemployment rates for 1970 and 1990 were 3.4 percent and 5.0 percent, respectively. For the same years, personal income increased from approximately $4.8 billion to $23.2 billion (an annual average of 8 percent), and per capita income increased from $4,319 to $19,076.

Between 1970 and 1990, employment at KCP decreased from 7,546 to 6,320, representing less than 1 percent of the ROI employment in 1990 (KC ASAC, 1991h). Changes in mission requirements have historically led to fluctuations in employment levels over this period. For example, employment decreased to 4,623 in 1975 and increased to 7,827 by 1985. As of September 30, 1992, employment at KCP had decreased to 4,473. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. With the proposed Fiscal Year 1994 budget, the No Action alternative future site employment is expected to decrease to approximately 3,900 by the year 2000 (DOE, 1993c). In 1992, the total KCP payroll was estimated to be more than $158 million (KC ASAC, 1991h). With the No Action baseline, the total payroll is projected to be approximately $137 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 752,000 by 2000 and 768,000 by 2020. The unemployment rates for 2000 and 2020 are both projected to be 6 percent. For the same years, personal income is projected to increase from approximately $32.1 billion to $40.4 billion, an annual average increase of 1 percent. Per capita income is projected to increase from an estimated $24,000 in 2000 to $27,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 11 percent to 1,214,087. During the same period, the Missouri population increased 9 percent, and the Kansas population increased 10 percent. The population in the 4-county ROI is projected to increase from an estimated 1,335,000 in 2000 to 1,473,000 by 2020, at an annual rate of less than 1 percent.

The largest county population increase (63 percent) occurred in Johnson County between 1970 and 1990, while over the same years, populations in Wyandotte and Jackson counties declined 13 percent and 3 percent, respectively. Population in Johnson County is estimated to increase 6 percent between 1990 and 2000 and 10 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Wyandotte County population is projected to increase approximately 16 percent between 1990 and 2000 and 10 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The population in Jackson County is expected to increase approximately 11 percent by 2000 and an additional 10 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Kansas City, MO, had the greatest decrease in city population (33 percent) in the ROI. For the same years, the Belton, Harrisonville, Lee's Summit, and Overland Park populations increased 86 percent, 52 percent, 183 percent, and 42 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 34 percent from 386,007 to 518,323. Concurrent with population growth in the ROI, the number of housing units is

expected to increase approximately 10 percent by the year 2000 and an additional 10 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (114 percent) occurred in Johnson County, while the smallest increase (9 percent) occurred in Wyandotte County. The number of housing units in Johnson County is expected to increase approximately 12 percent by 2000 and an additional 10 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Wyandotte County is expected to increase about 16 percent by 2000 and an additional 10 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 2 percent in the ROI and ranged from approximately 2 percent in Cass County to 3 percent in Wyandotte County. The vacancy rates for rental units averaged 12 percent and ranged from about 9 percent in Johnson County to 16 percent in Wyandotte County.

Community Infrastructure and Services. The water supply systems operated by Johnson County; Kansas City, KS; Kansas City, MO; and Independence maintain about 97 percent of the total capacity of the 6 major public systems in the ROI. Most of these systems utilize surface water as their primary source of raw water, although Kansas City, MO, utilizes some groundwater and Independence utilizes only groundwater supplies.

Kansas City, MO (240 MGD capacity), and Independence, MO (36 MGD capacity), operate systems in Jackson County and had 1991 average daily demands of 48 percent and 64 percent of capacity, respectively. The Johnson County Water Supply District #1 (105 MGD capacity) had 1991 average daily demands of 42 percent of capacity. The Kansas City, KS, system (60 MGD capacity) in Wyandotte County had 1991 average daily demands of 50 percent of capacity.

Independence and Johnson County plan to increase their system capacities to 42 MGD and 130 MGD, respectively, by 1995. In 1995, these systems are projected to have average daily demands of less than 61 percent of capacity. By 2000, these systems are projected to have average daily demands of less than 66 percent of capacity.

Johnson County; Kansas City, KS; Kansas City, MO; Independence; and the Little Blue Valley Sewer District in Missouri operate wastewater treatment systems that maintain about 96 percent of the capacity of the 7 major public systems in the ROI. Kansas City, MO, (about 132 MGD capacity); the Little Blue Valley Sewer District (40 MGD capacity); and Independence (10 MGD capacity) all operate systems in Jackson County and had 1991 average daily demands of 77 percent, 68 percent, and 80 percent of capacity, respectively. The Johnson County Unified Wastewater District (about 33 MGD capacity) had 1991 average daily demands of 96 percent of capacity. The Kansas City, KS, system (42 MGD capacity) in Wyandotte County had 1991 average daily demands of 48 percent of capacity.

Johnson County plans to expand its system capacity to about 37 MGD by 1995 and is projected to have average daily demands of to 87 percent of capacity in 1995 and 90 percent of capacity in 2000. The Independence system is projected to have average daily demands of 83 percent of capacity in 1995 and 86 percent of capacity in 2000. The other 2 systems are projected to have average daily demands of less than 80 percent of capacity in 1995 and less than 82 percent of capacity in 2000.

Thirty-two school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 110 students in the Strasburg School District to 34,640 students in the Kansas City, MO, School District #33. School districts with enrollments over 1,000 were operating between 60 percent and 107 percent of capacity, but the majority of school districts were operating between 85 and 100 percent of capacity. Those school districts operating over 100 percent of capacity were Independence (107 percent) and Piper-Kansas City (101 percent). School districts

in Jackson, Cass, and Wyandotte counties were operating, on average, at 87 percent of capacity. However, current capacities are projected to be exceeded by the years 1995 and 2000 with the No Action future baseline. The largest increases are expected to occur in the Jackson County school districts, where enrollments are projected to exceed current capacities by 17 percent in 1995, increasing to 24 percent in 2000. Smaller increases are expected to occur in the Wyandotte County school districts, where enrollments are projected to exceed the current capacities by 3 percent in 1995 and 11 percent in 2000. The average pupil-to-teacher ratio for the ROI was 15:1, and expenditures averaged $4,558 per pupil. The Missouri average pupil-to-teacher ratio was 21:1, and expenditures averaged $4,142 per pupil. The Kansas average pupil-to-teacher ratio was 16:1, and expenditures averaged $4,760 per pupil (MO DEd, 1990; KS DEd, 1990).

Thirty-five hospitals serve the four-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 3,538 physicians served the ROI. The physician-to-population ratio for the ROI was 2.9:1,000, and ranged from 0.4:1,000 in Cass County to 3.5:1,000 in Johnson County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Sixteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the 4-county ROI was in Kansas City, MO, with 1,178 sworn officers or 2.7 sworn officers per 1,000 persons. Other large agencies are in Kansas City, KS, with 297 sworn officers or 2.0 sworn officers per 1,000 persons, and Johnson County, with 230 sworn officers or 0.6 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 2.1 per 1,000 persons (FBI, 1991).

Thirty-three fire departments and 2,615 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Kansas City, MO (733 firefighters; 1.7 firefighters per 1,000 persons), and in Kansas City, KS (435 firefighters; 2.9 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.2 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to KCP is provided by Troost Avenue, a city-maintained arterial; Bannister Road, a four-lane divided highway; and 95th Street.

Projected 1995 and 2000 baseline traffic for segments providing access to KCP was estimated using average daily traffic (ADT), peak-hour volume (PHV), and LOS. ADT estimates represent the average vehicular traffic volume experienced on a specific route segment each day, with PHV representing the maximum volume of vehicles during a given hour of that day. These volume estimates were assessed relative to the design capacity of the route to determine the associated LOS, which is a qualitative measure of traffic flow conditions. These levels are further defined in appendix E.

Estimated traffic along segments providing access to KCP is projected to contribute to differing service level conditions in accordance with population growth. Bannister Road would generally support congestion-free traffic flow. Troost Avenue, however, and to a lesser extent 95th Street, would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in considerable congestion. In addition, estimated truck traffic into KCP for delivery of supplies and removal of wastes would typically average 77 trips per day. However, the additional traffic volumes associated with continued operation of KCP are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to KCP (KS DOT, 1991; MO Hwy, 1990).

KCP has a fleet of 29 government-owned and 5 subcontractor-owned vehicles on the property. Other modes of transportation within the ROI include public transportation systems, railways, and waterways. Public transport in the ROI is provided by the Area Transportation Authority, serving metropolitan counties in both Missouri and Kansas. Major railroads in the ROI include the Atchison, Topeka, and Santa Fe Railroad; Burlington Northern Railroad; Chicago and Northwestern Railroad; Norfolk Southern Corporation; the SOO Line; and the Union Pacific Railroad. KCP is provided rail access via single-track rail line operated by the Union Pacific Railroad. Waterborne transportation to the ROI is via the Missouri River and the Port of Kansas City, MO (COE, 1991).

Kansas City International Airport, the largest airport in the ROI, receives passenger and cargo service from both national and local carriers. Numerous smaller private airports are located in the ROI (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 425 to 330 new jobs (DOE, 1993d). The analysis presented in table 4.1.1.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 425 new jobs. The estimate of 330 new jobs is 23 percent lower than the 425 new jobs used in the following analysis, and this lower estimate would result in fewer economic benefits than the 425 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at KCP would require 80 additional employees during peak construction (KC ASAC, 1993b). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 425 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 190 jobs would be created indirectly during peak construction and 670 additional jobs during operations. This direct and indirect employment would lead to the in-migration of 58 persons during peak construction and 558 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside the regional labor force.

With the No Action alternative, the current KCP employment level of 4,473 is projected to decline to 3,900 by the year 2000, a decrease of 573. The addition of 425 full time equivalent jobs at KCP would be realized as a result of the Proposed Action.

The direct and indirect additional jobs at KCP will help offset the closure of the Defense Finance and Accounting Service Center located next to KCP at the Bannister Federal Complex. The Kansas City Center was not chosen as a finalist for a future consolidated center and will be closed in the near future. It is estimated that this closure will result in the loss of 1,000 jobs (KC DOD, 1992).

The projected economic and population changes that would result with the Proposed Action are summarized in table 4.1.1.7-1 . In the year 2000, this project-related population growth from in-migration would represent an increase of less than 1 percent over the projected ROI baseline population of 1,335,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1 percent change in population during peak construction would create the need for only an estimated 22 additional housing units. For operations in the year 2000, the less than 1 percent change in population would not create a need for additional housing units beyond a 1 percent increase.

TABLE 4.1.1.7–1.—*Kansas City Plant Proposed Action Economic and Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	710,129	NA	751,591	NA
Baseline Unemployment Rate	5.5%	NA	6.0%	NA
Baseline Personal Income (Thousands $)	$27,257,974	NA	$32,080,918	NA
Baseline Per Capita Income ($/Person)	$21,412	NA	$24,034	NA
Baseline Employment	671,291	NA	706,818	NA
Direct Jobs	80	0.01	425	0.06
Indirect Jobs	190	0.03	670	0.09
In-Migrating Workforce	26	0.00	220	0.03
Total In-Migration	58	0.00	558	0.04
Population Increase				
Cass County	9	0.01	84	0.13
Belton	3	0.01	26	0.14
Harrisonville	2	0.02	17	0.21
Jackson County	37	0.01	358	0.05
Kansas City	17	0.00	165	0.04
Lee's Summit	7	0.01	67	0.13
Johnson County	10	0.00	101	0.03
Overland Park	4	0.00	41	0.03
Wyandotte County	2	0.00	15	0.01
ROI (County Total)	58	0.00	558	0.04

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1991; KS DHR, 1991; MO DES, 1991; KC ASAC, 1993b; DOE, 1993c.

In past years, housing units have been built at an annual rate of 2 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. Many existing public education facilities are currently approaching 100 percent of capacity. Although enrollments will exceed school capacities by the years 1995 and 2000 with the No Action future baseline, these capacities will be affected only slightly beyond what would naturally occur with the No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into KCP would be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving KCP would be negligible.

4.1.1.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the KCP waste management baseline is provided in section 3.2.1.3 and appendix A.1. Because no transuranic (TRU) wastes are associated with any of the

proposed consolidation activities, no further discussion of TRU waste generation or management is presented.

Generation of all waste types at KCP is expected to decrease as production operations are reduced. Additionally, KCP's Pollution Prevention Program would systematically reduce waste generation through specific waste minimization projects and the use of process waste assessments. The following discussion represents no significant changes in waste stream types or handling other than possibly reduced quantities due to the smaller workload.

KCP generates small quantities of low-level waste (LLW); however, through process changes, KCP no longer generates low-level mixed waste (section 3.2.1.3). Smaller amounts of LLW are also expected in the future due to a projected decrease in production operations. All radioactive and mixed waste management activities conducted at KCP, including requirements for handling, storage, and shipping of LLW and mixed waste, are covered by many DOE orders, and Federal and state statutes and regulations such as RCRA (see tables 5-1 and 5-2). KCP mixed wastes are currently subject to all applicable RCRA requirements. LLW and mixed waste are accumulated onsite and stored in DOE-approved containers in one controlled-access facility. LLW is stored onsite on an interim basis until sufficient quantities accumulate to warrant shipment to an approved DOE disposal facility. The mixed waste is stored onsite on an interim basis until the Nevada Test Site (NTS) receives permit approval for receipt of this type of material. At this time, mixed waste would be packaged according to regulatory requirements and transported to NTS or other treatment and disposal facilities that may be developed in the future for ultimate disposal.

All hazardous wastes generated onsite are managed and stored in compliance with all RCRA requirements. PCB and asbestos wastes are managed and stored in compliance with all applicable TSCA requirements. KCP has submitted both a RCRA Part A and Part B Permit Application and currently manages hazardous waste under RCRA interim status pending approval of its RCRA permit application. All waste stream residue generated at KCP that is not reclaimed by solvent reclamation/distillation or recycled onsite is manifested and shipped under contract with RCRA-permitted transporters to RCRA-permitted offsite treatment and disposal facilities.

The onsite industrial waste processing facility uses a precipitation process to treat dilute metal-finishing rinsewaters, concentrated acids and caustics, chromium waste, and cyanide waste to acceptable indirect discharge, pretreatment effluent standards. This is done prior to discharge to the Kansas City, MO, wastewater treatment plant.

KCP operates under discharge permits required by the CWA, the Missouri Department of Natural Resources, and the city of Kansas City, MO. Compliance with respect to the permitted discharge limits was described or referenced in section 4.1.1.3.

Solid refuse waste streams, including paper, cardboard, glass, wood, plastics, metal scrap, and metal containers, are segregated and recycled whenever possible. Normal refuse is disposed of in the local sanitary landfill by a commercial contractor. Normal sanitary wastewaters are discharged to the industrial wastewater processing facility or to the sanitary sewer system.

Because of a projected decrease in KCP production operations, certain existing KCP equipment may be categorized as surplus, making it subject to decontamination protocols. The decontamination of existing equipment could result in the generation of wastes; the volume of waste would depend on the degree of decontamination required.

The volumes of several waste streams at KCP have been reduced since 1989 as a result of KCP's Pollution Prevention Program. Significant progress has been achieved as a result of activities such as significant solvent usage and emission reduction, inorganic waste reductions, ongoing material

substitution development work, and development of process waste assessments. The most noteworthy is the overall chlorinated hydrocarbon and chlorinated fluorocarbon reductions of 90 percent each over 1989 baseline usage. Corresponding 1991 reductions over 1990 for chlorinated hydrocarbons and chlorinated fluorocarbons were 70 percent and 61 percent, respectively. In addition, the KCP Waste Management organization recycled 99 gallons of trichloroethylene and 144 gallons of 1,1,1-trichloroethane during 1991. These have been accomplished through material substitution, minimization, recycling, and training. The operation of the KCP industrial wastewater pretreatment facility in 1991 has minimized the amount of acid, alkaline, and cyanide wastes by 80 percent since 1988. Goals established for pollution prevention activities to be achieved during 1992 and 1993 include a reduction of chlorinated hydrocarbon and chlorinated fluorocarbon use by 15 percent over 1991 usage, process waste assessment completion goals, and spill reduction and solid waste initiatives. Table 4.1.1.8–1 summarizes the 1991 reductions for solvent usage and plating waste over 1989 and 1990.

Environmental Consequences. No radioactive or mixed waste streams are anticipated as a result of the relocated nonnuclear functions. Consequently, no impacts on KCP's radioactive waste management operations are anticipated. Any equipment to be transferred to KCP from another site as a result of the Proposed Action would be decontaminated prior to shipment. Construction debris and scrap metals from demolition of existing interior utilities and partitions would be disposed of as sanitary waste or sold and recycled as scrap. Although the quantities cannot be accurately assessed at this time, minimal impacts to the KCP waste management program are expected. All demolition will be conducted in such a manner so that construction debris will not contain any hazardous waste subject to TSCA.

Construction/modification activities involving decontamination are part of routine facility operations at KCP. Project decontamination activities may include the removal of asbestos piping insulation, floor and ceiling tiles, and asbestos- or PCB-contaminated concrete flooring. Such decontamination activities, if identified as necessary, would be performed in accordance with TSCA requirements for handling and disposal of asbestos and PCB wastes. The amount of hazardous construction waste materials is expected to be minimal.

Should any soil excavation occur as a result of piping modification or replacement of sanitary and industrial drains, the soils would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. If soils are found to be contaminated, the

TABLE 4.1.1.8–1.—*Kansas City Plant: Waste Reduction Progress 1989–91*

Category	1989	1990	Reduction	1991	Reduction Over 1990
Chlorinated Flurocarbon Solvent Usage (lb)	229,415	77,607	-66%	30,524	-61%
Chlorinated Hydrocarbon Solvent Usage (gal)	31,460	18,420	-41%	5,530	-70%
Cyanide Waste (lb)	6,000	5,800	-3%	0	-100%
Alkaline Waste (lb)	255,000	83,220	-67%	63,400	-24%
Acid Waste (lb)	42,000	32,000	-23%	0	-100%
F006 sludge[a] (lb)	299,050	364,560	+18%	197,320	-54%

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[a] Wastewater treatment sludges from electroplating operations.

Source: KC ASAC, 1992c.

location would be referred to the KCP Environmental Restoration Program for subsequent management. Management activities would involve an area inspection and characterization, then an evaluation of cleanup alternatives (if necessary). Cleanup action and compliance follow-up would be conducted, as necessary, to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities would have additional project cost implications, no adverse impacts to the KCP waste management program are expected.

No new hazardous waste streams would be generated at KCP as a result of consolidation operations. Wastes generated from the consolidation of operations are outlined in appendix B, section B.1, and would be disposed of through KCP's Waste Management Department. Section B.1 also summarizes the waste minimization considerations for processes being transferred. The 8,130 GPY of additional liquid hazardous wastes represent a less than 5 percent annual addition to the current KCP waste stream. The 109 ft^3 of additional solid hazardous waste is a less than 1 percent increase. KCP has 11 RCRA-permitted waste storage areas for containerized waste and 6 RCRA bulk waste storage tanks. The storage container areas and the tanks have storage capacities of 44,000 gallons for liquid hazardous wastes and 83,000 ft^3 for solid hazardous wastes. In 1988, approximately 22,630 ft^3 of hazardous liquid and solid wastes were shipped offsite for disposal in 88 shipments. Consequently, at any given time, existing storage areas would have sufficient capacity to handle the additional liquid and solid hazardous wastes.

The additional 1.7 MGY of nonhazardous sanitary effluents generated by the relocated reservoirs and nonnuclear Acorn product and the support pads operation can easily be handled by the KCP industrial wastewater processing facility, which has a design capacity of 1 MGD.

In summary, the additional quantities of waste generated by increased nonnuclear manufacturing activities at KCP are well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.1.9 *Human Health: Facility Operations and Accidents*

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.0. Information specific to KCP is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (4.1.1.2 and 4.1.1.3, respectively), chemical pollutant levels from KCP operations to which the public is exposed meet applicable permit, regulatory, and DOE operational requirements. No radiological releases are associated with KCP activities.

A review of the recent KCP annual environmental and accident reports indicates that there have been no significant adverse impacts on workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The level of operations during the time period of the review (1986-1990) was higher than either the past year's operations or those expected in the future.

Environmental Consequences. The Air and Water Resources sections discuss the releases associated with relocating the electrical/mechanical and special products functions identified in section 3.3.1 to KCP.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated to remove the toxicants before combining with sanitary wastewater and discharge to the Kansas City Wastewater Treatment Plant. Furthermore, all

stormwater releases of the pollutants are below NPDES limits and surface water quality would not be adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at KCP, all possible HAPs were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, dimethylformamide, 1,4-dioxane, isopropyl alcohol, methylene chloride, toluene, TCA, TCE, methyl ethyl ketone, and nitric acid. The Hazard Index (EPA, 1983), a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for KCP (see table F-12a) were 0.210 onsite (worker effects) and 0.080 at the site boundary (effect on the public) on an annual basis, and the incremental change Hazard Indexes were 0.00003 onsite and 0.00001 at the site boundary. Therefore, the Proposed Action would contribute only 0.01 percent to the cumulative Hazard Index onsite and at the site boundary.

Three of the chemicals identified (1,4-dioxane, methylene chloride, and TCE) are considered to be carcinogens and the cancer risk to individuals for each was calculated. The combined risk for the carcinogens was calculated as 1.2×10^{-5} onsite (worker) and 4.7×10^{-6} at the site boundary (public) (see table F-12b), whereas the incremental change due to the Proposed Action contributed a risk of 0 both onsite and at the site boundary. Most of the current risk is attributed to TCE, a solvent, which will be replaced by a different solvent that does not pose a cancer risk. Risks less than 10^{-6} are considered acceptable by EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

Consolidation of the nonnuclear activities at KCP would not result in the emission of radioactive materials from normal operations.

In summary, these analyses show that no adverse health effects or excess cancer risks are expected from the normal release of hazardous chemicals/ chemical pollutants at KCP as a result of the Proposed Action.

The accident assessment for KCP draws upon the information presented in chapter 3, section 3.3.1. The processes and chemicals of concern associated with the functions to be relocated to KCP from the donor sites are the same as those performed and currently used at KCP. There is an increased annual usage of 3 lb of methylene dianiline and 1 lb of toluene diisocyanate. These amounts represent only 2.1 percent and 0.02 percent, respectively, of the present annual usages at KCP.

KCP site activities have been reviewed in accordance with the requirements of DOE Order 5481.1B; KCP is currently in the process of performing a site safety assessment. The safety assessment reviews site processes to identify potential hazards. The results of the safety assessment would be used as a basis for determining the need for additional reviews, including an SAR, if required by DOE. The site safety assessment, expected to be completed in 1993, is anticipated to confirm that KCP is a low-hazard facility. The existing site accident profile is strictly chemical in nature. As indicated in section 3.3.1, the functions to be relocated to KCP are common industrial processes that are the same as or similar to those currently being performed at KCP and would require no additional bulk chemical storage or chemical resources. Based on the above discussions, the current accident profile would not change as a result of the relocation of functions to KCP.

4.1.2 Savannah River Site

A detailed discussion of SRS's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.5. The functions and processes associated with the Proposed Action to be consolidated at SRS and the proposed facility modifications required to support each relocated function are discussed in section 3.3.2. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at SRS and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on SRS, is also provided in the chapter 4 introduction and section 4.1.

4.1.2.1 *Land Resources*

Affected Environment. SRS occupies a 300-square-mile area approximately 16 miles southeast of Augusta, GA (figure 3.2.5-1). Generalized land uses at SRS and in the vicinity are shown in figure 4.1.2.1-1. The residential distribution of SRS employees is discussed in section 4.1.2.7.

SRS land use can be grouped into three major categories: forest/undeveloped, water, and developed facility locations. Ninety-six percent of SRS's area, about 184,000 acres, is undeveloped. Approximately 89 percent of this area is forested (SR DOE, 1991b). A forest management program has been in effect at SRS since 1952, when it was formed through an interagency agreement between DOE (then the AEC) and the U.S. Forest Service. In 1972, DOE designated SRS as a National Environmental Research Park (NERP). Currently, 12,000 acres (6 percent) are designated as NERP set-asides. These areas are specifically protected for environmental research activities that are coordinated through the University of Georgia, Savannah River Ecology Laboratory, or Savannah River Research Center (SR DOE, 1990a). There are no prime farmlands currently under cultivation on SRS.

Land use bordering SRS is primarily forest and agricultural. There is also a significant amount of open water and non-forested wetland along the Savannah River Valley. Incorporated and industrial areas are the only other significant use of land in the vicinity (figure 4.1.2.1-1). SRS land is not zoned by any of the three counties in which it is located. The only adjacent area that has any zoning is the town of New Ellenton. It has two zoning categories that bound SRS, urban development and residential development. The closest residences to the SRS boundary include several located to the west, north, and northeast, within 200 feet of the perimeter.

SRS does not contain any public recreation facilities; however, controlled deer and feral hog hunts occur on SRS each fall, from mid-October through mid-December. The purpose of the hunts is to control the resident deer and feral hog populations and reduce animal-vehicle accidents on SRS. The Operations Recreation Association owns and operates a 210-acre recreation complex approximately 5 miles northwest of SRS.

The viewshed consists mainly of agricultural land use, with some limited residential and industrial areas. DOE facilities are scattered throughout SRS and are brightly lit at night. Viewpoints affected by DOE facilities are primarily associated with the public access roadways, including U.S. 278, State Highway 125, and SRS Road 1. Because of the rolling terrain, normally hazy atmospheric conditions, and heavy vegetation, the DOE facilities are not generally visible from offsite. The new K-Reactor cooling tower will be visible from some distance, especially when operating and emitting a plume. The few offsite areas that do have views of some of the facilities are quite distant (5 miles or more) and have low visual sensitivity levels.

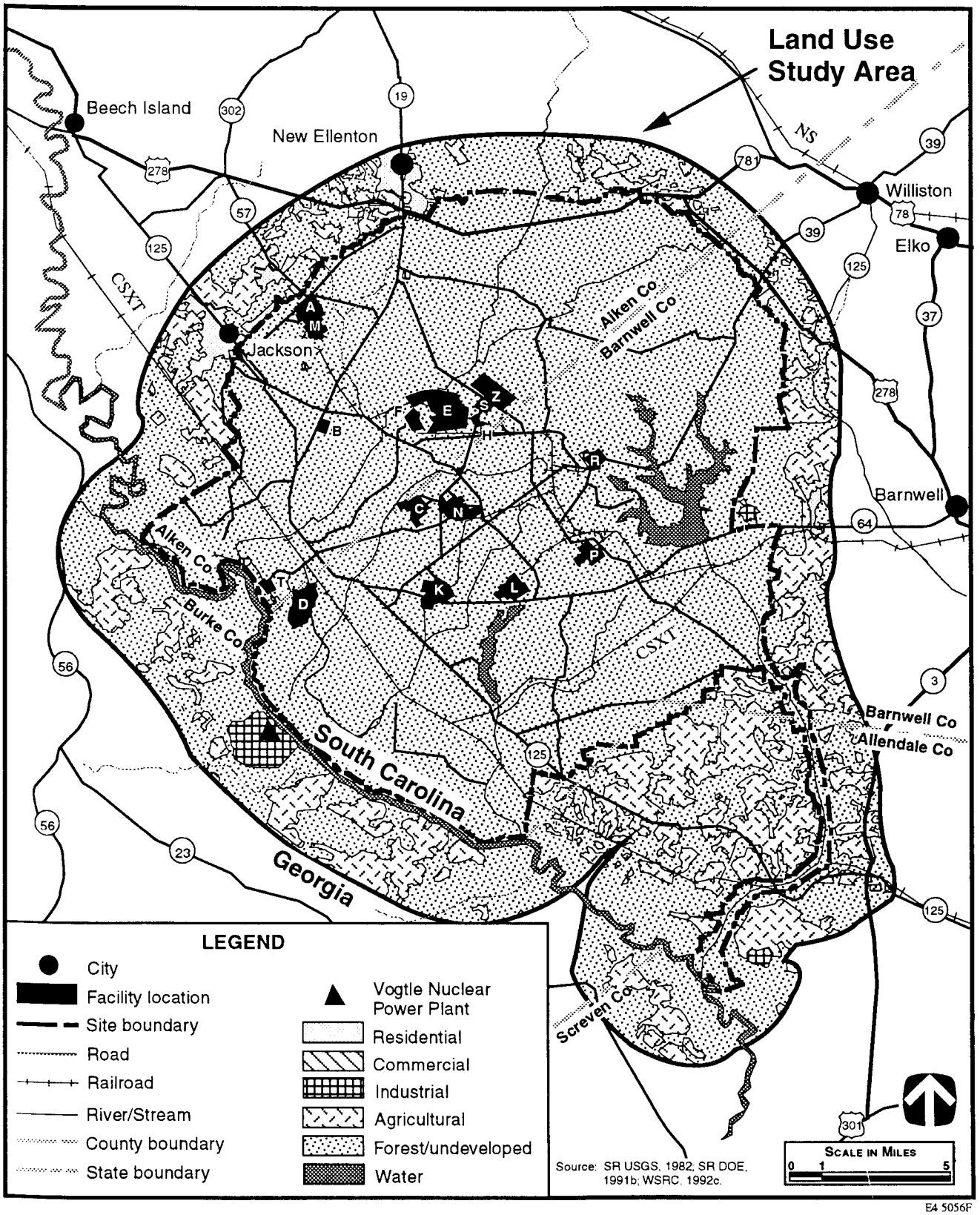

FIGURE 4.1.2.1–1.—*Generalized Land Use at the Savannah River Site and Vicinity.*

The developed areas of SRS are consistent with a Class 5 VRM designation. The remainder of SRS generally ranges from VRM Class 3 to Class 4.

Environmental Consequences. Nonnuclear functions would be located within existing facilities (see section 3.3.2) and be compatible with existing SRS operations.

The small number of in-migrating employees (see section 4.1.2.7) would have a minimal impact on land resources. Offsite land requirements for residential uses associated with project-related in-migration operations would be approximately 7 acres, and construction land requirements would be approximately 2 acres; these constitute small percentages of the total land available. There are extensive public and private recreational facilities in the region that could easily absorb the resulting increased demand. Impacts to recreational resources would be minor. Impacts to visual resources would be negligible and would not affect VRM classifications because relocated tritium-handling functions would be located within existing structures.

4.1.2.2 *Air Quality and Acoustics*

Affected Environment. The SRS region has a temperate climate with short, mild winters and long, humid summers. The region is frequently affected by warm and moist maritime air masses (Trewartha, 1954). The annual average temperature at SRS is 66 °F; temperatures vary from an average daily minimum of 37.9 °F in January to an average daily maximum of 90.8 °F in July. The average annual precipitation at SRS is 49.7 inches (NOAA, 1991a).

Ambient Air Quality. SRS is located within the Augusta-Aiken Interstate AQCR. None of the areas within SRS and its surrounding counties is designated as a nonattainment area by the EPA with respect to any of the NAAQS (40 CFR 81.341). The NAAQS and the ambient air quality standards for South Carolina and Georgia are listed in table D2.1.1-1. The South Carolina and Georgia state standards are identical to the NAAQS, except for the annual average total suspended particulate (TSP) standard, for which a NAAQS no longer exists. The South Carolina Department of Health and Environmental Control also has ambient standards for gaseous fluorides (SC DHEC, 1989).

The South Carolina Department of Health and Environmental Control has standards for over 250 HAPs/toxics (SC DHEC, 1991). These provide maximum 24-hr concentrations not to be exceeded at the site boundary. They are divided into three groups depending on toxicity level. The HAPs/toxics described in this section are those currently used at SRS or those anticipated to be used under the Proposed Action.

Ambient air quality at SRS is monitored at five onsite locations. The data presented in table D2.1.5-1 and used in the analysis are considered representative of the background concentrations at SRS.

The principal sources of criteria air pollutants at SRS are the nine coal-burning and four fuel-oil burning boilers for producing steam and electricity (A-, D-, H-, K-, and P-Areas) and fuel and target fabrication (M-Area) and processing facilities (F- and H-Areas). Other emissions include fugitive particulate emissions from coal piles and coal-processing facilities, vehicular emissions, and temporary emissions from various construction-related activities. The emission inventories are included in table D2.1.5-2.

HAP/toxic emissions from various SRS operations include CFC-113, TCA, and nitric acid. Table D2.1.5-3 presents the SRS emission inventory for HAPs/toxics.

The ambient and No Action conditions at SRS are presented in table 4.1.2.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action

TABLE 4.1.2.2–1.—*SRS Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[f]
Carbon Monoxide (CO)	8-hour	10,000[a]	h	38	≥ 38
	1-hour	40,000[a]	h	195	≥ 195
Hydrogen Fluoride (HF)	30-day	0.8[b]	h	e	h
	7-day	1.6[b]	h	e	h
	24-hour	2.9[b]	h	e	h
	12-hour	3.7[b]	h	e	h
Lead (Pb)	Calendar Quarter	1.5[a]	h	e	h
Nitrogen Dioxide (NO_2)	Annual	100[a]	6[c]	16	22
Ozone (O_3)	1-hour	235[a]	224[d]	e	224
Particulate Matter (PM_{10})	Annual	50[a]	27[c]	1	28
	24-hour	150[a]	47[c]	17	64
Sulfur Dioxide (SO_2)	Annual	80[a]	5[c]	11	16
	24-hour	365[a]	34[c]	232	266
	3-hour	1,300[a]	48[c]	1,074	1,122
Total Suspended Particulates (TSP)	Annual	75[b]	27[c]	1	28
Hazardous Air Pollutants and Other Toxic Compounds[g]					
1,1,1–Trichloroethane	24-hour	9,550[b]	h	1.3	≥1.3
Nitric Acid	24-hour	125[b]	h	1.1	≥1.1
Trichlorotrifluoroethane	24-hour	i	h	23.3	≥23.3

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a Federal standard (40 CFR 50).
b State standard (SC DHEC, 1991).
c Ambient air quality monitoring data for calendar year 1985 (DOE, 1991c).
d Ambient air quality monitoring data for calendar year 1989 and 1990 (SR DOE, 1990a and 1991b).
e Not estimated because the potential release is negligible.
f The total concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
g The compounds listed are the major pollutants of concern (SR DOE, 1991a).
h Data unavailable.
i No standard or guideline.

concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. Baseline air quality concentrations from the SRS do not exceed, and are not expected to exceed, any applicable guidelines or regulations.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Normal operations result in the emission of radioactive materials at SRS. These emissions include 253,000 curies of tritium annually. The health effects of these emissions are discussed in section 4.1.2.9. Tritium is the only radionuclide that may be affected by nonnuclear consolidation activities.

Acoustic Conditions. Major noise sources at SRS are primarily located in developed areas, including various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Noise from these sources would be barely distinguishable from background noise levels at the SRS boundary, which is a considerable distance from the facilities. Major noise sources outside these areas consist primarily of vehicles and rail operations. These are also the major sources of offsite noise attributed to SRS activities and would have an effect on noise levels along the highways through the nearby towns of New Ellenton, Jackson, and Aiken.

A sound-level survey was conducted at SRS in July 1989 and January 1990 to determine background noise levels for major transportation routes near SRS and for a limited number of onsite locations (SR NUS, 1990b). In both surveys, the sound-level data were collected at seven offsite locations and three onsite locations during daytime and nighttime periods for weekdays and weekends. DNL derived from the summer survey data L_{eq}(1-hr) ranged from 62 to 72 dBA for offsite locations and from 54 to 62 dBA for onsite locations. Winter survey data generally showed noise levels slightly lower than those for the summer survey data. The levels observed were higher than those suggested by EPA as representative of rural, small-town, or quiet suburban areas, except in a few cases where insect, traffic, and industrial-facility noise contributions were all minor. Estimated L_{eq}(24-hr) values at all measurement locations were below the EPA guideline level of 70 dBA for protection of the public from hearing loss. Further, the levels described are based on data collected at locations adjacent to roads (50 feet); therefore, these levels are greater than those expected for general background.

The states of Georgia and South Carolina and the counties where SRS is located have not established any noise regulations that specify acceptable community noise levels with the exception of a provision of the Aiken County Nuisance Ordinance, which limits daytime and nighttime noise by frequency band as described in appendix D (section D.2.2). Noise levels at residences near SRS may exceed the EPA guideline level for residential areas as a result of natural sources, such as insects, and are expected to exceed the guideline level for residential areas at residences along major roads where traffic is a major noise source.

Environmental Consequences.

Air Quality. Relocating nonnuclear functions would require renovation of existing facilities and some modification of the Replacement Tritium Facility (RTF) (section 3.3.2). Modification and renovation of these facilities would temporarily increase particulate matter emissions, such as dust and dirt, vehicle emissions, and various other types of construction-related air releases. The increase is minor when compared to overall site emissions (WSRC, 1992b and c), and when added to existing levels, is not expected to exceed applicable air quality standards.

The nonnuclear functions associated with the reservoir surveillance operations would be located in the RTF. All gaseous waste streams leaving the reservoir surveillance operations would pass through the RTF stripper system prior to discharge to the RTF stack system. In addition, the reservoir surveillance operations area heating, ventilation, and air conditioning (HVAC) room exhaust would go to the RTF stack, which is provided with tritium form monitors for elemental and tritium oxide (WSRC, 1992c).

No increase in background air concentrations from the Proposed Action is expected (table 4.1.2.2-2).

Consolidation of the nonnuclear activities at SRS would result in an increase in the emission of tritium. An additional 1,823 curies of tritium would be released annually (MD DOE, 1991a). The health effects of these emissions are discussed in section 4.1.2.9. The nonnuclear consolidation activities would only affect the emission of tritium.

TABLE 4.1.2.2–2.—*Contribution to Air Quality from Proposed Action and Total Concentrations at SRS with Comparison to Applicable Standards and Regulations and Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)[d]	Proposed Action Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)
Carbon Monoxide (CO)	8-hour	10,000[b]	≥ 38	g	≥ 38
	1-hour	40,000[b]	≥ 195	g	≥ 195
Hydrogen Fluoride (HF)	30-day	0.8[c]	f	g	f
	7-day	1.6[c]	f	g	f
	24-hour	2.9[c]	f	g	f
	12-hour	3.7[c]	f	g	f
Lead (Pb)	Calendar Quarter	1.5[b]	f	g	f
Nitrogen Dioxide (NO_2)	Annual	100[b]	22	g	22
Ozone (O_3)	1-hour	235[b]	224	g	224
Particulate Matter (PM_{10})	Annual	50[b]	28	g	28
	24-hour	150[b]	64	g	64
Sulfur Dioxide (SO_2)	Annual	80[b]	16	g	16
	24-hour	365[b]	266	g	266
	3-hour	1,300[b]	1,122	g	1,122
Total Suspended Particulates (TSP)	Annual	75[c]	28	g	28
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,1,1-Trichloroethane	24-hour	9,550[c]	≥1.3	g	≥1.3
Nitric Acid	24-hour	125[c]	≥1.1	g	≥1.1
Trichlorotrifluoroethane	24-hour	e	≥23.3	g	≥23.3

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[a] Compounds listed are the major pollutants of concern (SR DOE, 1991a).
[b] Federal standard (40 CFR 50).
[c] State standard (SC DHEC, 1991).
[d] Baseline Concentration values are from table 4.1.2.2-1.
[e] No standard or guideline.
[f] Data unavailable.
[g] Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (WSRC, 1992b and c).

Acoustic Conditions. Effects of the Proposed Action on noise levels during renovation and operations have been evaluated for the major traffic routes around SRS. The changes in traffic volumes are expected to result in an increase of less than 1 dB in peak-hour sound levels along South Carolina Routes 19 and 125. Changes in sound levels along other routes are expected to be less than 1 dB. The slight increase in noise levels along the major access routes is expected to cause little or no increase in annoyance to surrounding communities or individuals.

Noise generated by construction and onsite operation activities is not expected to increase offsite noise levels. Construction activities are limited to renovation of existing buildings in H- and 700-Areas, which are isolated from offsite areas. As required, noise generated by construction equipment and machines, and by operational facilities, equipment, and machines, would not cause ambient noise levels at the site boundary to exceed EPA guidelines.

Although no increase in annoyance is expected offsite from construction and operations, measures would be implemented onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during

construction and operations with hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and a hearing protection program would be conducted.

4.1.2.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at SRS.

Surface Water. Surface water bodies at SRS include the Savannah River, Savannah River Swamp, Upper Three Runs Creek (including its tributaries, Tims Branch and Tinker Creek), Beaver Dam Creek, Four Mile Creek, Pen Branch (including its tributary, Indian Grave Branch), Steel Creek (including its tributary, Meyers Branch), and Lower Three Runs Creek (figure 4.1.2.3-1). All these surface water bodies drain into the Savannah River. With the exception of Tinker Creek, these surface water bodies receive effluent from site operations.

There are more than 190 Carolina Bays scattered throughout the site. Carolina Bays are naturally occurring closed depressions that often hold water. There are no direct discharges to Carolina Bays; however, some do receive stormwater runoff. One bay in the 3/700-Area receives approximately 43,200 GPD of clean overflow water from a fire protection water holding tank.

Two onsite man-made surface water bodies, Par Pond and L-Lake, have served as cooling water reservoirs. Par Pond has a surface area of 2,640 acres and was formed by impounding waters of Lower Three Runs Creek. L-Lake has a surface area of 1,000 acres and was formed by impounding waters of Steel Creek (SR DOE, 1987a).

The Savannah River is the principal surface water body near the site, flowing along a 35-mile stretch of the SRS southwestern boundary. The Savannah River basin is one of the major river systems in the Southeast, draining an area of approximately 10,600 square miles. Stream flow is regulated by five large reservoirs upriver of SRS, the nearest being the Thurmond Reservoir 65 miles upstream (figure 3.2.5-1). The Thurmond Reservoir Dam operates at a water-release level of no less than 3,600 ft^3/s to meet downstream requirements of SRS. The average flow rate of the river for the 81-year period of record is approximately 10,000 ft^3/s. The peak historic (1929) flow rate is 350,000 ft^3/s, and the lowest average annual flow rate is approximately 6,500 ft^3/s, recorded during the 1985 to 1988 drought (SR DOE, 1990b).

The Savannah River Swamp lies along the river for a distance of 10 miles and averages 1.5 miles in width (approximately 15 square miles). The swamp is separated from the river by a 10-foot high natural levee. Four Mile Creek, Pen Branch, Steel Creek, and Beaver Dam Creek empty into the swamp (SR DOE, 1987a).

Surface water rights in the Savannah River watershed are set by the Doctrine of Riparian Rights; users must not adversely affect downstream quantity or quality (DOE, 1991c). SRS discharges wastewater into the Savannah River and onsite tributaries under a sitewide NPDES permit. Through October 1990, the SRS NPDES permit regulated 76 active NPDES outfalls at locations on the 6 onsite streams and at 6 locations on the Savannah River. In November 1990, another NPDES permit was issued for 5 additional outfalls, bringing the total number of permitted outfalls to 81 (SR DOE, 1991b). These discharges are primarily thermal effluents but also include sanitary and industrial wastes that contain radioactive and nonradioactive constituents.

All SRS streams and their associated wetlands, except Tinker Creek and Upper Three Runs Creek, have been influenced by SRS reactor cooling water discharges. These discharges, 10 to 20 times the natural stream flows, caused the streams to overflow their original banks and to scour and erode the stream channels. Deposition of eroded material has resulted in the creation of large deltas where the streams enter the Savannah River Swamp (SR DOE, 1987a).

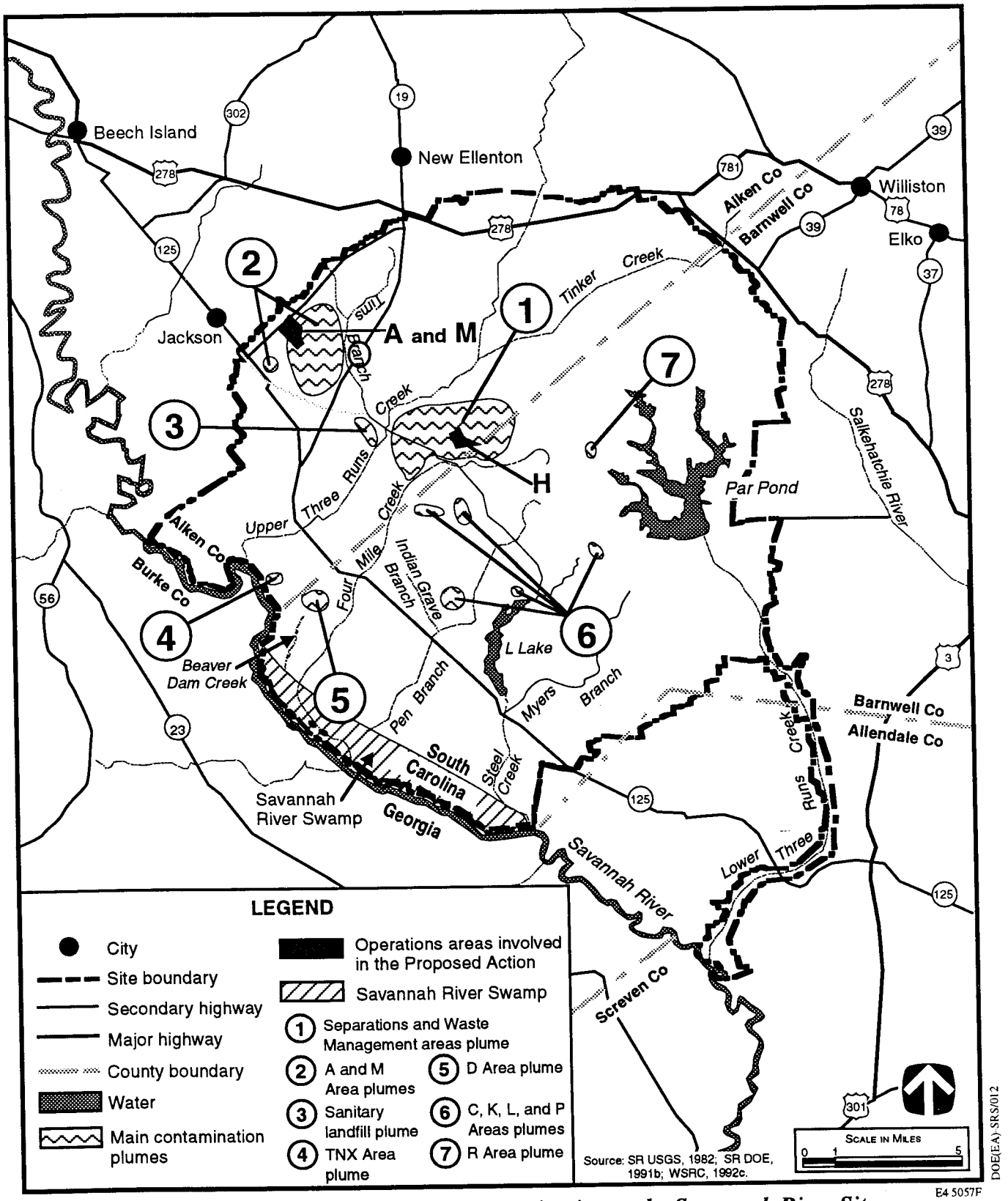

FIGURE 4.1.2.3–1.—*Groundwater Contamination at the Savannah River Site.*

When it is operating, K-Reactor discharges cooling water to Indian Grave Branch and Pen Branch. Other discharges to Pen Branch and Indian Grave Branch include nonprocess cooling water, ash basin effluent, powerhouse wastewater, waste treatment plant overflow, reactor process wastewater, and sanitary wastewater, all of which are associated with K-Area operation. In the past, Steel Creek received cooling water effluents from L-Reactor, and Par Pond received cooling water effluent from P- and R-Reactors. P-Reactor is being prepared for transition to EM, and L-Reactor is being placed in a minimal maintenance mode (SR DOE, 1992a).

Within H-Area there are 13 NPDES permitted discharge points which discharge to either Upper Three Runs Creek or Four Mile Branch. Effluent wastewater consists of stormwater, nonprocess cooling water, cooling tower blowdown, process water, and treatment plant effluent.

The Effluent Treatment Facility located on the south side of H-Area, collects and treats routine process wastewater, contaminated canyon facility cooling water, and tank farm stormwater from F- and H-Areas. The Effluent Treatment Facility (ETF) removes radioactive and non-radioactive contaminants, except tritium from process effluents (SR DOE, 1991b).

Upper Three Runs Creek receives tritiated wastewater from the facility (SR DOE, 1987a). (The mean flow rate of Upper Three Runs Creek is 106 ft^3/s.) Discharges from the SRS wastewater treatment facilities average approximately 185 MGY (table 3.2.5-1).

When K-, L-, and P-Reactors and the D-Area Powerhouse were all operational, the maximum SRS withdrawal rate from the Savannah River was approximately 650 MGD. This was primarily used as cooling water in the production reactors and coal-fired steam plants. Approximately 87 percent of this water was returned to the Savannah River via SRS streams. Consumptive water use for these operations was approximately 83 MGD (SR DOE, 1987a).

Construction of the K-Reactor cooling tower is complete and testing will begin in early 1993. Preliminary estimates indicate that when it is operational, K-Reactor will withdraw between 29 and 43 MGD from the Savannah River and discharge approximately 85 percent of that back into Indian Grave Branch and Pen Branch. This 85 percent consists of both blowdown and bypass water. The percentage of each will be influenced by factors such as weather and season, and thus will fluctuate frequently, perhaps daily. The South Carolina Department of Health and Environmental Control permit for operation of the K-Reactor cooling tower has been issued. The current startup date for the tower was April 1993. Full heat load and more specific withdrawal and discharge information will be available in the summer of 1993.

Surface Water Quality. Much of the contaminated groundwater emerges onsite at streams. Migration from the source of contamination to a surface water body may take from 5 to 30 years. The quantity of tritium migrating from all seepage basins represented 84 percent of the total amount of tritium released to site streams in 1990. Liquid releases of tritium through spills and seepage basin migration generally account for more than 99 percent of the total radioactivity introduced into the Savannah River from SRS activities (SR DOE, 1991b).

In the vicinity of SRS, the Savannah River and onsite streams are Class B streams under the South Carolina Department of Health and Environmental Control Regulations. These regulations define Class B waters as suitable for secondary-contact recreation and as a source of drinking water after conventional treatment. Water from the Savannah River is not used as a source of drinking water within 50 miles downstream of SRS (SR DOE, 1991b).

In 1990, Savannah River water quality and sediment analyses upriver and downriver from SRS showed

no significant differences except for fecal coliform, which were higher upriver than downriver. All pesticides and herbicides were found at less than minimum detectable concentrations in the river water and in sediments. The 1990 surface water quality monitoring results for the Savannah River are presented in table 4.1.2.3-1. Aluminum, iron, and manganese had maximum concentrations exceeding listed water quality criteria. However, these maximum concentrations were less than or equal to maximum concentrations monitored upstream from SRS, indicating that the primary source of contamination is upstream. Analytical results for both chemicals and metals were generally within the ranges observed in previous years (SR DOE, 1991b). Water quality would be taken into consideration in future NPDES permitting of all upstream and downstream dischargers, including those at SRS.

The majority of the proposed activities would be located at existing facilities within H-Area. The primary receiving streams in H-Area are Four Mile Creek and Upper Three Runs. The 1990 water quality monitoring results for Four Mile Creek were compared to water quality criteria. The comparison indicated that the maximum concentration of iron (0.74 milligram per liter (mg/L)) was the only nonradiological parameter of the sampling program that exceeded water quality criteria. The average concentration was below the criteria value of 0.3 mg/L. In 1990, tritium was detected downstream of discharges to the creek, at an average concentration of 830,000 picocuries per liter (pCi/L) (SR DOE, 1991b). This concentration exceeds the EPA drinking water maximum containment level (MCL) of 20,000 pCi/L. The primary source of tritium in Four Mile Creek are from F- and H-Area seepage basins. Although the basins are no longer used, radioactivity currently in the groundwater continues to migrate and outcrop to the creek.

The 1990 water quality monitoring results for Upper Three Runs were compared to water quality criteria. The comparison indicated that there were no nonradiological parameters of the sampling program that exceeded water quality criteria. In 1990, strontium-90 was detected at 9.6 pCi/L and tritium was detected at 20,000 pCi/l. These concentrations exceed the EPA drinking water MCL of 8 pCi/L and 20,000 pCi/L, respectively. The tritium concentrations are attributed to Effluent Treatment Facility operations, which do not remove tritium from effluent released to the stream. The source of the strontium is under investigation (SR DOE, 1991b).

Permitted discharges to the Savannah River and the onsite streams are monitored pursuant to NPDES and South Carolina Department of Health and Environmental Control permits. In 1990, SRS had a 99.8 percent NPDES compliance rate with 16 noncompliances out of 6,810 analyses performed. Of the 16 noncompliances, 4 were for total suspended solids, 3 were for oil and grease, 3 were for pH, 2 were for TCE, 2 were for mercury, 1 was for biochemical oxygen demand, and 1 was for fecal coliform. Two pH noncompliances occurred at the same outfall and both TCE noncompliances occurred at the same outfall. All other noncompliances were one-time, one-outfall events (SR DOE, 1991b).

Each noncompliance was reported to the South Carolina Department of Health and Environmental Control in the monthly Discharge Monitoring Report. The monitoring report includes the following information: parameter in noncompliance, location, possible cause, and any corrective action taken (SR DOE, 1991b).

Groundwater. SRS is located in an area of sedimentary rocks that slope southeastward and generally thicken toward the southeast. A number of geologic units contain large amounts of groundwater, and the site relies on this groundwater to supply most of its sanitary and process water needs.

The coastal plain sequence has been divided into a series of aquifers and aquitards and include from bottom to top, Confining System I, Aquifer System I, Confining System I-II, and Aquifer System II (SR

TABLE 4.1.2.3–1.—*Summary of Surface Water Quality at Savannah River Site*

Receiving Water: Savannah River—1990				
Parameter	Unit of Measure	Water Quality Criteria	Existing Water Body Concentration[a]	
			Average	Maximum
Aluminum[g]	mg/L	0.05-0.2[d]	NC	1.1
Ammonia	mg/L	NA	0.1	0.2
Cadmium	mg/L	0.005[c]	NC	<0.01
Calcium	mg/L	NA	NC	4.4
Cesium-137	pCi/L	120[e]	0.028	0.037
Chemical Oxygen Demand	mg/L	NA	9.8	14
Chloride	mg/L	250[d]	8	10
Chromium	mg/L	0.1[b]	NC	<0.02
Copper	mg/L	1.0[b]	NC	<0.01
Dissolved Oxygen	mg/L	NA	7.7	9.5
Fecal Coliform	Colonies Per 100/ml	1,000[c]	54	197
Gross Alpha	pCi/L	15[c]	0.08	1.48
Iron[g]	mg/L	0.3[d]	NC	1.5
Lead	mg/L	0.015[c]	NC	0.01
Magnesium	mg/L	NA	NC	1.3
Manganese[g]	mg/L	0.05[d]	NC	0.1
Mercury	mg/L	0.002[b]	NC	<0.0002
Nickel	mg/L	0.1[c]	NC	<0.05
Nitrite/Nitrate	mg/L	10[c]	0.28	0.43
Non Volatile Beta (dissolved)	pCi/L	50[c]	2.1	5.1
pH	pH Units	6.5-8.5[d]	(not reported)	8.2
Phosphate	mg/L	NA	0.1	0.16
Plutonium-238	pCi/L	1.6[e]	0.0006	0.0029
Plutonium-239	pCi/L	1.2[e]	0.0014	0.0079
Sodium	mg/L	NA	NC	11
Strontium-89	pCi/L	800[e]	0.25	0.98
Strontium-90	pCi/L	8[c]	0.13	0.30
Sulfate	mg/L	250[d]	8.5	12
Suspended Solids	mg/L	NA	12	19
Temperature	Degrees Celsius	32.2[f]	18.0	27
Total Dissolved Solids	mg/L	500[d]	63	71
Tritium	pCi/L	20,000[c]	900	6,810
Zinc	mg/L	5[d]	NC	0.02

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a Average concentration of all samples taken at the downstream monitoring station. Maximum taken as the highest sampled concentration along the reach of the river potentially affected by site activities. Less than symbol (<) indicates concentration below the analysis detection limit.
b Maximum Contaminant Level (MCL), South Carolina State Water Quality Standards.
c Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
d Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).
e U.S. Department of Energy Derived Concentration Guides (DCGs) for Water (DOE Order 5400.5). DCG values are based on a committed effective does of 100 millirem per year; however, because the drinking water MCL is based on 4 millirem per year, the number listed is 4 percent of the DCG.
f Shall not exceed weekly average of 32.2 degrees Celsius after mixing nor rise more than 2.8 degrees Celsius in one week unless appropriate temperature criterion mixing zone has been established.
g Concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process.. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards—they do not constitute enforceable limits.
NA None Applicable.
NC Not calculated due to insufficient number of samples.

Source: SR DOE, 1991b.

Bledsoe, 1990). In the northwest corner of the site, Aquifer Systems I and II coalesce, forming a single system, Aquifer System I/II. These systems are considered Class II aquifers that are current and potential drinking water sources and waters having other beneficial uses.

The water table in H-Area is approximately 20 to 25 feet below the ground surface. The depth of incision of the creeks that allow discharge of water to the surface determines the horizontal direction of groundwater. The vertical direction of groundwater movement is governed by the permeability of the aquitards (confining layers) and the relative difference in hydraulic head between the water-bearing units (SR DOE, 1990a).

Groundwater Quality. The SRS groundwater monitoring program includes analyses for several hundred radioactive and nonradioactive constituents from over 1,100 wells at more than 85 locations.

The radioactive constituents include gross alpha, nonvolatile beta, strontium-89, strontium-90, and tritium. The nonradioactive constituents include volatile organics, herbicides, pesticides, metals, and major ions. The areas of SRS contaminated by radioactive and nonradioactive constituents are shown in figure 4.1.2.3-1. The contaminant plumes near A- and H-Areas contain chlorinated volatile organics, radionuclides, nitrate, and heavy metals. The plume near H-Area also contains sulfate (SR DOE, 1991b).

Groundwater quality at SRS ranges from good to poor. There is no evidence that Aquifer Unit IA has been degraded by SRS operations. Water quality in parts of Aquifers IIA and IIB has deteriorated because of infiltration of radioactive and hazardous contaminants (SR DOE, 1990a). Radionuclide concentrations in SRS groundwater range from below detection limits to 7 billion pCi/L, 140,000 pCi/L, and 2,400 pCi/L for tritium, strontium-89 and -90, and chromium-51, respectively. Typical groundwater quality is shown in table 4.1.2.3-2. Wells RAC-3 and RDB-2D are downgradient from a former acid/caustic basin. Measured values for pH reflect an influence from acid waters disposed of in this basin.

Groundwater Use. SRS is 1 of 56 major municipal, industrial, and agricultural groundwater users identified within a 20-mile radius. The total pumpage for these 56 users averages about 12.9 BGY (SR DOE, 1990b). Groundwater use at SRS totals approximately 4 BGY, which represents about 31 percent of the total groundwater used in the area. To meet future development plans and regulatory requirements, a new production well is planned in the B-Area.

The entire water supply for H-Area is from groundwater. The H-Area tritium-handling operations currently use approximately 0.6 MGD (table 3.2.5-2).

Groundwater Rights. Groundwater rights in South Carolina are traditionally associated with property ownership. The South Carolina Water Resources Commission requires groundwater users pumping more than 1.162 gallons per second (37 MGY) to report their withdrawal rates. SRS groundwater use of approximately 4 BGY exceeds this amount and, consequently, SRS reports its withdrawal rates to the Commission.

Environmental Consequences. The relocation of the tritium-handling functions would not result in the construction of any new buildings at SRS. Some modification would take place within existing facilities. Processes associated with these tritium functions would not generate any new waste streams (WSRC, 1992a, b, and c). A description of the functions to be transferred to SRS and the facility locations selected to house these activities is presented in section 3.3.2.

Surface Water. Activities transferred with the Proposed Action, as well as with the alternatives, would be relocated to existing buildings in areas well outside the 100-year floodplain. Information on the 500-year floodplain is currently unavailable.

TABLE 4.1.2.3–2.—*Summary of Groundwater Quality Monitoring at Savannah River Site*

Parameter	Unit of Measure	Water Quality Criteria	1990—Existing Conditions[e]		
			Well No. RAC 3	Well No. RDB-2D	Well No. YSC 2D
1,1,1-Trichloroethane	mg/L	0.2[b]	<0.001	a	a
Barium	mg/L	1[b]	0.045	0.021-0.036	0.011-0.016
Carbon Tetrachloride	mg/L	0.005[b]	<0.001	a	a
Chloride	mg/L	250[d]	2.2	1.3-1.8	1.2
Chloroform	mg/L	0.10[b]	<0.001	a	a
Copper	mg/L	1[d]	0.012	a	a
Gross alpha	pCi/L	15[b]	3	2-3	3.80-11.3
Iron	mg/L	0.3[d]	0.025-0.055	0.84-2.78	0.006-0.014
Lead	mg/L	0.015[b]	0.01-0.018	<0.003-0.011	<0.002-0.005
Manganese	mg/L	0.05[d]	0.021-0.03	0.062-0.146	0.012-0.032
Nitrate	mg/L	10[b]	1.07	0.05-0.09	1.18-1.44
Nonvolatile beta	pCi/L	50[b]	<2	4-10.7	2.70-3.2
Organic Halogens (total)	mg/L	c	<0.005-0.011	0.005	<0.005
pH	pH units	6.5-8.5[d]	4.4-4.9	6.2-6.6	6.1-7.6
Phenols	mg/L	c	<0.005	<0.005	<0.005
Phosphates (total)	mg/L	c	<0.05	0.05-0.49	0.23-1
Radium (total)	pCi/L	5[b]	94	<1-5.4	1-21[d]
Sulfate	mg/L	250[d]	5	3.7-13.1	<1
Tetrachloroethylene	mg/L	0.005[b]	<0.001	a	a
Total Dissolved Solids	mg/L	500[d]	a	59-154	43-81
Trichloroethylene	mg/L	0.005[b]	<0.001	a	a
Tritium	pCi/L	20,000[b]	a	57,900-119,000	5,800-6,100

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[a] Did not analyze for this constituent.
[b] Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).
[c] No limit specified.
[d] Secondary Maximum Contaminant Level (SMCL), National Secondary Drinking Water Regulations (40 CFR 143).
[e] Data comes from wells located in the area of the facilities receiving relocated functions. Less than symbol (<) indicates concentration below analysis detection limit.

Source: SR DOE, 1990c.

The environmental consequences of the construction and operations of the new RTF were assessed in an EA prepared in 1986 (SR DOE, 1992b). This document examined applicable environmental considerations, including floods and flooding, and determined that the environmental impacts would be insignificant.

If an outside construction laydown area is used, surface water runoff would be collected by a stormwater collection system. No impacts to surface water levels are anticipated during the facility modification phase.

As described in appendix B, section B.2, the gas transfer systems process would generate small quantities of an ethanol/water solution. The wastewater is not expected to be hazardous and can be treated at existing facilities. The remaining processes to be transferred would not generate any wastewater effluents.

The additional sanitary wastewater generated by the transferred processes would be approximately 0.3 MGY (table 3.3.2-4). This additional wastewater represents a less than 1 percent increase over the current SRS wastewater generation rate of approximately 185 MGY (table 3.2.5-1). This is not a

significant increase in the wastewater generation rate.

If the entire additional 0.3 MGY (0.001 ft^3/s) of wastewater generated were discharged to Four Mile Branch, it would result in a less than 1 percent increase to the mean flow rate of the stream of 16.5 ft^3/s. The mean flow rate of Upper Three Runs Creek is an order of magnitude greater than that of Four Mile Branch, and hence the additional flow in Upper Three Runs Creek would be a much less than 1 percent increase.

Surface Water Quality. SRS was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. There are no new waste streams to be generated due to the Proposed Action. Additionally, there should be no increases in stormwater runoff.

Wastewater would be treated onsite initially in existing treatment facilities having sufficient treatment capacity and later in new facilities that are already planned (WSRC, 1992e).

Due to the nature and relatively small volume of the wastewater generated, there would be no impact to the surface water quality of Four Mile Branch.

Groundwater. H-Area draws its water supply from onsite wells. The amount of water used for building modification would be approximately 600 GPD (table 3.3.2-2). The amount is less than 1 percent of current groundwater use in H-Area of approximately 0.6 MGD. Therefore, it would not be a significant increase in groundwater use.

During operations, 144,000 GPD of water would be required for consolidation activities (table 3.3.2-5). This amount is approximately 25 percent of the current groundwater use by the H-Area tritium-handling operations, approximately 5 percent of the H-Area system capacity, and approximately 1 percent of the total SRS groundwater usage.

Groundwater Quality. No discharge of waste materials to groundwater is planned. However, the H-Area operations historically release in excess of 1,000 curies per year of tritium to surface waters. Through seepage, these releases have the potential to contaminate groundwater, although most of the shallow groundwater flows toward and discharges to streams, minimizing this potential. Wastewater amounts would be minor and transported to sewer systems in existing facilities. All wastewater discharges would comply with NPDES permit requirements.

4.1.2.4 *Geology and Soils*

Affected Environment. SRS is located in the Upper Atlantic Coastal Plain province of the Aiken Plateau.

SRS lies within Seismic Zone 2A (ICBO, 1991). There are no known capable faults in the immediate region of SRS. Evidence from subsurface mapping and seismic surveys suggests the presence of faults underlying SRS (WSRC, 1991b). However, there is no evidence of recent movement along any of these faults.

There are few geologic concerns associated with SRS. SRS does not lie within 80 miles of any known capable faults, nor does it lie in areas of subsidence, landslides, active volcanism, rapid erosion, or sedimentation. SRS is therefore considered a low geologic hazard area.

SRS lies on bottomland and upland soils of seven soil associations (SR USDA, 1990). Most of the soils are well to excessively drained. The well-drained soils have a sandy surface layer underlain by a loamy subsoil. The somewhat excessively drained soils have a thick, sandy surface layer that extends to a depth of 80 inches or more. Several soil units which cover nearly 17 percent of the plant property have been designated as prime farmland (SR USDA, 1990). All soils have low shrink-swell potentials. Many soils are subject to flooding, ponding, and cutbank caving. Upland soils are subject to

moderate water erosion and slight to moderate wind erosion because of their slope. All other soils have a slight water and wind erosion hazard.

Environmental Consequences. SRS lies in an area characterized by geological and soil stability. Consolidation of the tritium-handling functions at SRS would be accomplished within existing buildings, or within the RTF, which is currently preparing for operational startup. There would be no significant alteration of topographic features such as geological landmarks, slopes, rock outcrops, or drainages.

Renovation to accommodate relocated functions would be performed according to seismic building code requirements appropriate to the facility and regional seismicity; therefore, earthquake activity hazards would not increase.

Because no new construction would occur, relocation of the tritium-handling functions to SRS would have no impact on the soils of the site, including prime farmland.

4.1.2.5 *Biotic Resources*

Affected Environment. Areas within SRS that would be modified by activities associated with the Proposed Action (H-Area and 700-Area) are already developed and do not support natural vegetation or terrestrial wildlife habitat. Adjoining undeveloped lands support primarily upland hardwood pine forest with narrow zones of bottomland hardwood forest in swales and stream valleys (SR Jensen, 1982). Much of the upland hardwood pine forest consists of loblolly pine (*Pinus taeda*), longleaf pine (*Pinus palustris*), and slash pine (*Pinus elliottii*) that has been planted and managed by the U.S. Forest Service. Several areas within SRS have been designated as a National Environmental Research Park (NERP) (section 4.1.2.1) and support a variety of short-term and long-term ecological research activities.

Approximately 43,000 acres of wetlands occur on SRS (DOE, 1991c). These include the roughly 9,400 acre Savannah River Swamp bordering the channel of the Savannah River, an estimated 190 Carolina Bays of various sizes scattered throughout SRS, and numerous large and small wetlands within lowland areas associated with the many streams on SRS. Wetlands do not occur within the pavement and graveled lands in the H-Area or 700-Area, but several areas of wetlands occur adjacent to or in close proximity to each of these areas.

Operation of DOE facilities on SRS, including the present tritium functions, involves surface and groundwater withdrawal and discharge to aquatic ecosystems within and adjacent to the site. Numerous species of fish, macroinvertebrates, and other aquatic biota are present in these aquatic ecosystems (DOE, 1991c; SR DOE, 1984; SR Bennett, 1983). No aquatic habitats occur within the H-Area or 700-Area, but several streams flow through undeveloped lands immediately adjoining these areas.

Several Federally-listed threatened and endangered species are known to occur, or potentially occur, at SRS (DOE, 1991c). A biological assessment prepared in 1984 addressed several Federally-listed species, including the American alligator (*Alligator mississippiensis*) (a Federally-listed species which is threatened by similarity of appearance and is most commonly found in Par Pond, swamps, and marshes), the red-cockaded woodpecker (*Picoides borealis*) (a Federal and state-listed endangered species that nests in medium- to old-age living pines), and the American wood stork (*Mycteria americana*) (a Federal and state-listed endangered species most commonly found in the Savannah River Swamp) (SR Mackey, 1984). Several other Federal and state-listed endangered species occur on SRS, including the bald eagle (*Haliaeetus leucocephalus*) (observed near Par Pond and L Lake, nested on Pen Branch), the smooth coneflower (*Echinacea laevigata*) a perennial herb that requires open glade habitat, the peregrine falcon (*Falco peregrinus*) (rare winter migrant), and the short nose sturgeon (*Ancipenser*

brevirostrum) (spawns in the Savannah River upstream from SRS) (DOE, 1991c). None of these species is expected to inhabit the H-Area, 700-Area, or other such highly developed area, although undeveloped lands in the vicinity of each area could potentially provide suitable habitat for these species.

Environmental Consequences. Temporary minor land disturbance could result from renovating SRS facilities with the Proposed Action. The disturbance would be limited to laydown areas on lawns and paved areas in two existing intensively developed areas within SRS (the H-Area, and 700-Area). All have minimal value as terrestrial wildlife habitat. No undeveloped land would be disturbed by nonnuclear consolidation activities, and these activities would not affect current forestry operations, public hunting, or research activities conducted at the NERP.

Renovation and operation activities would be limited to previously developed areas, and therefore, would not result in impacts to wetlands. Standard erosion control procedures would be implemented before renovation to protect wetlands adjoining the H-Area and 700-Area from potential sedimentation.

The Proposed Action would not significantly affect aquatic biota. Minor increases in water withdrawal from the Savannah River and water discharged to its tributaries resulting from the consolidation facilities (section 4.1.2.3) would not significantly affect aquatic habitats associated with those water bodies. Additional wastewater would be discharged in compliance with the NPDES permit issued by the South Carolina Department of Health and Environmental Control.

Terrestrial or aquatic habitats potentially providing habitat to Federally-listed or South Carolina-listed threatened or endangered species would not be affected by the Proposed Action. DOE has initiated discussions with the FWS and the South Carolina Natural Heritage Program to ensure that renovation and operation activities would affect any listed or special status species in the vicinity.

4.1.2.6 *Cultural Resources*

Affected Environment. The prehistoric chronology of the SRS area is separated into five broad time periods: Paleoindian (9550-7950 B.C.), Archaic (7950-1050 B.C.), Woodland (1050 B.C.-A.D. 1150), Mississippian (A.D. 1150-1450), and Protohistoric (A.D. 1450-1540) (SR ARP, 1990a). Prehistoric types in the region include villages, base camps, limited activity sites, quarries, and workshops. Over 60 percent of SRS has received some level of cultural resources evaluation (SR Brooks, 1988; SR Brooks, 1987; SR Hanson, 1978a; and SRARP, 1990a; SRARP, 1989a). Over 800 prehistoric sites have been identified at SRS; however, less than 8 percent have been evaluated for NRHP eligibility. Only 10 prehistoric sites have been determined eligible, with concurrence from State Historic Preservation Office (SHPO).

The history of the region has been previously documented (SR Brooks, 1986; SR DePratter, 1987; SR Brooks, 1991). About 400 historic sites have been identified at SRS; approximately 10 percent have been evaluated for NRHP eligibility (SRARP, 1989; 1990a and b; 1991). Only 10 historic sites have been determined eligible, with concurrence from the South Carolina SHPO.

The AEC selected South Carolina Site No. 5 in 1950. Construction began at SRS in 1951 and the plant was operational in 1953 (History Associates, 1987). Most of the previously existing historic structures were demolished during the initial establishment of SRS in 1951. The existing nuclear production facilities are not likely to be considered NRHP-eligible because they may lack architectural integrity, may not represent a particular style, and may not be contributing features to the broad historic theme of the Manhattan Project and initial nuclear production.

Native American groups with traditional ties to the area include the Westo, Shawnee, Yuchi, Apalachee, Chickasaw, Creek, and Cherokee (SR DOE, 1991d). Native American resources in the region include villages or townsites, ceremonial lodges, burial sites,

cemeteries, and areas containing traditional plants used for certain rituals. The Yuchi Tribal Organization, the National Council of the Muskogee Creek, the Indian People's Muskogee Tribal Town Confederacy, the Pee Dee Indian Association, the Ma Chis Lower Alabama Creek Indian Tribe, and the United Keetoowah Band of the Cherokees have expressed concerns about sensitive Native American resources at SRS. Villages or townsites may contain a variety of sensitive features associated with different ceremonies and rituals; therefore, Pee Dee, Creek, and Yuchi townsites are considered sensitive. The Yuchi and the Muskogee Creek expressed concern that the area contains several plants traditionally used in ceremonies (SR DOE, 1991d).

Environmental Consequences. All tritium-handling functions relocated to SRS would be accommodated within existing structures without new construction. The existing facilities are not likely to be considered NRHP-eligible. Therefore, no NRHP-eligible prehistoric or historic resources or important Native American resources would be affected by either renovation or operation activities.

4.1.2.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at SRS is based on the ROI where 93 percent of the SRS employees lived in 1991. The ROI includes Aiken (52 percent), Allendale (1 percent), Bamberg (2 percent), Barnwell (7 percent), Edgefield (1 percent), and Orangeburg (2 percent) counties in South Carolina; and Columbia (11 percent) and Richmond (17 percent) counties in Georgia. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Aiken, SC (26 percent); North Augusta, SC (14 percent); and Augusta, GA (15 percent) (see figure 3.2.5.1-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.2-1 through E3.2-5 provide ROI resource information on residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 75 percent, increasing from 146,087 in 1970 to 256,074 in 1990. Total employment increased from 138,668 to 243,301 between 1970 and 1990, an annual growth rate of 3 percent. The unemployment rates for 1970 and 1990 were 5.1 percent and 5.0 percent, respectively. For the same years, personal income increased from approximately $1.2 billion to $7.6 billion (an annual average of 10 percent), and per capita income increased from $2,959 to $14,446.

In 1990, employment at SRS was 20,230, representing 8 percent of the ROI employment (SR DOE, 1992a). As of September 30, 1992 employment at SRS had increased to 21,478. Under the No Action alternative, future site employment is expected to decrease to approximately 18,500 by the year 2000 (DOE, 1993c). In 1992, the total SRS payroll was estimated to be $771 million (SR DOE, 1992a). Under the No Action baseline, the total payroll is projected to be approximately $664 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 289,000 by 2000 and 300,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 6.3 percent and 6.2 percent, respectively. For the same years, personal income is projected to increase from approximately $10.6 billion to $13.7 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $18,000 in 2000 to $21,500 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 31 percent to 528,785. During the same period, the South Carolina population

increased 35 percent and the Georgia population increased 41 percent. The population in the eight-county ROI is projected to increase from an estimated 583,000 in 2000 to 636,000 by 2020, an annual rate of less than 1 percent.

The largest county population increase (196 percent) occurred in Columbia County between 1970 and 1990, while over the same years, populations in Bamberg and Aiken counties increased 6 percent and 33 percent, respectively. Population in Columbia County is estimated to increase 5 percent between 1990 and 2000 and 10 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Bamberg County population is projected to increase approximately 13 percent between 1990 and 2000 and 9 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The population in Aiken County is expected to increase approximately 10 percent by 2000 and an additional 9 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, the city of Aiken had the greatest increase in population (48 percent) in the ROI. For the same years, the North Augusta population increased 19 percent and the Augusta population decreased 25 percent.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 70 percent from 122,558 to 208,433. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 10 percent by the year 2000 and an additional 9 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (252 percent) occurred in Columbia County, while the smallest increase (32 percent) occurred in Bamberg County. The number of housing units in Columbia County is expected to increase approximately 15 percent by 2000 and an additional 11 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Bamberg County is expected to increase about 18 percent by 2000 and an additional 9 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 2 percent in the ROI and ranged from approximately 1 percent in Barnwell County to 2 percent in Columbia County. The vacancy rates for rental units averaged 10 percent and ranged from about 7 percent in Allendale County to 11 percent in Aiken County.

Community Infrastructure and Services. The water supply systems operated by the counties of Aiken, Allendale, Bamberg, Edgefield, Orangeburg, Columbia, and Richmond, and the cities of Aiken, Augusta, North Augusta, and Barnwell maintain about 97 percent of the total capacity of the 14 major public systems in the ROI. The majority of these systems draw their raw water supplies from groundwater, but the systems serving Aiken, North Augusta, Columbia County, and Richmond County also draw a portion of their water supplies from surface water. Edgefield County, Orangeburg County, and Augusta utilize only surface water.

The Aiken County (about 16.1 MGD capacity), Aiken (10.3 MGD capacity), and North Augusta (8 MGD capacity) in Aiken County systems had 1989 average daily demands of 55 percent, 84 percent, and 31 percent of capacity, respectively. The systems operated by Allendale County (about 6.8 MGD capacity), Bamberg County (about 3.1 MGD capacity), and the city of Barnwell (about 4.8 MGD capacity) had 1989 average daily demands of 13 percent, 51 percent, and 15 percent of capacity, respectively. The water supply systems operated by Edgefield County (4.4 MGD capacity) and Orangeburg County (11 MGD capacity) had 1991 average daily demands of 57 percent and 54 percent of capacity, respectively. The systems operated by Columbia County (about 16.7 MGD capacity), Richmond County (22 MGD capacity), and the city of Augusta (60 MGD capacity) had 1989 average daily demands of 40 percent, 55 percent, and 47 percent of capacity, respectively.

Aiken is projected to have average daily demands of 86 percent of capacity in 1995 and 88 percent of capacity in 2000. All of these systems are projected to have average daily demands of less than 63 percent of capacity in 1995 and less than 71 percent of capacity in 2000.

The counties of Aiken, Bamberg, Orangeburg, and Columbia and the city of Augusta operate wastewater treatment systems that maintain about 93 percent of the capacity of the 10 major public systems in the ROI. The Aiken County system (20 MGD capacity), which also serves the cities of Aiken and North Augusta, had 1989 average daily demands of 45 percent of capacity. The system operated by Bamberg County (4 MGD capacity) had 1989 average daily demands of 13 percent of capacity. The Orangeburg County system (9 MGD capacity) had 1991 average daily demands of 41 percent of capacity. The systems operated by Columbia County (about 5.4 MGD capacity) and the city of Augusta (46.1 MGD capacity) had 1989 average daily demands of 61 percent and 63 percent of capacity, respectively. All of these systems are projected to have average daily demands of less than 66 percent of capacity in 1995 and less than 69 percent of capacity in 2000.

Eighteen school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 640 students in Orangeburg School District #8 to 31,669 students in the Richmond County School District. School districts with enrollments over 1,000 were operating between 83 percent and 105 percent of capacity, but the majority of school districts were operating between 80 percent and 100 percent of capacity. Those school districts operating over 100 percent of capacity were Aiken County (103 percent), Allendale County (103 percent), Orangeburg District #3 (101 percent), and Orangeburg District #7 (103 percent). School districts in Aiken, Allendale, and Columbia counties were operating between 100 percent and 103 percent of capacity. Under the No Action future baseline, the current capacity of the Aiken County School District is projected to be further exceeded by the years 1995 and 2000, while the current capacity of the Columbia County School District is projected to be further exceeded by the year 2000. The largest increase is expected to occur in the Aiken County School District, where enrollments are projected to exceed the existing capacity by 4 percent in 1995 and 9 percent in 2000. A smaller increase is expected to occur in the Columbia County School District, where enrollments are projected to exceed the current capacity by less than 1 percent in 2000. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,378 per pupil. The Georgia average pupil-to-teacher ratio was 16:1, and expenditures averaged $3,731 per pupil. The South Carolina average pupil-to-teacher ratio was 19:1, and expenditures averaged $3,788 per pupil (SC DEd, 1991).

Fifteen hospitals serve the eight-county ROI. In 1991, Barnwell County Hospital was operating close to capacity, while the other hospitals were operating well below capacity (AHA, 1990). In 1990, a total of 1,477 physicians served the ROI. The physician-to-population ratio for the ROI was 2.8:1,000, and ranged from 0.3:1,000 in Allendale County to 5.6:1,000, in Richmond County. The statewide physician-to-population ratio was 1.8:1,000 in South Carolina and 1.9:1,000 in Georgia (AMA, 1990).

Thirteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the 8-county ROI was in Richmond County, with 310 sworn officers or 1.6 sworn officers per 1,000 persons. Other large agencies are in the city of Augusta with 157 sworn officers 3.5 sworn officers per 1,000 persons and in Columbia County, with 88 sworn officers 1.3 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.6 per 1,000 persons (FBI, 1991).

Eleven fire departments and 1,104 regular and volunteer firefighters provided fire protection

services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Aiken County (221 firefighters; 1.8 firefighters per 1,000 persons) and in Richmond County (166 firefighters; 0.9 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.1 per 1,000 persons (Kapalczynski, 1988; SC FA, 1990).

Local Transportation. Vehicular access to SRS is via South Carolina State Route 125 to the west and south, South Carolina State Route 19 to the north, South Carolina State Route 39 to the northeast, and South Carolina State Route 64 to the east. U.S. Route 278, South Carolina State Route 125, and SRS Road 1 are public roads that traverse SRS. Interstates and highways near SRS are shown in figure 4.1.2.7-1.

Estimated traffic along segments providing access to SRS is projected to contribute to differing service level conditions in accordance with population growth. South Carolina State Routes 64 and 125 and U.S. 278 would generally support congestion-free traffic flow. South Carolina State Route 19, however, would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of the roadway. Along this roadway, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in moderate congestion. In addition, estimated truck traffic into SRS for delivery of supplies and removal of wastes would typically average 196 trips per day. However, the additional traffic volumes associated with continued operation of SRS are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to SRS (GA DOT, 1991b; SC DHwy, 1991).

Rail service in the ROI is provided by the Norfolk Southern Corporation and CSX Transportation. SRS is provided rail access via Robbins Station on the CSX Transportation line. In addition, SRS maintains 50 miles of onsite track for internal uses (SR DOE, 1990a).

Waterborne transportation is available via the Savannah River. The river was last dredged in 1979 and the Corps of Engineers has no future dredging plans. Currently, the Savannah River is used primarily for recreation (SR DOE, 1990a).

Columbia Metropolitan Airport in Columbia and Bush Field in Augusta receive jet air passenger and cargo service from both national and local carriers (SR DOE, 1990a; DOT, 1991). Numerous smaller private airports are located in the ROI.

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 45 to 50 new jobs (DOE, 1993d). The analysis presented in table 4.1.2.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 45 new jobs. The estimate of 50 new jobs is 11 percent higher than the 45 new jobs used in the following analysis, and this higher estimate would result in slightly more economic benefits than the 45 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at SRS would require 100 additional employees during peak construction (SR DOE, 1992a). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 45 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 219 jobs would be created indirectly during peak construction and 58 additional jobs during operations. The creation of direct and indirect employment would lead to the in-migration of 74 persons during peak construction and 60 persons

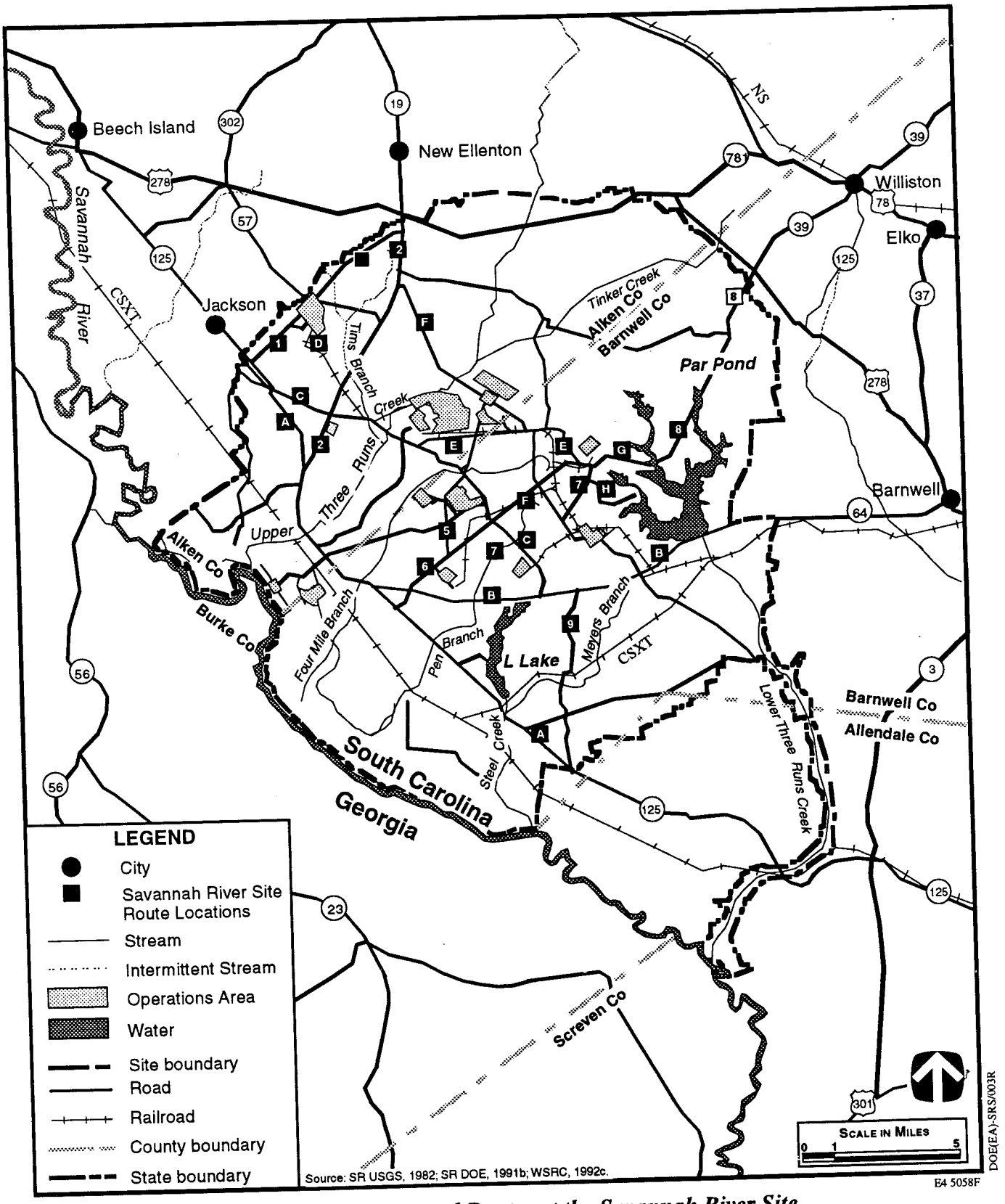

FIGURE 4.1.2.7–1.—*Local Routes at the Savannah River Site.*

TABLE 4.1.2.7–1.—*Savannah River Site Proposed Action Economic and Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	271,832	NA	288,560	NA
Baseline Unemployment Rate	5.6%	NA	6.3%	NA
Baseline Personal Income (Thousands $)	$9,011,037	NA	$10,629,518	NA
Baseline Per Capita Income ($/Person)	$16,236	NA	$18,246	NA
Baseline Employment	256,495	NA	270,405	NA
Direct Jobs	100	0.04	45	0.02
Indirect Jobs	219	0.09	58	0.02
In-Migrating Workforce	33	0.01	24	0.01
Total In-Migration	74	0.01	60	0.01
Population Increase				
Aiken County	41	0.03	33	0.03
Aiken	20	0.10	17	0.08
North Augusta	11	0.07	9	0.05
Allendale County	1	0.01	1	0.01
Bamberg County	1	0.01	1	0.01
Barnwell County	6	0.03	5	0.02
Edgefield County	1	0.01	1	0.00
Orangeburg County	1	0.00	1	0.00
Columbia County	8	0.01	7	0.01
Richmond County	14	0.01	11	0.01
Augusta	11	0.02	9	0.02
ROI (County Total)	74	0.01	60	0.01

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a; GA DOL, 1991; SC ESC, 1991; DOE, 1993c.

during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside the regional labor force.

Under the No Action alternative, the current SRS employment level of 21,478 is projected to decline to 18,500 by the year 2000, a decrease of 2,978. The addition of 45 full time equivalent jobs at SRS would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.2.7-1. In the year 2000, this project-related population growth from in-migration would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 583,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1 percent change in population during peak construction would create the need for only an estimated 28 additional housing units, which is not a significant addition. For operations in the year 2000, the less than 1 percent change in population would create the need for only an estimated 23 additional housing units, with no adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. Many existing public

education facilities are currently approaching 100 percent of capacity. Under current conditions, enrollments will not exceed most school capacities by the years 1995 and 2000 given the No Action future baseline. School districts in Aiken, Allendale, and Orangeburg counties currently exceed their capacities and the Columbia County School District will exceed its capacity by 2000. However, these school capacities will not be affected beyond what would naturally occur with No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into SRS is estimated to be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving SRS would be negligible.

4.1.2.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the SRS waste management baseline is provided in section 3.2.5.3. Because no high-level or TRU wastes are associated with any proposed consolidation activities, no further discussion of high-level or TRU waste generation or management is presented.

The waste management objective at SRS is to contain waste handling, treatment, storage, and disposal within SRS. Exceptions to onsite final disposal are PCBs, which must go to EPA-approved disposal facilities; some types of nonradioactive hazardous waste, which are sent offsite for incineration and disposal at a RCRA-permitted facility until onsite facilities are available; and chlorinated hydrocarbons, lead batteries, and scrap metal, which are sold to commercial recyclers.

LLW is buried at a 100-acre site in the north portion of E-Area, with storage capacity projected to meet SRS and other offsite DOE facilities solid LLW storage/disposal requirements to include LLW from other offsite DOE facilities for the next 20 years.

The SRS facilities designed to treat and dispose of mixed waste includes an interim storage complex called the Mixed Waste Storage Facility, the Waste Solidification and Disposal Facility (planned for 1995), the Consolidated Incineration Facility (planned for 1996), and the new Hazardous Waste/ Mixed Waste Disposal Facility (planned for 1998).

The Consolidated Incineration Facility would incinerate SRS hazardous, mixed, and low-level radioactive waste. The incineration of hazardous and mixed waste would enable SRS to comply with RCRA requirements for treatment of hazardous waste prior to disposal. Construction of the Consolidated Incineration Facility began in January 1993 and will be completed in early 1996. The Waste Solidification and Disposal Facility to be located in Y-Area is being planned to treat the slurry from off-gas treatment.

All hazardous waste treatment, storage, and disposal facilities at SRS are either fully permitted, have interim status, or are operating pursuant to enforceable agreements with the regulators, while other waste management facilities are being developed.

Hazardous wastes are manifested and shipped offsite by Department of Transportation (DOT)-registered transporters to RCRA-permitted disposal facilities. Sanitary waste is disposed of in the onsite sanitary waste landfill; the northern expansion section would be utilized from 1992 until 1997 if current generation rates continue. The northern expansion would cease operation when the new onsite sanitary landfill, with a 20-year capacity, becomes operational in 1996. Scrap metal and other selected materials are recycled

whenever possible. All other nonhazardous wastes are sent to the sanitary landfill. Asbestos and rubble are also sent to the sanitary landfill. Powerhouse ash is sent to the ash basin and to land reclamation, while domestic sewage is conveyed to the onsite sanitary treatment plant. After sanitary treatment, the process sludge is sent to land reclamation, and the treated effluent discharged to a NPDES-permitted outfall.

SRS has implemented waste minimization and pollution prevention using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. A Chlorinated Solvents Reduction Program has been initiated to evaluate opportunites to reduce or eliminate the use of chlorinated solvents in plant operations. Hazardous waste has been reduced by minimizing the use of chlorofluorocarbons and converting to dry wiping.

Environmental Consequences. Any equipment to be moved to SRS from another site as a result of the Proposed Action would be decontaminated to a level that meets all shipping regulations governing radioactive shipments.

Construction/modification activities involving decontamination are part of routine facility operations at SRS. Project decontamination activities may include removing asbestos piping insulation, floor and ceiling tiles, and asbestos or PCB-contaminated concrete flooring. Such decontamination activities, if identified as necessary, would be performed in accordance with TSCA requirements for handling and disposal of asbestos and PCB wastes. The amount of hazardous construction waste materials is expected to be minimal.

Any soil excavated for subsurface investigations, or as a result of piping modification or replacement of sanitary and industrial drains, would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. Soils found to be contaminated would be referred to the SRS Environmental Restoration Program for subsequent management.

Management of potentially contaminated soil would involve an area inspection, characterization, and evaluation of cleanup activities (if necessary). Cleanup action and compliance follow-up would be conducted, as necessary, to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities may have additional project cost implications, no adverse affect to the SRS waste management program is expected.

No new waste streams would be generated as a result of the nonnuclear consolidation. Estimated additional wastes associated with the relocated functions are listed in appendix B, section B.2. Consolidation of the tritium-handling functions at SRS would generate approximately 500 ft^3 of LLW. This amount is insignificant in relation to existing LLW at SRS. A small portion of the LLW is expected to be classified radioactive waste. The LLW would include low-level compactible and noncompactible wastes generated from glove boxes and from decontamination of tritium-contaminated components. These wastes would be repackaged, if necessary, and stored temporarily in 96 ft^3 boxes to minimize radiation exposure and contamination. The wastes would be sent to the E-Area Burial Ground for disposal per DOE Order 5820.2A. The Burial Ground, in combination with the concrete vaults, has adequate capacity to receive the additional LLW generated by proposed nonnuclear consolidation activities.

Small quantities of acid wastewater generated from laboratory operations would be collected in bottles or other suitable containers and treated in another facility that meets the requirements for sampling, monitoring, and neutralizing these wastes.

The disposal of nonhazardous waste would be made onsite at the sanitary landfills in accordance with SRS waste management policies. The additional nonhazardous wastes would have a minor impact on shortening the anticipated operational life of the existing SRS sanitary landfills.

The volume of liquid effluent from the relocated functions is quite small and well within the capacity of the SRS wastewater treatment facility and process sewers. Consequently, there would be minimal impact on the SRS wastewater treatment system and the resulting NPDES-permitted discharges.

Each of the functions transferring to SRS from Mound has been subject to programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, SRS would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

In summary, additional waste streams generated by the increased nonnuclear manufacturing activities at the SRS are well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.2.9 *Human Health: Facility Operations and Accidents*

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.0. Information specific to SRS is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (4.1.2.2 and 4.1.2.3, respectively), chemical pollutant levels from SRS operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Radiological release levels to which the public is exposed are also well below applicable permit, regulatory, and DOE operational requirements (SR DOE, 1991b).

A review of the recent SRS annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The period of the review (1986-1990) was a time during which plant operations were much higher than in the past year and higher than anticipated in the future.

Historical releases of tritium from SRS facilities due to normal operations and accidents are well documented and their effects have been thoroughly studied. Total SRS annual offsite doses from accidental and routine releases for 1984 to 1988 ranged from 0.28 to 0.52 millirem (mrem) effective dose equivalent (a risk of less than 5×10^{-7} fatal cancers from 1 year of operations) to the maximum individual at the site boundary and from 15 to 27 person-rem environmental dose commitment (less than 3×10^{-2} fatal cancers from 1 year of operations) to the population of more than 500,000 individuals living within 80 kilometers of the site, resulting in a frequency of 6×10^{-8}. The Separations Area, where the new tritium functions would be located, accounted for 73 percent of the total releases (WSRC, 1991a).

Most of the Mound tritium-handling functions would be located in the existing tritium extraction and purification facility (Building 232-H) and in the new RTF (Building 233-H). The RTF replaces the tritium-processing and filling functions that have been performed in an existing tritium-filling facility (Building 234-H) that has contributed to historical tritium releases. When the RTF replaces the filling

operations in Building 234-H, routine operation of the RTF would substantially reduce atmospheric tritium releases from SRS tritium-handling operations to less than 5 percent of the levels experienced from Building 234-H. Analysis of the most severe credible accident (earthquake) for the RTF indicates a maximum individual dose at the site boundary of 408 mrem effective dose equivalent (a risk of less than 4×10^{-4} fatal cancers) (SR DOE, 1986). This is about 25 percent of the dose that would be received if Building 234-H experienced an equal magnitude earthquake.

Environmental Consequences. The Air and Water Resources sections address the chemical releases associated with relocating tritium-handling functions identified in section 3.3.2 at SRS. As shown, the cumulative impacts from existing releases and the releases of chemicals and radioactive materials associated with relocating these functions at SRS are below applicable permit, regulatory, and DOE operational requirements.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water which may contain hazardous chemicals is pretreated before discharge. Furthermore, discharge of wastewater through NPDES-permitted outfalls which can be attributed to the activities to be relocated at SRS are expected to be below NPDES limits and water quality would not be adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway. For SRS, all possible HAPs were examined and from their assessment only trichlorotrifluoroethane was identified for further analysis based on its toxicity, concentration, and frequency of use. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified a carcinogens. The cumulative Hazard Indexes for SRS (see table F-16 in appendix F) were 6.7×10^{-5} onsite (worker effects) and 9.5×10^{-7} at the site boundary (effect on the public) on an annual basis, and the incremental change Hazard Index due to the Proposed Action was 0 both onsite and at the site boundary. Therefore, the Proposed Action would not contribute to the cumulative Hazard Index at SRS. No cancer risk from hazardous air pollutants was identified.

Normal releases of radioactive materials from SRS result in a total maximum individual annual dose on the public of 0.163 mrem effective dose equivalent (WSRC, 1991a). The resulting risks of potential fatal cancers associated with 1 year of operation would be 7.3×10^{-8}. The dose increment associated with the increase in tritium emissions would be less than 0.001 mrem effective dose equivalent and results in an increased risk of less than 4.5×10^{-10} fatal cancers from one year of operation. A cancer risk of 10^{-6} or less is considered to be acceptable by the EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

The average dose to workers at SRS associated with tritium handling activities is 0.27 mrem per year (WSRC, 1993). The dose increment associated with the increased level of tritium-handling activities would be less than 0.011 mrem per year. This would result in an incremental and cumulative cancer risk of 4.9×10^{-9} and 1.3×10^{-7}, respectively.

In summary, these analyses show that no adverse health effects can be expected from the release of hazardous chemicals/chemical pollutants or radioactive materials at SRS attributable to the Proposed Action.

All tritium-handling functions to be relocated to SRS would be performed in an SRS facility with an equal or greater hazard level designation. The risks to workers and the general public from potential accidents at SRS tritium facilities have been thoroughly studied and documented in SARs and are routinely updated in accordance with DOE Orders 5480.21 (DOE, 1991a), 5480.22 (DOE, 1992e), and 54809.23 (DOE, 1992h) to ensure that operations are within an acceptable safety baseline. For tritium functions being relocated to SRS from Mound, the risks due to potential accidents have been analyzed. Conservative worst-case estimates of offsite doses were made assuming: an accidental release occurs (probability equal to one); all of the tritium would be released in an oxide form (the oxide form of tritium is 25,000 times more hazardous than the elemental form); and, the release would be unmitigated (no credit taken for the tritium stripper systems, secondary containment, and favorable dispersion effects of the facilities exhaust stack). Under these assumptions, the estimated offsite dose to the maximum individual at the site boundary ranged from 30 mrem effective dose equivalent for the commercial sales function to 900 mrem effective dose equivalent for the gas transfer systems function (a risk of less than 8×10^{-4} fatal cancers). Under more realistic assumptions, the estimated consequences would be less due to the source term reduction afforded by the tritium stripper systems and the reservoir secondary containers, due to the dispersion effects of the facility's exhaust stack, and because a portion of the released tritium could be in the less hazardous elemental form (WSRC, 1992a).

Postulated accidents for the new tritium-handling functions are the same as those identified and analyzed in SARs for tritium facilities existing at SRS; no new accident scenarios were identified. They include accidents associated with an earthquake, tornado, explosion, or fire that have sufficient energy to cause a tritium release. The risk (mathematical product of the accident frequency of occurrence and estimated dose) of an individual receiving the estimated offsite dose from exposure to tritium is reduced by the extent that the accident probability is smaller than one. Under assumptions that incorporate mitigating factors, the probabilities and consequences of these accidents at existing SRS tritium facilities are in the range of 2×10^{-4} events/yr and 4,000 mrem dose to the maximum exposed offsite individual (equates to a risk of 7×10^{-7} fatal cancers/yr) for a design basis earthquake accident, to 8.8 events/yr and 3×10^{-5} mrem dose to the maximum exposed offsite individual (equates to a risk of 3×10^{-10} fatal cancers/yr) for a tritium leak accident in the product evacuation system (WSRC, 1992d; SR King, 1987). For comparison purposes, the same maximum individual living on the site boundary received an estimated annual dose of 300 mrem from natural sources with a probability of 1 per year which equates to a risk of 300 mrem/yr (1×10^{-4} fatal cancers/yr) (WSRC, 1991a).

A summary of the accident impacts discussed above is presented in table 4.1.2.9-1. Included in the table are the impacts from natural sources of radiation.

The reduction in requirements for nuclear weapons has reduced the tritium operations at SRS. The quantity of tritium in operations and inventories associated with relocating Mound functions to SRS would be below those that currently exist at SRS. Most of the tritium-handling functions to be relocated are the same as or similar to those currently being performed at SRS. The operations would be conducted in an SRS facility designed for tritium handling with an equal or greater hazard level designation (i.e., high hazard facility), and the current accident profile at SRS would not change as a result of relocating these functions. The current chemical accident profile is not affected by the Proposed Action.

4.1.3 Los Alamos National Laboratory

A detailed discussion of LANL's current mission, facility/process description, and waste treatment and management activities is provided in section 3.2.6. The functions and processes associated with the Proposed Action to be consolidated at LANL and

TABLE 4.1.2.9–1.—*SRS Comparison of Consequences and Risks of SRS Tritium Accidents with Radiation from Natural Sources*

Event	Maximum Offsite Individual Dose Consequences (Rem)	Event Frequency Events/yr	Risk (Rem/yr) (Fatal Cancers/yr)[c]
Severe accident-gas transfer function	$9x10^{-1}$	a	a
Design Basis Earthquake[b]	4	$2x10^{-4}$	$8x10^{-4}$ $7x10^{-7}$
Tritium leak in Product Evacuation System[b]	$3x10^{-8}$	8.8	$3x10^{-7}$ $3x10^{-10}$
Radiation from natural sources	$3x10^{-1}$	1	$3x10^{-1}$ $1x10^{-4}$

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a A release of the total tritium inventory is postulated for only the tritium inventory in the Gas Transfer System without consideration for a release mechanism or frequency of occurrence and without credit for mitigating factors such as secondary containment and the tritium stripper system.

b The dose and fatal cancer consequences shown are as postulated for existing tritium facilities without the new tritium functions.

c A factor of $8.85x10^{-4}$ fatal cancers/rem is assumed for accidents and one-half that value for exposure to natural sources of radiation.

the proposed facility modifications required to support each relocated function are discussed in section 3.3.3. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at LANL and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action that supports the following discussion on LANL is also provided in the chapter 4 introduction and section 4.1.

4.1.3.1 *Land Resources*

Affected Environment. LANL is located approximately 60 miles north-northeast of Albuquerque, NM (figure 3.2.6-1). Generalized land uses at LANL and in the vicinity are shown in figure 4.1.3.1-1. The County of Los Alamos has zoned the entire area of the lab FL (Federal Land) (Los Alamos County, 1990 and 1991). LANL has developed nine land use classifications for their operations (LANL, 1990a). The affected environment for this project consists of six Technical Areas (TA) situated in the western half of LANL, designated TA-3, -16, -21, -22, -35, and -40 (figure 3.2.6-2). There are no prime farmlands on LANL although portions are designated as NERP. The residential distribution of LANL employees is discussed in section 4.1.3.7.

TA-3, called the Central Business District in the Administrative and Technical Services land classification areas, contains the highest density of development and the highest working population at LANL. TA-3 is physically separated from the Los Alamos townsite by the steep-walled Los Alamos Canyon. Multifamily housing is located on the north rim of the canyon, set back approximately 10 feet from the Federal Reservation boundary fence.

TA-16, called Weapons Engineering in the High Explosives (HE) Research, Development, and Testing (RD&T) land classification area, is a remote site located in the southwest corner of LANL. The mission requirements of TA-16 necessitate large blast buffer zones contained within DOE-controlled land and radiation site evaluation circles that extend offsite (LANL, 1990a).

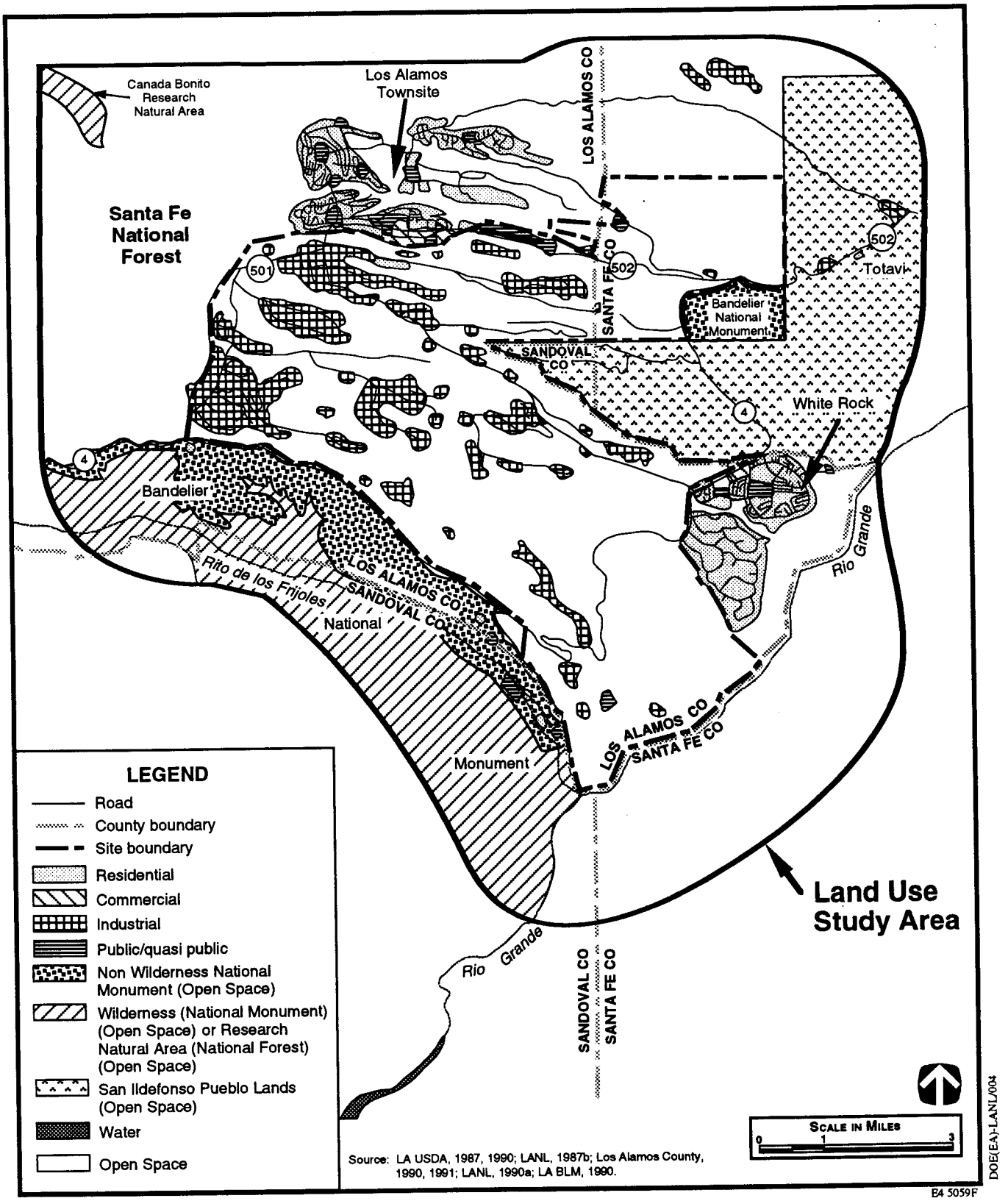

FIGURE 4.1.3.1–1.—***Generalized Land Use at Los Alamos National Laboratory and Vicinity.***

TA-21, called the DP site in the Experimental Science land classification area, contains both plant processing and laboratory functions surrounded by radiation site evaluation circles that partially extend offsite into the Los Alamos townsite (LANL, 1990a).

TA-22, also in the HE RD&T area, is located approximately 1 mile southwest of TA-3. The remote site is used for detonator RD&T for HE. Surrounding open space has been designated for blast buffer zones that do not extend beyond the site boundary (LANL, 1990a).

TA-35, in an Experimental Science land classification area, is also located in a remote area southeast of TA-3. The mission at TA-35 is related to experimental science, special nuclear materials, and laser research. Development is clustered in a dense pattern surrounded by undeveloped open space (LANL, 1990a).

TA-40 abuts the east side of TA-22 and is also in the HE RD&T area. The mission of TA-40 is explosives testing and characterization. The site is remote and surrounded by undeveloped open space with blast buffer zones contained within LANL boundaries (LANL, 1990a).

LANL does not contain any public recreation facilities; however, there are several recreation facilities for LANL personnel.

Development and operation of DOE facilities has disturbed the character of the landscape in their respective areas. The DOE facilities are generally brightly lit at night and highly visible from nearby viewpoints, and are visible from as far away as southeast Santa Fe (approximately 30 miles). The developed areas of LANL are consistent with a Class 5 VRM area designation. The remainder of LANL ranges from a Class 3 to Class 4.

Offsite viewpoints affected by DOE facilities are primarily associated with the Los Alamos townsite and New Mexico State Highways 4, 501, and 502. On a clear day, views can exceed 50 miles. Topographic relief and heavy vegetation provide significant visual screening of LANL facilities, especially from mid- and long-distance viewpoints.

Environmental Consequences. High-power detonators, calorimeter functions, and neutron tube target loading functions would be situated within existing buildings at LANL (see section 3.3.3 and figures 3.3.3-1 through 3.3.3-1f). The high-power detonators function is to be sited within TA-22 and is compatible and consistent with the designated land use classification at LANL (LANL, 1990a). Both the proposed calorimeter functions sited at TA-35 and neutron tube target loading functions at TA-21 are located within an area designated as Experimental Science and are compatible and consistent with this land use classification (LANL, 1990a).

The small number of in-migrating employees (see section 4.1.3.7) would have a minimal impact on land resources. Offsite land requirements for residential use as a result of project-related in-migration would be approximately 4 acres during implementation and 10 acres during operations, and would result in no significant indirect impacts to land use resources. The small in-migration would have no impact on the extensive recreational facilities in the region.

The Proposed Action would place relocated functions in existing buildings. Approximately one-half acre would be required to accommodate temporary construction laydown and parking. The impacts to visual resources would be negligible.

4.1.3.2 *Air Quality and Acoustics*

Affected Environment. The climate at LANL and in the surrounding region is characterized as a semiarid tropical and subtropical steppe (Trewartha, 1954). Mountain barriers deplete a large portion of the moisture from the maritime air masses from the Pacific Ocean, a condition that contributes to the semiaridness. The annual average temperature in the area is 56.2 °F; average daily temperatures range

from 22.3 °F in January to 92.8 °F in July. The average annual precipitation in the area is 8.1 inches. The average monthly precipitation ranges from 0.38 inch in November to 1.51 inches in August (NOAA, 1991c).

Ambient Air Quality. LANL is located in the New Mexico Intrastate AQCR. Areas in LANL and its surrounding counties are designated as attainment with respect to the NAAQS (40 CFR 50). The applicable NAAQS and New Mexico state ambient air quality standards are presented in table D2.1.1-1.

Ambient concentration limits for HAPs/toxics have been promulgated by the New Mexico Environmental Improvement Board. The emission rates of HAPs/toxics from existing LANL facilities during 1989 are listed in table D2.1.6-3. The HAPs/toxics described in this section are those currently used at LANL or those anticipated to be used with the Proposed Action.

Ambient air quality within and near the LANL site boundary is currently monitored for TSP and beryllium (LANL, 1990b). Data for 1985 through 1989 indicate that the 24-hr New Mexico TSP standard was exceeded. In addition, a short-term monitoring program for O_3 was conducted during January to June 1986 at a station in the Bandelier National Monument, near the southern site boundary of LANL. Measurements indicated that the New Mexico O_3 standard was exceeded. The ambient air quality data are summarized in table D2.1.6-1.

The principal sources of criteria air pollutants at LANL are: the steam plants and power plant; operations associated with beryllium including machining in shop 4 at area TA-3-39, in shop 13 at area TA-3-102, beryllium shop at area TA-35-213, and beryllium processing facility at area TA-3-141; asphalt plant; burning of HE wastes at the area TA-16 burnground and experimental detonation of conventional explosives; and, the lead-pouring facility for casting lead at area TA-3-38 (LANL, 1990b). Other emissions include fugitive particulate emissions from waste-burial activities and coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction activities. Emission estimates for these sources are presented in table D2.1.6-2.

Normal operations result in the emission of radioactive materials at LANL. These emissions include 14,400 curies of tritium (LANL, 1990b). Operations at LANL are conducted to ensure that releases of radioactive materials result in a total maximum individual annual dose of less than the NESHAP standard of 10 mrem effective dose equivalent. Compliance with NESHAPs is required for DOE facilities. Tritium is the only radionuclide that may be affected by nonnuclear consolidation activities.

The air quality under ambient and No Action conditions at LANL is described in table 4.1.3.2-1. Ambient air quality monitoring data are listed as "maximum background concentrations" and the air dispersion modeling results for existing operations are listed as "No Action concentrations." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of the ozone (1-hour) standard and the 24-hr average concentration of particulate matter, baseline air quality impacts from LANL are well below any applicable guidelines or regulations. The ozone exceedance is typical of urban areas and areas affected by vehicle exhaust. The exceedance of the 24-hr PM_{10} and TSP standards would only occur occasionally, during periods with relatively high winds. The exceedance is typical of semiarid and arid regions with large areas of exposed earth.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

TABLE 4.1.3.2–1.—*LANL Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines* [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)
Carbon Monoxide (CO)	8-hour	10,000[b]	d	1,792	≥1,792
	1-hour	15,000[b]	d	9,402	≥9,402
Hydrogen Sulfide (H_2S)	1-hour	14[b]	d	f	d
Lead (Pb)	Calendar Quarter	1.5[c]	d	f	d
Nitrogen Dioxide (NO_2)	Annual	94[b]	d	8	≥8
	24-hour	188[b]	d	169	≥169
Ozone (O_3)	1-hour	118[b]	149.0	f	149
Particulate Matter (PM_{10})	Annual	50[c]	29.7[e]	0.4[e]	30
	24-hour	150[c]	150.8[e]	7.5[e]	158
Sulfur Dioxide (SO_2)	Annual	52[b]	d	0.1	≥0.1
	24-hour	262[b]	d	2.7	≥2.7
	3-hour	1,300[c]	d	9.3	≥9.3
Total Reduced Sulfur	1-hour	4[b]	d	f	d
Total Suspended Particulates (TSP)	Annual	60[b]	29.7	0.4	30.1
	30-day	90[b]	d	0.9	≥0.9
	7-day	110[b]	d	g	d
	24-hour	150[b]	150.8	7.5	158.3
Hazardous Air Pollutants and Other Toxic Compounds[a]					
2-Butoxyethanol	8-hour	1,200[b]	d	2.5	≥2.5
Acetic Acid	8-hour	250[b]	d	0.2	≥0.2
Acetone	8-hour	5,900[b]	d	26.3	≥26.3
Acetonitrile	8-hour	340[b]	d	0.5	≥0.5
Ammonia	8-hour	180[b]	d	9.2	≥9.2
Dioxane	8-hour	36[b]	d	0.3	≥0.3
Fluoride Compounds	8-hour	25[b]	d	0.3	≥0.3
Hexane (N-hexane)	8-hour	1,800[b]	d	1.1	≥1.1
Hydrogen Chloride	8-hour	70[b]	d	4.4	≥4.4
Isopropyl Alcohol	8-hour	9,800[b]	d	2.0	≥2.0
Methyl Acetate	8-hour	6,100[b]	d	3.6	≥3.6
Methyl Alcohol	8-hour	2,600[b]	d	10.7	≥10.7
Methyl Ethyl Ketone	8-hour	5,900[b]	d	7.7	≥7.7
Methylene Chloride	8-hour	2,610[b]	d	1.7	≥1.7
N-butyl Acetate	8-hour	7,100[b]	d	0.2	≥0.2
Nitric Acid	8-hour	50[b]	d	4.1	≥4.1
Nitric Oxide	8-hour	300[b]	d	2.5	≥2.5
Nitrogen Oxide	8-hour	300[b]	d	2.5	≥2.5
Nitrous Oxide	8-hour	449[b]	d	1.1	≥1.1
sec-Butyl Alcohol	8-hour	3,050[b]	d	0.3	≥0.3
Stoddard Solvent	8-hour	5,250[b]	d	2.3	≥2.3
Sulfuric Acid	8-hour	10[b]	d	0.3	≥0.3

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Footnotes at end of table.

TABLE 4.1.3.2–1.—*LANL Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*—Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)
Hazardous Air Pollutants and Other Toxic Compounds[a]					
Tetrahydrofuran	8-hour	5,900[b]	d	0.5	≥0.5
Toluene	8-hour	3,750[b]	d	0.7	≥0.7
Trichloroethylene	8-hour	250[b]	d	3.0	≥3.0
Trichloromethane	8-hour	97.5[b]	d	1.1	≥1.1
Turpentine	8-hour	5,600[b]	d	1.4	≥1.4
VM&P Naphtha	8-hour	13,500[b]	d	5.2	≥5.2
Xylene	8-hour	4,350[b]	d	3.3	≥3.3

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a Compounds listed are the major pollutants of concern (LANL, 1990b).
b State standard (NM EIB, 1991a and b).
c Federal standard (40 CFR 50).
d Data unavailable.
e It is assumed that all PM_{10} concentrations are TSP concentrations.
f No sources indicated or negligible emissions.
g Not calculated, concentration values between the 24-hour and 30-day values.

Acoustic Conditions. The major noise sources at LANL include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, vehicles, pistol and rifle firing range, and explosives detonation). No LANL environmental noise survey data are available. At the LANL boundary, away from most of the industrial facilities, noise from most of these sources is barely distinguishable from background noise levels.

Impulsive noise from explosives testing can be heard occasionally in Los Alamos Townsite, White Rock Communities, or Bandelier National Monument. The acoustic environment along the LANL boundary away from traffic noise, although not measured, is expected to be that of a rural location with typical DNL levels in the range of 35 to 50 dBA (EPA, 1974). Traffic is the primary source of noise at the site boundary and at residences near roads. The acoustic environment in the town of Los Alamos is similarly expected to be that of a suburban location with typical DNL in the range of 53 to 62 dBA (EPA, 1974).

The State of New Mexico has not established specific numerical environmental noise standards applicable to LANL. Los Alamos County has adopted a noise ordinance which specifies maximum sound levels in residential areas. (This ordinance is discussed in appendix D). Although the maximum levels specified by the ordinance and the EPA guideline may be exceeded occasionally at the LANL boundary, this is expected to be attributable to traffic noise and not to sources at LANL; the ordinance does not apply to traffic noise.

Environmental Consequences.

Air Quality. The relocated functions would require modification of some facilities (section 3.3.3). The modifications would temporarily increase particulate matter emissions such as dust and dirt and vehicle emissions. The increase, when added to existing levels, is expected to be below applicable standards and would cause no adverse impacts to ambient air quality.

No significant additional emissions of criteria pollutants are expected at LANL. Therefore, the

TABLE 4.1.3.2–2.—*Contribution to Air Quality from Proposed Action and Total Concentrations at LANL with Comparison to Applicable Regulations and Guidelines* [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)[g]	Proposed Action Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)
Carbon Monoxide (CO)	8-hour	10,000[b]	≥ 1,792	f	≥ 1,792
	1-hour	15,000[b]	≥ 9,402	f	≥ 9,402
Hydrogen Sulfide (H_2S)	1-hour	14[b]	d	f	d
Lead (Pb)	Calendar Quarter	1.5[c]	d	f	d
Nitrogen Dioxide (NO_2)	Annual	94[b]	≥ 8	f	≥ 8
	24-hour	188[b]	≥ 169	f	≥ 169
Ozone (O_3)	1-hour	118[b]	149	f	149
Particulate Matter (PM_{10})	Annual	50[c]	30[e]	f	30
	24-hour	150[c]	158[e]	f	158
Sulfur Dioxide (SO_2)	Annual	52[b]	≥ 0.1	f	≥ 0.1
	24-hour	262[b]	≥ 2.7	f	≥ 2.7
	3-hour	1,300[c]	≥ 9.3	f	≥ 9.3
Total Reduced Sulfur	1-hour	4[b]	d	f	d
Total Suspended Particulates (TSP)	Annual	60[b]	30.1	f	30.1
	30-day	90[b]	≥ 0.9	f	≥ 0.9
	7-day	110[b]	d	f	d
	24-hour	150[b]	158.3	f	158.3
Hazardous Air Pollutants and Other Toxic Compounds[a]					
2-Butoxyethanol	8-hour	1,200[b]	≥2.5	f	≥2.5
Acetic Acid	8-hour	250[b]	≥0.2	f	≥0.2
Acetone	8-hour	5,900[b]	≥26.3	f	≥26.3
Acetonitrile	8-hour	340[b]	≥0.5	f	≥0.5
Ammonia	8-hour	180[b]	≥9.2	f	≥9.2
Dioxane	8-hour	36[b]	≥0.3	f	≥0.3
Fluoride Compounds	8-hour	25[b]	≥0.3	f	≥0.3
Hexane (N-hexane)	8-hour	1,800[b]	≥1.1	f	≥1.1
Hydrogen Chloride	8-hour	70[b]	≥4.4	f	≥4.4
Isopropyl Alcohol	8-hour	9,800[b]	≥2.0	f	≥2.0
Methyl Acetate	8-hour	6,100[b]	≥3.6	f	≥3.6
Methyl Alcohol	8-hour	2,600[b]	≥10.7	f	≥10.7
Methyl Ethyl Ketone	8-hour	5,900[b]	≥7.7	f	≥7.7
Methylene Chloride	8-hour	2,610[b]	≥1.7	f	≥1.7
N-butyl Acetate	8-hour	7,100[b]	≥0.2	f	≥0.2
Nitric Acid	8-hour	50[b]	≥4.1	f	≥4.1
Nitric Oxide	8-hour	300[b]	≥2.5	f	≥2.5
Nitrogen Oxide	8-hour	300[b]	≥2.5	f	≥2.5
Nitrous Oxide	8-hour	449[b]	≥1.1	f	≥1.1
sec-Butyl Alcohol	8-hour	3,050[b]	≥0.3	f	≥0.3
Stoddard Solvent	8-hour	5,250[b]	≥2.3	f	≥2.3
Sulfuric Acid	8-hour	10[b]	≥0.3	f	≥0.3

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Footnotes at end of table.

TABLE 4.1.3.2–2.—*Contribution to Air Quality from Proposed Action and Total Concentrations at LANL with Comparison to Applicable Regulations and Guidelines* —Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Hazardous Air Pollutants and Other Toxic Compounds[a]					
Tetrahydrofuran	8-hour	5,900[b]	≥0.5	f	≥0.5
Toluene	8-hour	3,750[b]	≥0.7	f	≥0.7
Trichloroethylene	8-hour	250[b]	≥3.0	f	≥3.0
Trichloromethane	8-hour	97.5[b]	≥1.1	f	≥1.1
Turpentine	8-hour	5,600[b]	≥1.4	f	≥1.4
VM&P Naphtha	8-hour	13,500[b]	≥5.2	f	≥5.2
Xylene	8-hour	4,350[b]	≥3.3	f	≥3.3

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a Compounds listed are the major pollutants of concern (LANL, 1990b).
b State standard (NM EIB, 1991a and b).
c Federal standard (40 CFR 50).
d Data unavailable.
e It is assumed that all PM_{10} concentrations are TSP concentrations.
f Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (LA DOE, 1992).
g Baseline Concentration values are from table 4.1.3.2-1.

ambient concentration of criteria pollutants as shown in table 4.1.3.2-2 is not expected to change.

Hazardous/toxic air pollutant emissions are expected to be minimal. Consequently, impacts to ambient air quality are predicted to be very low compared to applicable standards and guidelines (table 4.1.3.2-2).

Consolidation of the nonnuclear activities at LANL would increase tritium emissions. An additional 122 curies of tritium would be released annually (PI DOE, 1991b). Operations at LANL would be conducted to ensure that releases of radioactive materials result in a total maximum individual annual dose below the NESHAP standard of 10 mrem effective dose equivalent. The nonnuclear consolidation activities would only affect the tritium emissions.

Acoustic Conditions. Effects of the Proposed Action on noise levels during construction and operation have been evaluated for major traffic routes around LANL. The changes in traffic volumes are expected to result in an increase of less than 2 dB in peak-hour sound levels along Route 4 at White Rock and along Route 502 in Los Alamos. Changes in sound levels along other routes are expected to be minor. The increase in noise levels along the major access routes is expected to cause little or no increase in annoyance to communities or individuals.

Noise generated by renovation of existing buildings, placement of transportable offices, and onsite operation activities is not expected to increase offsite noise levels. Noise generated by construction equipment and machines, and by operational facilities, equipment, and machines, is not expected to cause ambient noise levels to exceed EPA guidelines.

Construction workers and personnel working at any of the reconfigured facilities at LANL would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at LANL.

Although no increase in annoyance is expected offsite from construction and operations, measures would be initiated onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing

workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and an effective hearing protection program conducted.

4.1.3.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at LANL.

Surface Water. The major surface water body in the immediate vicinity of LANL is the Rio Grande east of the site (figure 3.2.6-2).

The primary surface water features near LANL are intermittent streams. Sixteen drainage areas pass through or start in the LANL site. Most LANL facilities are located well above the streambeds (DOE, 1988). Only those TAs located within canyons would be within the 500-year floodplain.

No surface water is withdrawn at LANL for either drinking water or facility operations. The water supply system for LANL is based on a series of groundwater supply wells and springs (LA DOE, 1988).

Los Alamos, Sandia, and Mortandad canyons currently receive treated industrial or sanitary effluent. Acid-Pueblo Canyon does not receive LANL effluents. Surface waters in these canyons are not a source of municipal, industrial, or agricultural water supply. Only during periods of heavy precipitation or snowmelt would waters from Acid-Pueblo, Los Alamos, or Sandia Canyons extend beyond LANL boundaries and reach the Rio Grande. In Mortandad Canyon, there has been no surface run-off to the laboratory's boundary since studies were initiated in 1960 (LANL, 1990b).

Acid-Pueblo Canyon received untreated and treated industrial effluents from 1944 to 1964. The canyon currently receives treated sanitary effluents from Los Alamos County treatment plants in the upper and middle reaches of the Pueblo Canyon. Los Alamos Canyon has received treated industrial effluents since 1952. During 1989, no liquid discharges were released from the treatment plants in technical area TA-21. The canyon also receives discharge from the sanitary treatment lagoons in area TA-53. The lagoons were modified during 1989, resulting in no discharge in 1990 (LANL, 1992). There were occasional releases of cooling water from the research reactor in the upper reaches of the canyon.

Sandia Canyon receives cooling tower blowdown from the TA-3 power plant and treated sanitary effluents from TA-3. Treated effluents form a perennial stream in a short reach of the upper canyon. Mortandad Canyon receives treated effluent from the industrial waste treatment plant in TA-50.

Existing wastewater generation is approximately 183 MGY (table 3.2.6-1). This effluent emerges from 10 sanitary outfalls and 102 industrial outfalls and is covered under one NPDES permit. Industrial effluent includes power plant discharges (1 outfall), boiler blowdown (2 outfalls), treated cooling wastewater (36 outfalls), noncontact cooling wastewater (19 outfalls), radioactive wastewater (2 outfalls), HE production facilities wastewater (19 outfalls), photographic laboratory rinse wastewater (13 outfalls), and printed circuit board process wastewater (1 outfall) (LANL, 1990b).

A new sanitary wastewater treatment and collection system to replace 8 existing treatment facilities and 30 existing septic tanks is completed. The new treatment plant located at TA-46, will enable reuse of the treated wastewater for cooling water and irrigation. Excess treated effluent is discharged to Canada del Buey under the laboratorie's NPDES permit (LANL, 1992).

In addition to NPDES monitoring, regional, perimeter, and onsite stations are monitored to provide routine surveillance of the effect of operations on surface water quality. This includes monitoring of the canyons that receive NPDES-permitted discharges, as well as the Acid-

Pueblo Canyon, which previously received both treated and untreated industrial effluent (LANL, 1990b). Surface water in the canyon is not a source of municipal, industrial or agricultural water supply. Water found in these canyons could only reach the Rio Grande during periods of heavy spring snowmelt or thunderstorms.

Surface Water Quality. In 1989, there were six instances where sanitary discharges were in noncompliance with NPDES permit limits. Four noncompliances occurred at the same outfall; two for total suspended solids, one for biochemical oxygen demand, and one for fecal coliform bacteria. Total suspended solids and biochemical oxygen demand were also in noncompliance at other outfalls. There were four noncompliances for industrial outfalls. Two were for total suspended solids at boiler blowdown outfalls, one was for total suspended solids at a high explosive production facility outfall, and one was for chlorine at a treated cooling wastewater outfall. EPA was notified of these and any other deviations from permit limits in the monthly NPDES sampling results report (LANL, 1990b).

The surface water quality monitoring results for the Rio Grande and four onsite canyons are presented in table 4.1.3.3-1. The monitoring results indicate that only turbidity exceeded listed water quality criteria for all locations. Total hardness and tritium exceed listed water quality criteria for Mortandad Canyon, which does not flow offsite. No runoff or sediment transport has occurred beyond the site boundary since the start of effluent release into the canyon (LANL, 1990b).

Groundwater. The main aquifer consists mainly of sediments of the Santa Fe Group. Nearly all groundwater at LANL is obtained from deep wells that produce water from this aquifer. The Bandelier Tuff, a volcanic unit that lies above the Santa Fe Group, contains fractures that yield small amounts of water to springs. A minor amount of groundwater at LANL is obtained from springs. The aquifers that lie beneath LANL are considered Class II aquifers, having current sources of drinking water and water having other beneficial uses.

The water in the main aquifer moves slowly from the major recharge area in the west to discharge springs in White Rock Canyon along the Rio Grande. The depth to the aquifer ranges from about 1,200 feet on the west to about 600 feet on the east. The total saturated thickness penetrated by production wells ranges up to at least 1,700 feet (LANL, 1984).

Groundwater Quality. Most wells yield fresh water (total dissolved solids less than 500 mg/L), although some wells east of the site have a higher total dissolved solids content (1,000 mg/L or more). The primary, secondary, and radiochemical groundwater quality, as measured at six distribution stations, was in compliance with all Federal and state regulations (LANL, 1989a). No contamination from organic compounds has been detected in the main aquifer (table 4.1.3.3-2).

Groundwater Use. LANL, the adjacent communities of Los Alamos and White Rock, and Bandelier National Monument are entirely dependent on groundwater for their water supply. The water supply is primarily obtained from well fields. About 4.1 MGD are used in the LANL area (table 3.2.6-2).

Groundwater Rights. LANL does not have Federal reserved rights. Existing water rights held by LANL include 5,541.3 acre-feet per year (1.8 BGY). An additional 1,200 acre-feet per year (391 MGY) are purchased from the San Juan-Chama Transmountain Diversion Project of the Bureau of Reclamation. This amount is currently in reservoir storage and would be available (minus an adjustment for evaporation) by way of the Rio Grande. No infrastructure currently exists to allow water to be withdrawn from the Rio Grande for use at LANL.

Over the next 50 years, increases in water use will require one or all of the following: use of the 1,200 acre-feet of San Juan-Chama water, pumping in excess of the 5,514 acre-foot allotment

TABLE 4.1.3.3–1.—*Summary of Surface Water Quality Monitoring, Los Alamos National Laboratory*

Parameter	Unit of Measure	Water Quality Criteria	Rio Grande Water Body Concentration[a]	Acid-Pueblo Canyon[g]	Los Almos Canyon[h]	Sandia Canyon[i]	Mortandad Canyon[j]
Bicarbonate	mg/L	NA	92	44-188	140	80-99	382
Calcium	mg/L	NA	31	17-26	48	16-21	210
Carbonate	mg/L	NA	<1	0	0	0	1
Cesium–137	pCi/L	120[e]	16	0.4-145	-2.3	-7-72	3130
Chlorine	mg/L	NA	5	43-239	140	33-72	352
Fluorine	mg/L	NA	0.3	0.2-0.8	0.8	0.5-0.6	7.2
Magnesium	mg/L	NA	6.3	2.0-4.9	3.4	2.7-4.0	2.8
Nitrate	mg/L	10.0[b]	0.2	0.7-3.7	<0.1	2.9-4.1	117
pH	pH units	6.5-8.5[d]	8.1	7.3-7.7	7.7	7.6-8.0	8.0
Phosphorus	mg/L	NA	<0.1	0.3-10.9	0.2	1.7-4.3	0.1
Plutonium–238	pCi/L	1.6[e]	0.008	-0.0008-0.009	-0.012	-0.015-0	7.36
Plutonium–239, 240	pCi/L	1.2[e]	0.013	0.009-0.082	0.004	-0.004-0.005	28.4
Potassium	mg/L	NA	2.7	7.4-1.3	8.2	4.9-11	120
Sodium	mg/L	NA	19	9.9-140	125	54-140	320
Sulfate	mg/L	250[d]	51	16-34	14	32-71	107
Total Dissolved Solids	mg/L	500[d]	192	356-452	430	269-412	1780[f]
Total Hardness	mg/L	NA	107	52-85	123	54-65	446
Tritium	pCi/L	20,000[c]	100	0-400	1200	0-700	38,000[f]
Turbidity	NTU	1[c]	19	16-72f	23[f]	66-78[f]	43[f]
Uranium, total	mg/L	NA	4	.001	.001	.003	.004

E4 3955

[a] Monitored values represent a one-time sampling event in March 1989. Less than symbol (<) indicates concentration below the analysis detection limit.
[b] Maximum Contaminant Level (MCL), New Mexico state water quality standards.
[c] MCL, National Primary Drinking Water Regulations (40 CFR 141).
[d] Secondary Maximum Contaminant Level (SMCL), National Secondary Drinking Water Regulations (40 CFR 143).
[e] U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG. All concentrations of radionuclides are determined by subtracting the instrument background environmental level from the monitored concentration. A negative or zero incremental concentration means that the concentration at the sampling location is equivalent to the environmental level and that there is no significant impact from the facility.
[f] Concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards—they do not constitute enforceable limits.
[g] Samples were collected from effluent release areas in April 1989. Surface water is monitored at 4 locations in Acid-Pueblo Canyon. The monitoring results are presented as the range of concentrations of parameters detected.
[h] Two locations are normally monitored in Los Almos Canyon, however one location was dry at the time of sampling. Results are reported for location DPS-1.
[i] Three locations are monitored in Sandia Canyon. The monitoring results presented are the range of concentrations of parameters detected.
[j] Only one location in Mortandad Canyon is sampled.
NA None applicable.

Source: LANL, 1990b. (Radiological data from table G-16 and 24 and nonradiological data from table G-17 and 25.)

TABLE 4.1.3.3–2.—*Summary of Groundwater Quality Monitoring at Los Alamos National Laboratory*

Parameter	Unit of Measure	Water Quality Criteria	1989—Existing Conditions[a]		
			Test Well #3	Test Well #DT-5A	Test Well #8
Cesium–137	pCi/L	120[c]	62	40	30
Chloride	mg/L	250[e]	3	2	1
Fluoride	mg/L	4[b]	0.4	0.3	0.3
Nitrate	mg/L	10[b]	0.6	0.4	0.3
pH	pH units	6.5–8.5[e]	8.2	8.0	8.0
Plutonium–238	pCi/L	1.6[c]	0.004	0.008	0.019
Plutonium–239, 240	pCi/L	1.2[c]	0.009	0.008	0.028
Sulfate	mg/L	250[e]	3	2	2
Tritium	pCi/L	20,000[b]	<600	<200	100
Uranium (total) (mg/L)	mg/L	d	2.7	2.0	2.0
Total Dissolved Solids	mg/L	500[e]	179	132	132

E4 4007

[a] All data comes from groundwater from onsite stations. Samples were collected March-April 1989. Less than symbol (<) indicates concentration below the analysis detection limit.
[b] Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).
[c] U.S. Department of Energy, 4 percent of Derived Concentration Guides (DCG) for water (DOE Order 5400.5).
[d] No specified limit.
[e] Secondary Maximum Contaminant Level (SMCL), National Secondary Drinking Water Regulations (40 CFR 143).

Source: LANL, 1990b.

in exchange for release of San Juan-Chama water, or establishment of credit for return flow (LANL, 1989a).

Although water use by the laboratory has decreased by about 1.7 MGY since 1979, water use by the city and county has been increasing by about 13 MGY. Thus, there has been a net growth in overall use of about 0.8 percent per year. Based on this growth rate, the present allotment would be fully used by about the year 2000. If San Juan-Chama water is added, the limit to the total available supply would be reached by about the year 2020 (LANL, 1988c). Recent water usage followed the trend of the 1988 projection, and in 1990 was at 91.5 percent of the allotment.

The preferred course of action is to use the San Juan-Chama water (LANL, 1988c). Ownership of this water has already been established, and this water constitutes an established source. Establishment of return flow credits is secondarily preferred. Return flow is potentially of low cost. The increased water supply obtained from return flow credit, however, would necessarily come from groundwater. There are potential problems in receiving approval for increased withdrawals, particularly because groundwater from the main aquifer discharges to the Rio Grande, and any further groundwater withdrawal has the potential to affect downstream users of Rio Grande water.

Environmental Consequences. A description of the functions to be transferred to LANL and the facility locations selected to house these activities is presented in section 3.3.3.

Surface Water. Reconfiguration activities would take place in TAs atop mesas and would not be affected by a 500-year flood. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

No surface water would be withdrawn for relocated activities. Impacts to surface water resources associated with runoff and wastewater discharged during modification would be negligible.

The additional sanitary wastewater generated by the transferred processes would be approximately 0.44 MGY (table 3.3.3-4). The increase represents less than 1 percent over the current sanitary wastewater generation rate of 183 MGY (table 3.2.6-1).

Surface Water Quality. LANL was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. As described in sections 4.1.3.8, Waste Management and appendix B, section B3, an incremental increase of less than 1 percent in liquid nonhazardous waste streams would result from the Proposed Action. The additional liquid waste can be accommodated by the new upgraded sanitary wastewater treatment plant and collection system. There should be no impact to surface waters because the treated effluent is of sufficient quality to be used for cooling water or irrigation. Further, the excess treated effluent is discharged to the Canada del Buey, a dry canyon that has only seasonal intermittent flow. There would be no increase in cooling water discharge or significant changes in stormwater runoff from LANL from the Proposed Action.

Groundwater. Water requirements for both the modification and operations phases would be supplied from local groundwater sources. It is projected that 5,500 GPD of water would be needed during the 3-year modification period (table 3.3.3-3). This amount is less than 1 percent of the current groundwater use of 4.1 MGD, and would not be a significant increase.

During operations, an additional 1,840 GPD of water would be required (table 3.3.3-5), which is less than 1 percent of the present groundwater use of 4.1 MGD. The projected water requirements for modification and operations would not constitute significant increases in the total amount of groundwater currently withdrawn by LANL and would not affect water supply in the area. This additional amount would still be below the LANL maximum allotment of 1.8 BGY, and would be approximately 0.2 percent of the remaining available allotment of 0.3 BGY.

Groundwater Quality. No process wastes would be discharged directly to the groundwater and all wastewater discharges would be required to comply with NPDES permit requirements. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from the Proposed Action.

4.1.3.4 *Geology and Soils*

Affected Environment. LANL is located on the Pajarito Plateau. The surface of the plateau is dissected by deep, southeast-trending canyons separated by long, narrow mesas.

LANL lies within Seismic Zone 2B (ICBO, 1991). The strongest earthquake in the last 100 years within a 50-mile radius was estimated to have a magnitude of 5.5 to 6 and an MMI of VII. Studies suggest that several faults have produced seismic events with a magnitude of 6.5 to 7.8 in the last 500,000 years. LANL operates a seismic hazards program which monitors seismicity through a seismic network and conducts studies in paleoseismology. These studies have determined the presence of three faults in the area that are considered active as defined by 10 CFR 100, appendix A. These form the Pajarito fault system, which includes the Pajarito, Water Canyon, and Guaje Mountain faults. The Guaje Mountain fault had movement on it between 4,000 and 6,000 years ago. There is no evidence of movement along the Pajarito fault system during historical times (LA DOE, 1979). The 100-year earthquake at Los Alamos is regarded as having a magnitude of 5, with an event of of magnitude 7 being the maximum credible earthquake. These values are currently used

in design considerations at Los Alamos (LA Gardner, 1987).

Geological concerns associated with the LANL area include potential downslope movements in association with regional seismic activity. Although isolated rockfalls commonly occur from the canyon rims, landslides are an unlikely hazard.

LANL is underlain by soil types varying in texture from clay and clay loam to gravel. Over 95 percent of the soils are developed on acidic volcanic rocks (LA USDA, 1978). Because of the topographic relief of the Pajarito Plateau, rock outcrops occur on greater than 50 percent of the site area.

Water and wind erosion of these soils varies from slight to severe depending on slope, soil grain size, amount of disturbance, and degree of protection. Shrink-swell potential ranges from low to high, correlating with the amount of swelling clays present (LA USDA, 1978). No soils in Los Alamos County have been designated prime farmland or Soil of Statewide Importance for New Mexico.

Environmental Consequences. All new functions would be accommodated within existing structures. All laydown areas would be either inside existing buildings or in existing paved areas; therefore, no impacts to geologic features would occur.

During implementation and operations of the new functions, seismic activity in the area poses a potential hazard to the facilities and personnel at LANL. Secondary effects from seismic activities, such as soil liquefaction or landslides, are not expected because of the depth of groundwater and relatively stable topography on top of the mesas. Rockfalls could occur along the cliffs at the edge of the mesas. Modifications of site facilities to accommodate the new functions would meet standards for Seismic Risk Zone 2B in the Uniform Building Code (ICBO, 1991). Hazards resulting from the return of volcanism during implementation and operations are unlikely.

Because there would be no new construction, relocation of functions to LANL would have no impact on the soils of the site.

4.1.3.5 *Biotic Resources*

Affected Environment. Terrestrial habitats within undeveloped areas of LANL support six major vegetative communities: juniper-grassland, pinyon pine-juniper, ponderosa pine, mixed conifer, spruce-fir, and subalpine grassland. Undeveloped areas within LANL provide habitat for a diversity of terrestrial wildlife, described in detail in an environmental impact statement (EIS) prepared for the continued operation of LANL in 1979 (LA DOE, 1979). LANL was designated a NERP in 1976.

National Wetland Inventory (NWI) maps (LA FWS, 1990a-d) indicate that wetlands within LANL are restricted to several canyons containing the Rio Grande or its tributaries. Most of the wetlands shown on the NWI maps have been designated as temporary or seasonal.

Aquatic habitats on LANL are limited to the Rio Grande and several springs and intermittent streams in the canyons. These habitats currently receive NPDES-permitted wastewater discharges (LA DOE, 1988). Fourteen species of fish are known to inhabit the roughly 6-mile reach of the Rio Grande between LANL and Cochiti Lake (NM DGF, 1992). The springs and streams on the site support limited, if any, aquatic life.

Seventeen Federally-listed or New Mexico-listed threatened, endangered, or candidate species potentially occur in the vicinity of LANL (NM DGF, 1990). Four of these species have been observed on LANL, including the bald eagle (*Haliaeetus leucocephalus*) (a Federally-listed endangered species that roosts along the Rio Grande); the peregrine falcon (*Falco peregrinus*) (a Federally-listed endangered species that historically nests in the northeast corner of LANL); the northern

goshawk (*Accipiter gentilis*) (a Federal candidate Category 2 species that forages in the northwest corner of LANL); and the giant helleborine orchid (*Epipactis gigantea*) (a state-listed endangered species that occurs near springs in White Rock Canyon). Five other species occur in close proximity to LANL and are likely to exist onsite (LA DOE, 1992).

Environmental Consequences. Minor permanent and temporary land disturbance would result from relocation activities associated with the Proposed Action. Disturbance would be limited to land within several of the fenced technical areas. Because of the high degree of land development, these areas are not significant habitat for terrestrial wildlife. No undeveloped areas would be disturbed by the Proposed Action. Relocation activities would not affect research activities conducted at the LANL NERP.

No areas potentially containing wetlands or other aquatic habitats would be affected by renovation or operations of the facilities. Operations of the consolidation facilities would not require water withdrawals from aquatic habitats, and minor increases in wastewater reaching the LANL canyons (section 4.1.3.4) would not significantly affect aquatic habitats within those canyons.

No terrestrial or aquatic habitats potentially providing habitat to Federally-listed or New Mexico-listed threatened or endangered species would be disturbed by the Proposed Action. DOE has initiated discussions with the FWS and the New Mexico Department of Game and Fish to ensure that renovation and operations of the facilities would not result in impacts to any listed or special status species in the vicinity.

4.1.3.6 *Cultural Resources*

Affected Environment. The prehistoric chronology for the LANL area consists of six broad time periods: Paleoindian (10,000-4000 B.C.), Archaic (5500 B.C.-A.D. 600), Early Developmental (A.D. 600-900), Late Developmental (A.D. 900-1100), Coalition (A.D. 1110-1325), and Classic (A.D. 1325-1600) (LA Cordell, 1979). Prehistoric site types identified in the vicinity of LANL include large multi-room pueblos, pithouse villages, field houses, talus houses, cave kivas, shrines, towers, rockshelters, animal traps, hunting blinds, water control features, agricultural fields and terraces, quarries, rock art, trails, campsites, windbreaks, rock rings, and limited activity sites (LA USDA, 1987). Approximately 75 percent of LANL has been inventoried for cultural resources (LANL, 1990a). Coverage for some inventories has been less than 100 percent; however, about 60 percent of LANL has received 100 percent coverage. Over 975 prehistoric sites have been recorded; about 95 percent of these sites are considered eligible or potentially eligible for the NRHP.

The history of the region has been documented (Los Alamos County, 1978). Over 50 historic resources have been recorded at LANL; more than 95 percent are considered eligible or potentially eligible for the NRHP. The existing LANL facilities have been extensively modified and refurbished since 1942 (LA Kunetka, 1979). The existing facilities are not likely to be considered NRHP-eligible because they may lack architectural integrity and may not be representative of a particular architectural style. However, some of the facilities may be NRHP-eligible based on their association with the broad historic theme of the Manhattan Project and initial nuclear production.

Native Americans with concerns in this area include the San Ildefonso, San Juan, Santa Clara, Nambe, Tesuque, Pojoaque Pueblos east of Los Alamos, and Jemez and Cochiti Pueblos (LA Arnon, 1979; LA Edelman, 1979a and b; LA Lambert, 1979; LA Ortiz, 1979; LA Spiers, 1979). Native American resources on LANL may consist of prehistoric sites with ceremonial features such as kivas, village shrines, petroglyphs, or burials; all of these site types or features would be of concern to local groups. Consultation with the San Ildefonso, San Juan, Santa

Clara, Tesuque, Nambe, and Pojoaque Pueblos has been initiated by DOE for this project.

Environmental Consequences. Native Americans with concerns in the project area and the SHPO were provided copies of the Preapproval Review Copy of this EA. The New Mexico SHPO and Native Americans were asked to review the EA and submit comments on the potential of the Proposed Action having any effect on important Native American resources or NRHP-eligible prehistoric or historic resources. Only one Native American group responded to the request for comments. Based on the response of Native American groups and the New Mexico SHPO to the preapproval review process for the EA, no important Native American resources or NRHP-eligible prehistoric or historic resources were identified. Therefore, no adverse effects to cultural resources are expected.

4.1.3.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at LANL is based on an ROI where 88 percent of LANL employees lived in 1991. The ROI includes Los Alamos (48 percent), Rio Arriba (21 percent), and Santa Fe (19 percent) counties in New Mexico. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Española (10 percent) and Santa Fe (16 percent), (see figure 3.2.5.2-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.3-1 through E3.3-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 144 percent, increasing from 34,467 in 1970 to 84,107 in 1990. Total employment increased from 31,155 to 79,846 between 1970 and 1990, an annual growth rate of 5 percent. The unemployment rates for 1970 and 1990 were 9.6 percent and 5.1 percent, respectively. For the same years, personal income increased from approximately $324.7 million to $2.3 billion (an annual average of 10 percent), and per capita income increased from $3,396 to $15,348.

Between 1975 and 1990, employment at LANL increased from 5,094 to 7,622, representing 10 percent of the ROI employment in 1990 (LA DOE, 1991b). As of September 30, 1992, employment at LANL had increased to 7,450. The prepared Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. With the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to 7,200 by the year 2000 (DOE, 1993c). In 1992, the total LANL payroll was estimated to be more than $383 million (LA DOE, 1991b). With the No Action baseline, the total payroll is projected to be approximately $373 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 99,000 by 2000 and 106,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 6.0 percent and 5.8 percent, respectively. For the same years, personal income is projected to increase from approximately $3.1 billion to $4.2 billion, an annual average of about 2 percent. Per capita income is projected to increase from an estimated $19,000 in 2000 to $22,000 in 2020.

Population. In 1991, more than half of the LANL workforce resided in the unincorporated communities of Los Alamos and White Rock in Los Alamos County. Between 1970 and 1990, the

population in the ROI increased 61 percent to 151,408. During the same period, the New Mexico population increased 49 percent. The population in the 3-county ROI is projected to increase from an estimated 169,000 in 2000 to 191,000 by 2020, an annual rate of less than 1 percent.

The largest county population increase (84 percent) occurred in Santa Fe County between 1970 and 1990, while during the same years, population in Los Alamos County increased 19 percent. Population in Santa Fe County is estimated to increase 11 percent between 1990 and 2000 and 14 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Los Alamos County population is projected to increase approximately 23 percent between 1990 and 2000 and an additional 14 percent between 2000 and 2020, an annual growth rate of 1 percent.

The unincorporated communities of Los Alamos and White Rock in Los Alamos County are included in the county population analysis. Between 1970 and 1990, the population in Española increased 85 percent. For the same years, the Santa Fe population increased 36 percent.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 124 percent from 28,344 to 63,386. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 11 percent by the year 2000 and an additional 13 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (157 percent) occurred in Santa Fe County, while the smallest increase (61 percent) occurred in Los Alamos County. The number of housing units in Santa Fe County is expected to increase approximately 12 percent by 2000 and an additional 14 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Los Alamos County is expected to increase about 9 percent by 2000 and an additional 12 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 1 percent in the ROI and ranged from less than 1 percent in Los Alamos County to 1 percent in Rio Arriba and Santa Fe counties. The vacancy rates for rental units averaged 8 percent and ranged from about 5 percent in Los Alamos County to 13 percent in Rio Arriba County.

Community Infrastructure and Services. The DOE at LANL and the cities of Santa Fe and Española operate water supply systems in the ROI. LANL and Española draw all of their raw water supplies from groundwater, while Santa Fe utilizes both groundwater and surface water.

LANL's system is the primary supplier in Los Alamos County and had 1988 average daily demands of about 83 percent of its current groundwater allotment of 4.92 MGD. Santa Fe's system (18 MGD capacity) in Santa Fe County had 1991 average daily demands of 49 percent of capacity. Española's system in Rio Arriba County had 1991 average daily demands of 67 percent of its 1.5 MGD capacity.

Under current conditions, LANL's system is projected to experience average daily demands of 92 percent of its current allotment in 1995 and 101 percent of its current allotment in 2000. The average daily demands on Santa Fe's system are projected to be about 53 percent of capacity in 1995 and 56 percent of capacity in 2000. Española's system is projected to have average daily demands of about 70 percent and 74 percent of capacity in 1995 and 2000, respectively.

Los Alamos County Utilities, Santa Fe, and Española all operate wastewater systems in the ROI. Los Alamos County Utilities had 1991 average daily demands of 42 percent of its 3.1 MGD capacity. The 1991 average daily demands on Santa Fe's system were 92 percent of its 6.5 MGD capacity, while Española had 1991 average daily demands of 99 percent of its capacity (about 1 MGD).

Española plans to increase its system capacity to 1.6 MGD by 1993 and is projected to have average daily demands of 64 percent of capacity in 1995 and 66 percent of capacity in 2000. Los Alamos County Utilities has two modifications planned, a decrease in capacity by 1993 and an increase in capacity by 1996, which would result in a net decrease in capacity to about 2.8 MGD by 1996. Los Alamos County Utilities is projected to have average daily demands of 67 percent of capacity in 1995 and 63 percent of capacity in 2000. The average daily demands on Santa Fe's systems are projected to be about 97 percent and 102 percent of current capacity in 1995 and 2000, respectively.

Seven school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 493 students in the Jemez Mountain School District to 12,556 students in the Santa Fe School District. School districts in Los Alamos, Rio Arriba, and Santa Fe counties with enrollments of over 1,000 were operating between 89 percent and 100 percent of capacity. However, current capacities in Los Alamos and Santa Fe counties are projected to be exceeded by the years 1995 and 2000 under the No Action future baseline. The largest increases are expected to occur in the Santa Fe County school districts, where enrollments are projected to exceed current capacities by 38 percent in 1995 and 45 percent in 2000. Smaller increases are expected to occur in the Los Alamos County School District, where enrollments are projected to exceed the current capacity by 21 percent in 1995 and 35 percent in 2000. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,323 per pupil. The statewide average pupil-to-teacher ratio was 18:1, and expenditures averaged $3,137 per pupil (NM DEd, 1990).

Five hospitals serve the three-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 366 physicians served the ROI. The physician-to-population ratio for the ROI was 2.4:1,000 and ranged from 0.9:1,000 in Rio Arriba County to 2.9:1,000, in Santa Fe County. The statewide physician-to-population ratio was 2.1:1,000 (AMA, 1990).

Six city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county ROI was in Santa Fe, with 126 sworn officers or 2.3 sworn officers per 1,000 persons. Other large agencies are in Santa Fe County with 60 sworn officers or 0.6 sworn officers per 1,000 persons, or and Los Alamos County, with 33.5 sworn officers, or 1.8 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.5 per 1,000 persons (FBI, 1991).

Three fire departments and 258 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Los Alamos County (130 firefighters; 7.2 firefighters per 1,000 persons) and in the city of Santa Fe (102 firefighters; 1.0 firefighters per 1,000 persons). The average number of firefighters in the ROI was 1.7 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to LANL is provided by Pajarito Road; East Jemez Road; U.S. Route 84; and New Mexico State Routes 4, 501, and 502.

Estimated traffic along segments providing access to LANL is projected to contribute to differing service level conditions in accordance with population growth. New Mexico State Route 4 would generally support congestion-free traffic flow. New Mexico State Routes 501 and 502 would support stable flow. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance

activities, resulting in minor congestion. In addition, estimated truck traffic into LANL for delivery of supplies and removal of wastes would typically average 72 trips per day. However, the additional traffic volumes associated with continued operation of LANL are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to LANL (LANL, 1990a).

Other modes of transportation within the ROI include public transportation systems and railways. Although no public bus service exists in Los Alamos County, a non-profit bus system provides regular scheduled service between White Rock, LANL, and the Los Alamos townsite (LANL, 1990a). The nearest railroad is the Atchison, Topeka, and Santa Fe Railroad (LA DOE, 1979; NM Hwy, 1991c). No navigable waterways within the ROI are capable of accommodating waterborne transportation of material shipments to LANL.

The ROI receives jet air passenger and cargo service from both national and local carriers at Albuquerque International Airport (DOT, 1991). The Santa Fe Municipal Airport and Los Alamos Airport serve local air traffic.

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 115 to 125 new jobs (DOE, 1993d). The analysis presented in table 4.1.3.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 115 new jobs. The estimate of 125 new jobs is 10 percent higher than the 115 new jobs used in the following analysis and this higher estimate would result in slightly more benefits than the 115 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at LANL would require 60 additional employees during peak construction (LA DOE, 1992).

TABLE 4.1.3.7–1.—*Los Alamos National Laboratory Proposed Action Economic and Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	91,191	NA	98,872	NA
Baseline Unemployment Rate	5.5%	NA	6.0%	NA
Baseline Personal Income (Thousands $)	$2,698,386	NA	$3,133,307	NA
Baseline Per Capita Income ($/Person)	$16,886	NA	$18,578	NA
Baseline Employment	86,139	NA	92,928	NA
Direct Jobs	60	.07	115	0.12
Indirect Jobs	144	0.17	179	0.19
In-Migrating Workforce	20	0.02	61	0.07
Total In-Migration	45	0.03	154	0.09
Population Increase				
Los Alamos County	25	0.12	84	0.38
Rio Arriba County	11	0.03	36	0.10
Española	5	0.08	17	0.25
Santa Fe County	10	0.01	33	0.03
Santa Fe	8	0.01	28	0.05
ROI (County Total)	45	0.03	154	0.09

E4 4004

Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM ESD, 1991; DOE, 1993c; LA DOE, 1992.

Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 115 full time equivalent jobs for hourly and salaried personnel in 2000. These positions would be filled through donor transfers, new hires, and internal reassignments (DOE, 1993b). In addition to the jobs created directly by the project, another 144 jobs would be created indirectly during peak construction and 179 additional jobs during operations. The creation of direct and indirect employment would lead to in-migration of 45 persons during peak construction and 154 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force.

Under the No Action alternative, the current LANL employment of 7,450 persons is projected to decrease to 7,200 by the year 2000, a decrease of 250. The addition of 115 full time equivalent jobs at LANL would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.3.7-1. In the year 2000, this project-related population growth from in-migration would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 169,000, and no cities or counties in the ROI would experience a population growth greater than 1 percent.

The less than 1 percent change in population during peak construction would create the need for only an estimated 17 additional housing units, which is not a significant addition. For operations in the year 2000, the less than 1 percent change in population would not create a need for additional housing units beyond a 1 percent increase. In past years, housing units have been built at an annual rate of 4 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

Under the No Action future baseline, Santa Fe's wastewater system would exceed current capacity by 1995 and the LANL current water system allotment would be exceeded by the year 2000. However, the less than 1 percent estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI beyond what would naturally occur under the No Action baseline. Some existing public education facilities are currently approaching 100 percent of capacity. Under current conditions, enrollments will exceed capacities by the years 1995 and 2000 given the No Action future baseline. However, these school capacities will not be affected beyond what would naturally occur under the No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into LANL would be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving LANL would be negligible, as well.

4.1.3.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the LANL waste management baseline is provided in section 3.2.6.3. Because no TRU wastes are associated with any of the proposed activities that would be consolidated, no further discussion of TRU waste generation or management is presented.

Current LLW management activities at LANL requires development of a 60- to 70-acre site for new landfills to replace the existing landfill at LANL. A portion of the expansion area for the existing landfill has been contaminated by a chemical plume from the hazardous chemical disposal site, which restricts further development. The new landfill is required to ensure continued operation of laboratory activities that generate LLW and to provide safe isolation of the wastes. Construction completion is anticipated in late 1996.

A new HE wastewater treatment facility at LANL must also be constructed in order to comply with RCRA and NPDES regulations. The planned project would eliminate approximately 20 HE sumps and outfall lines which do not comply with Federal regulations and permits. If these existing sumps are not upgraded, HE operations at LANL could be curtailed under No Action. Construction completion is anticipated in late 1995.

LANL has constructed a new sanitary wastewater treatment plant and collection system to replace 8 existing treatment facilities and 30 existing septic tanks to centralize and consolidate sanitary wastewater treatment at LANL. The plant and collection system meets the requirements of the Laboratory's Federal Facilities Compliance Agreement, and meets all current and expected future standards and regulations required by the EPA.

Waste minimization has been implemented by LANL's Environmental Management Division using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. A Waste Minimization and Pollution Prevention Awareness Plan was completed in 1991. Major waste generating operations have been prioritized by severity of hazard and volume, to determine which generating systems to address. Also, halogenated solvent substitution has been evaluated for a number of research processes.

Environmental Consequences. Any equipment moved to LANL from another site due to the Proposed Action would be decontaminated prior to shipment. Construction debris and scrap metals from demolition of existing interior utilities and partitions would be disposed of as sanitary waste or sold/recycled as scrap.

Construction/modification activities involving decontamination are part of routine facilities operations at LANL. Project decontamination activities may include the removal of asbestos piping insulation, floor and ceiling tiles, and asbestos- or PCB-contaminated concrete flooring. Such decontamination activities, if identified as necessary, would be performed in accordance with TSCA requirements for handling and disposal of asbestos and PCB wastes. The amount of hazardous construction waste materials is expected to be minimal.

Should any soil excavation occur as a result of piping modification or replacement of sanitary and industrial drains, the soils would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. If soils are found to be contaminated, the location would be referred to the LANL Environmental Restoration Program for subsequent management. Management of potentially contaminated soil would involve an area inspection, characterization, and evaluation of cleanup alternatives (if necessary). Cleanup action and compliance follow-up would be conducted as necessary to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities may have additional project cost implications, no adverse affects to the LANL waste management program are expected.

Wastes generated from the consolidation of operations are outlined in appendix B, section B.3

and would be disposed of through LANL's existing Environmental Management Division. The activities under the Proposed Action would increase Los Alamos's liquid and solid LLW streams by 30 gallons per year and 200 ft^3 per year which are insignificant amounts when compared to current annual LLW streams. There are no liquid or solid mixed wastes being generated as part of the Proposed Action. With the addition of the planned 60- to 70-acre landfill site, the additional LLW due to the Proposed Action to be treated or disposed of at LANL would be accommodated.

Under the Proposed Action, LANL would increase its hazardous waste streams by 7,508 gallons per year of liquid and 305 ft^3 per year of solid hazardous waste. Approximately 3,200 gallons, primarily HE-contaminated wastewater, will be stored and sent to the incinerator or flashpad (TA-16), where it is burned. The remaining ash residue is considered nonhazardous and is disposed of in the industrial non-RCRA landfill. Up to approximately 3,800 gallons per year of nonhalogenated solvent waste streams, of which about 20 percent is acetone with a small amount of ethanol, will be generated. The remainder of the waste is water. The solvent waste would also be burned at TA-16 and the nonhazardous residue disposed of in the industrial non-RCRA landfill. A future option of offsite treatment/Disposal could be pursued.

All HE solid hazardous waste and potentially contaminated HE waste is delivered by LANL to the incinerator or flash pad (TA-16), where it is burned. Ash residue that exhibits hazardous characteristics is treated, and when nonhazardous, disposed of in the industrial, non-RCRA landfill. LANL has 31 hazardous waste management units located at 7 different sites operating under state and Federal regulations promulgated in accordance with RCRA. At any given time, existing storage areas would have sufficient excess capacity to handle the additional hazardous waste streams. Other liquid and solid hazardous wastes are packaged, manifested, and shipped by a DOT-registered transporter to RCRA-approved commercial facilities. Consequently, the impacts on the LANL hazardous management storage and handling capacities and current operating permits would be minimal.

Each of the functions transferring to LANL from Mound, Pinellas and RFP have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, LANL would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goal, and strategies for preventing or minimizing additional generation of pollutants.

An increase of less than 1 percent in liquid nonhazardous waste streams would result from the Proposed Action. The additional nonhazardous liquid waste can be handled with the existing and planned upgraded sanitary wastewater treatment plant and collection system. The additional solid nonhazardous waste due to the Proposed Action is approximately 3 percent of current disposal volume.

4.1.3.9 *Human Health: Facility Operations and Accidents*

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.1. Information specific to LANL is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (4.1.3.2 and 4.1.3.3, respectively), the chemical pollutant levels from LANL operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Radiological pollutant

levels to which the public is exposed are also below applicable permit, regulatory, and DOE operational requirements (LANL, 1990b).

A review of the recent LANL annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The period of the review (1986-1990) was a time during which site operations were much higher than in the past year and higher than anticipated in the future.

Environmental Consequences. The Air and Water Resources sections discuss the chemical releases associated with relocating the tritium handling, special products, HE, and beryllium technology and pit support functions identified in section 3.3.3 to LANL. As shown, the cumulative impacts resulting from existing releases and the releases of chemicals and radioactive materials associated with relocating these functions at LANL are below applicable permit, regulatory, and DOE operational requirements.

Water from processes that generate hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge. Furthermore, discharge of wastewater through NPDES-permitted outfalls which can be attributed to the activities to be relocated at LANL are expected to be below NPDES limits. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at LANL, all possible HAPs were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, ammonia, chromium trioxide, dimethylformamide, 1,4 dioxane, formaldehyde, isopropyl alcohol, methylene chloride, TCE, methyl ethyl ketone, and nitric acid. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for LANL (see table F-13a) were 0.0465 onsite (worker effects) and 0.0044 at the site boundary (effect on the public) on an annual basis, and the incremental change to the Hazard Indexes due to the Proposed Action were both 0 for onsite and at the site boundary. Therefore, the Proposed Action would not contribute to the cumulative Hazard Indexes at the LANL site.

Four of the chemicals identified, 1,4 dioxane, formaldehyde, methylene chloride, and TCE, are considered to be carcinogens and the cancer risk to individuals for each was calculated. The combined risk for the carcinogens was calculated as 1.5×10^{-6} onsite (worker) and 1.2×10^{-7} at the site boundary (public) (see table F-13b). The increment change due to the Proposed Action contributed no additional risk either onsite or at the site boundary. The cancer risk of 1.5×10^{-6} for the onsite worker is primarily the result of the use of TCE in the current operations (No Action); the Proposed Action would not increase the risk to workers. Solvents posing reduced risk will be substituted for TCE.

Operations are conducted to ensure that normal releases of radioactive materials from LANL result in a total maximum individual dose on the public of less than 10 mrem effective dose equivalent (LANL, 1990b). The resulting risks of potential fatal cancers associated with 1 year of operations would be less than 4.5×10^{-6} to that individual. The annual dose increment associated with the increase in tritium emissions due to the Proposed Action would be less than 0.1 mrem effective dose equivalent and results

in an increased risk of less than 4.5×10^{-8} potential fatal cancers from 1 year of operations. Mitigation measures, currently underway, would reduce the dose from the Los Alamos Meson Physics Facility by a factor of 6. The new resulting cumulative dose would result in a risk of less than 7.9×10^{-7} potential fatal cancers from 1 year of operations. Risks less than 10^{-6} are acceptable by EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population. When risks are greater than 10^{-6}, appropriate measures are required to reduce the risk to less than 10^{-6}.

The average doses to workers at LANL associated with tritium-handling activities would be less than those at SRS since the tritium inventories and level of tritium-handling activities at LANL would be much less than those at SRS. Based on worker dose experience at SRS (see section 4.1.2.9), the average dose to workers at LANL is expected to result in incremental and cumulative doses of less than 0.011 and 0.281 mrem, respectively. This would result in an incremental and cumulative cancer risk of less than 4.9×10^{-9} and 1.3×10^{-7}, respectively.

Tritium-handling, explosive, and activities similar to the beryllium and pit support functions have been analyzed previously for accidents at LANL in the site EIS (LA DOE, 1979). The accidents analyzed included explosions and the release of tritium, beryllium, and plutonium. Both natural and man-made external initiating events were considered (e.g., human errors, fires, explosions, and aircraft crashes).

The neutron tube target loading function would be located in the Tritium Salt Laboratory in TA-21, Building 209. The Tritium Salt Laboratory is an operating tritium facility that has an inventory of approximately 100 grams of tritium. The tritium inventory requirements for the neutron tube target loading activities are about 2 grams, which represents an insignificant addition to the amount of tritium in the Tritium Salt Laboratory.

Radioactive materials are routinely stored, handled, processed, and tested at LANL. Additionally, explosives are also routinely stored, handled, processed, manufactured, and tested at LANL. Safety procedures and requirements have been developed and implemented for storing, handling, processing, manufacturing, and testing radioactive and explosive materials, as appropriate. These procedures and requirements limit the amount of materials that can be used or stored in one location, as well as material proximity to site boundaries or other materials.

Currently, beryllium inventories at LANL total approximately 1,852 lb, and include 80 lb in powder form and 2 lb of beryllium oxide. Data for the period 1985 through 1989 indicate ambient concentrations for beryllium at LANL are significantly below the Federal standard of 0.01 $\mu g/m^3$ over a 30-day period (LANL, 1990b). Transferring the beryllium technology function to LANL would result in a cumulative inventory of 10,200 lb, of which only 200 lb would be powder. The powder material is the only form capable of producing adverse health effects. However, there have been significant improvements in the safety procedures for handling beryllium, and the crystal structure of beryllium powder now used in industry has a much lower toxicity than that used during the early days (1940-1950) of the industry (Rossman, 1991). Employee exposure limits will be maintained below applicable standards and acceptable concentrations established by OSHA.

Projected workloads of the tritium-handling, explosive, and plutonium operations and inventories at LANL would be reduced. Therefore, including the operations and inventories that would be moved from the other DOE sites to LANL, operations and inventories would be below those that currently exist at LANL. As discussed in section 3.3.3, the tritium-handling, explosive, and beryllium technology and pit support functions involve operations and chemicals that are the same as those currently being performed and used at LANL.

Based on the above discussions, the current accident profile at LANL would not change as a result of the Proposed Action.

4.1.4 Y-12 Plant

A detailed discussion of the Y-12 Plant's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.7. The functions and processes associated with the Proposed Action to be consolidated at Y-12 and the proposed facility modifications required to support each relocated function are discussed in section 3.3.4. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at Y-12 and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action which supports the following discussion on Y-12 is also provided in the chapter 4 introduction and section 4.1.

4.1.4.1 *Land Resources*

Affected Environment. The Oak Ridge Reservation (ORR) and Y-12 are located approximately 20 miles west of Knoxville, TN (figure 3.2.7-1). Generalized land uses at ORR and in the vicinity are shown in figure 4.1.4.1-1.

Land uses within ORR generally fall under one of four major land use classifications: industrial, forest/ undeveloped, public/quasi-public, and water. ORR contains three major operations areas: Y-12, the Oak Ridge National Laboratory (ORNL or X-10), and the K-25 site. These areas account for approximately 11,665 acres or about 33.1 percent of the total site acreage. Numerous other support facilities are scattered throughout ORR. An additional 1,200 acres (3.5 percent) are used for security buffer zones around the various facilities.

About 790 acres (2.2 percent) of ORR's land are classified as public and consist mainly of the Clark Center Recreational Park, numerous small public cemeteries, and onsite public roads (Y-12 DOE, 1989). The remaining area, about 21,577 acres (61.2 percent), consists of forested undeveloped land. There are no prime farmlands on ORR.

Approximately 13,590 acres of ORR undeveloped land are designated as a NERP. This is one of five DOE NERPs primarily used for environmental research to study the impact of human activities on the environment (Y-12 MMES, 1991c).

Except for the city of Oak Ridge on the northeast, land use bordering ORR is predominately rural and used largely for residences, small farms, forest land, and pasture land. Several residences are adjacent to the ORR boundary approximately 1,300 feet north of Y-12; the closest house is within 100 feet of the boundary. The residential distribution of ORR employees is discussed in section 4.1.4.7.

ORR contains one recreation facility, Clark Center Recreational Park, which is open to the public. Clark Center Recreational Park is located on 90 acres along an embayment of Melton Hill Lake, about 2 miles south of Y-12. Facilities include a boat ramp and two softball fields. Deer hunting is permitted on ORR to control the resident deer population and reduce animal-vehicle accidents.

Development of the three major operations areas at ORR has disturbed the character of the landscape within their respective areas. The onsite DOE facilities are brightly lit at night, with lighting at the three major operations areas especially visible. Views affected by DOE facilities are primarily associated with the public access roadways and the bluffs on the opposite side of the Clinch River. Some partial views of the water treatment plant facilities can be seen from the urban areas of the city of Oak Ridge. Views are limited by the hilly terrain, heavy vegetation, and generally hazy atmospheric conditions.

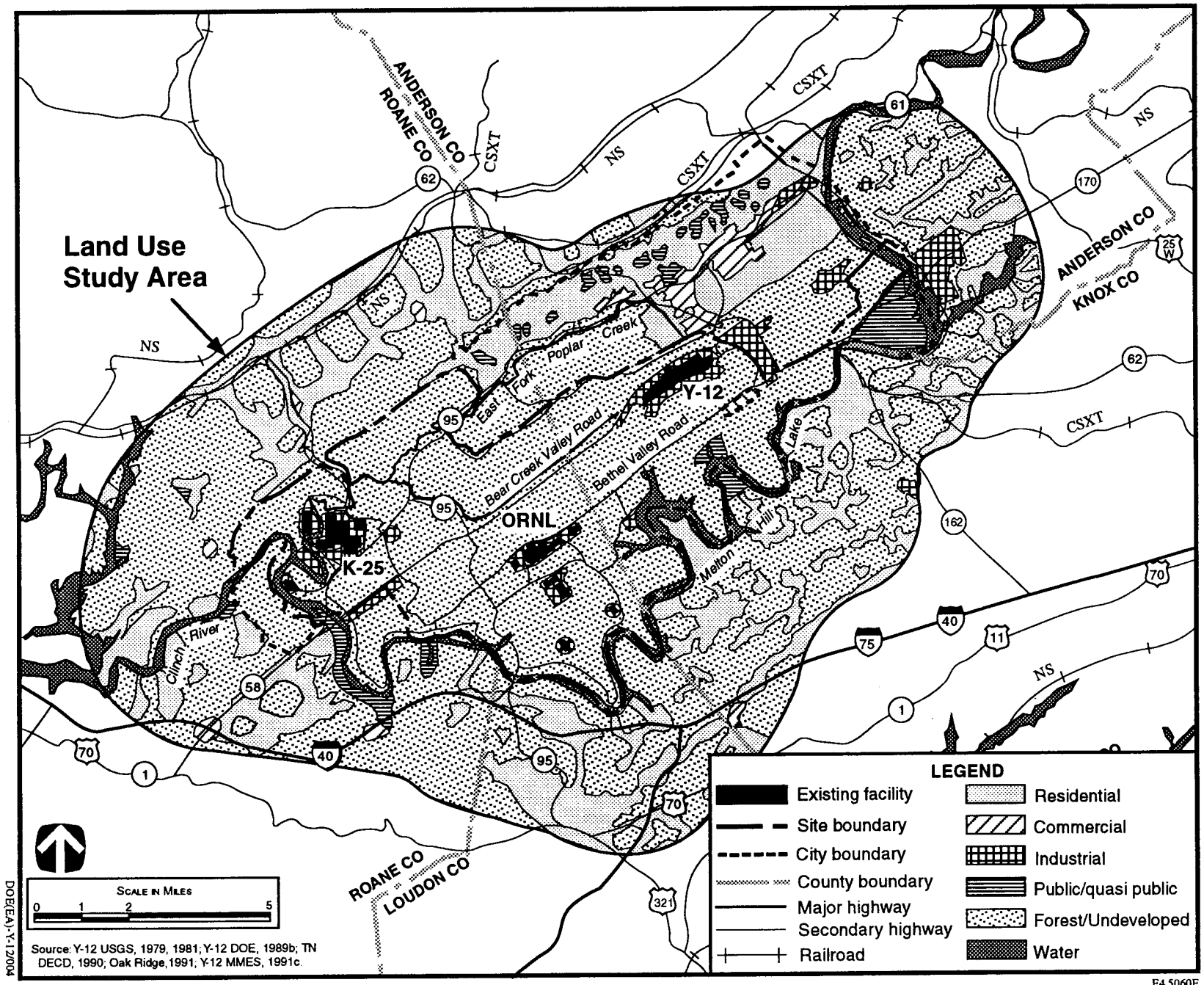

FIGURE 4.1.4.1–1.—*Generalized Land Use at the Oak Ridge Reservation and Vicinity.*

The three major ORR operations areas are consistent with a Class 5 VRM designation. The remainder of the ORR ranges from Class 3 to Class 4.

Environmental Consequences. The locations of the beryllium technology and pit support functions are shown in figure 3.3.4-1. The relocated functions would be compatible with existing operations.

The number of in-migrating employees (see section 4.1.4.7) would have a minimal impact on land resources for residential use. Offsite land requirements would be 8 acres during implementation and 1 acre during operations. This represents only a small percentage of the total developable land available for residential uses. Because the Proposed Action would result in a slight population increase (section 4.1.4.7), impacts on recreational resources would not be expected, nor would VRM classification be affected. Because all relocated beryllium functions would be placed within existing structures, the impact to visual resources would be negligible.

4.1.4.2 *Air Quality and Acoustics*

Affected Environment. The climate at ORR and in the surrounding region is characterized as humid, subtropical, with warm summers (Trewartha, 1954) and generally mild winters. Moderate annual precipitation is evenly distributed throughout the year. The annual average temperature at ORR is 57.5 °F; temperatures vary from an average daily minimum of 27.7 °F in January to an average daily maximum of 87.2 °F in July. The average annual precipitation measured at ORR is 54.8 inches (NOAA, 1991b).

Ambient Air Quality. ORR is located within the Eastern Tennessee-Southwestern Virginia Interstate AQCR. This AQCR is designated as attainment by the EPA with respect to the NAAQS (40 CFR 81.343) for PM_{10}, CO, and SO_2, and designated as nonattainment for NO_2. The NAAQS and Tennessee state ambient air quality standards are listed in table D2.1.1-1.

The Tennessee Department of Environment and Conservation provides guidance for the evaluation of HAPs/toxics (TN DH&E, 1991b). The list of HAPs/toxics is identical to those promulgated by Title III of the CAA. The acceptable ambient concentration is defined as 10 percent of the threshold limit value (TLV) or permissible exposure limit (PEL), whichever is the most restrictive. For those "high-risk pollutants," the acceptable ambient air concentration is defined as 1 percent of the TLV or PEL, whichever is the most restrictive. The HAPs/toxics described in this section are those currently used at Y-12 and those anticipated to be used with the Proposed Action.

Ambient air quality at Y-12 is monitored at two locations. The data from these monitoring stations for 1989 and 1990 are presented in table D2.1.7-1. To achieve a conservative estimate, the maximum background concentrations were used in the analysis.

The principal source of criteria air pollutants at Y-12 is the steam plant. Other sources include fugitive particulate emissions from coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction processes (Y-12 MMES, 1987). HAP emissions occur from various laboratories and manufacturing facilities. The emission inventories are included in tables D2.1.7-2 and D2.1.7-3.

The air emissions also include trace amounts of the HAP beryllium. Compliance testing was performed in 1990 in accordance with applicable Tennessee Department of Environment and Conservation regulations. Testing showed that emissions from Y-12 were less than 3.5 grams per 24-hr period. A "less-than" number was reported because the results of the individual stack tests were below the detection limits of the laboratory analysis. The regulation states that emissions to the atmosphere shall not exceed 10 grams of beryllium during a 24-hr period.

Normal operations result in the emission of radioactive materials at Y-12. These emissions

would not be affected by nonnuclear consolidation activities.

The air quality under ambient and No Action conditions at Y-12 is shown in table 4.1.4.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. Baseline air quality concentrations at ORR exceed applicable guidelines or regulations for TSP and SO_2.

TABLE 4.1.4.2–1.—*ORR Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)[c]	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[d]
Carbon Monoxide (CO)	8-hour	10,000[a]	f	7.5	≥7.5
	1-hour	40,000[a]	f	15.4	≥15.4
Hydrogen Fluoride (HF) (as fluorides)	30-day	1.2[b]	0.2	e	0.2
	7-day	1.6[b]	0.3	e	0.3
	24-hour	2.9[b]	f	e	f
	12-hour	3.7[b]	f	e	f
	8-hour	250[b]	f	9.5	≥9.5
Lead (Pb)	Calendar Quarter	1.5[a]	f	e	f
Nitrogen Dioxide (NO_2)	Annual	100[a]	f	9.0	≥9.0
Sulfur Dioxide (SO_2)	Annual	80[a]	35.1	27.8	62.9
	24-hour	365[a]	165.6	399.6	565.2
	3-hour	1,300[a]	322.0	1,269.6	1,591.6
Total Suspended Particulates (TSP)	Annual	60[b]	76.0	1.2	77.2
	24-hour	150[b]	385.6	17.0	402.6
Hazardous Air Pollutants and Other Toxic Compounds[g]					
1,1,1-Trichloroethane	8-hour	19,000[b]	f	92.6	≥92.6
Acetonitrile	8-hour	6,700[b]	f	7.9	≥7.9
Chlorine	8-hour	150[b]	f	2.1	≥2.1
Hydrogen Chloride	8-hour	700[b]	f	62.6	≥62.6
Methyl Alcohol	8-hour	26,000[b]	f	266.8	≥266.8
Nitric Acid	8-hour	500[b]	f	175.8	≥175.8
Tetrachloroethylene	8-hour	17,000[b]	f	49.9	≥49.9
Trichlorotrifluoroethane	8-hour	562,000[b]	f	174.9	≥174.9

E4 3404

a Federal standard (40 CFR 50).
b State standard (TN DH&E, 1991a and b).
c Ambient air quality data (Y-12 MMES, 1990, 1991b).
d The Baseline Concentration represents a conservative assessment of potential impacts since the concentration contributions from individual sources do not necessarily occur at the same location.
e Not estimated because the potential release is negligible.
f Data unavailable.
g The compounds listed are the major pollutants of concern (Y-12 MMES, 1990, 1991b).

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources within ORR include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, paging systems, construction and materials-handling equipment, and vehicles). At the site boundary, away from most of these industrial facilities, noise from these sources would be barely distinguishable from background noise levels. Sound-level measurements have been made around ORR in the process of testing sirens and in preparing support documentation for the Atomic Vapor Laser Isotope Separation site (Y-12 Cleaves, 1991). The acoustic environment along the ORR site boundary in rural areas and at nearby residences away from traffic noise is typical of a rural location, with the DNL in the range of 35 to 50 dBA. Areas near the site within the city of Oak Ridge are typical of a suburban area with the DNL in the range of 53 to 62 dBA (EPA, 1974). The primary noise source at the site boundary and at residences near roads is traffic. During peak hours, plant traffic is a major contributor to traffic noise levels in the area.

The State of Tennessee has not established specific numerical environmental noise standards applicable to ORR. The city of Oak Ridge has specified allowable noise levels at property lines as described in appendix D (section D2.2.). Noise levels at the residences adjacent to the ORR boundary are not expected to exceed the EPA guideline level for residential areas as a result of any noise sources at ORR. Noise levels can be expected to exceed the EPA guideline along major roads as a result of traffic noise and may exceed the limits set for streets.

Environmental Consequences.

Air Quality. The transfer of the beryllium technology function from RFP would involve modifying existing buildings and facilities within Y-12 (section 3.3.4). Renovation of these facilities would temporarily increase particulate matter, emissions such as dust and dirt, and vehicle emissions. This increase, although relatively minor when compared to overall site emissions and when added to existing levels, is not expected to exceed applicable air quality standards. Appropriate mitigative actions, such as increased watering, would be implemented to minimize emissions.

The combined beryllium operations include beryllium machining, assembly, testing, and inspection. The exhaust from all beryllium operations is ducted into a special filter system. The air emissions of criteria pollutants from beryllium operations total only about 0.2 ton per year, including primarily VOC and NO_X (Y-12 DOE, 1992b). Consequently, resulting impacts to the ambient air quality are predicted to be low compared to applicable standards and guidelines. Concentrations of criteria pollutants would be the same as shown in table 4.1.4.2-2.

Estimated beryllium emissions associated with the transferred beryllium functions are 1.4×10^{-10} lb/hr or 3.3×10^{-9} lb in a 24-hr period, assuming continuous operation (Y-12 DOE, 1992b). This is well below the emission rate limit of 10 grams (0.02 lb) in a 24-hr period.

Consolidation of the nonnuclear activities at Y-12 would not increase radionuclide emissions.

Acoustic Conditions. Changes in noise levels during renovation and operations have been estimated for the major traffic routes around Y-12. The estimates are based on existing traffic volumes and projected changes in volumes as a result of Proposed Action changes in employment at ORR. These changes in traffic volumes are predicted to result in an increase of less than 1 dB in peak-hour sound levels along Route 62 through Oak Ridge and Route 95. Changes in sound levels along other routes are also estimated to be less than 1 dB. The increased noise levels along the major access routes are expected to cause little or no increase in annoyance to surrounding communities or individuals.

TABLE 4.1.4.2–2.—***Contribution to Air Quality from Proposed Action and Total Concentrations at ORR with Comparison to Applicable Regulations and Guidelines***

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[d]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Carbon Monoxide (CO)	8-hour	10,000[b]	≥ 7.5	e	≥ 7.5
	1-hour	40,000[b]	≥ 15.4	e	≥ 15.4
Hydrogen Fluoride (HF) (as fluorides)	30-day	1.2[c]	0.2	e	0.2
	7-day	1.6[c]	0.3	e	0.3
	24-hour	2.9[c]	f	e	f
	12-hour	3.7[c]	f	e	f
	8-hour	250[c]	≥ 9.5	e	≥ 9.5
Lead (Pb)	Calendar Quarter	1.5[b]	f	e	f
Nitrogen Dioxide (NO_2)	Annual	100[b]	≥ 9.0	e	≥ 9.0
Sulfur Dioxide (SO_2)	Annual	80[b]	62.9	e	62.9
	24-hour	365[b]	565.2	e	565.2
	3-hour	1,300[b]	1,591.6	e	1,591.6
Total Suspended Particulates (TSP)	Annual	60[c]	77.2	e	77.2
	24-hour	150[c]	402.6	e	402.6
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,1,1-Trichloroethane	8-hour	19,000[c]	≥ 92.6	e	≥ 92.6
Acetonitrile	8-hour	6,700[c]	≥ 7.9	e	≥ 7.9
Chlorine	8-hour	150[c]	≥ 2.1	e	≥ 2.1
Hydrogen Chloride	8-hour	700[c]	≥ 62.6	e	≥ 62.6
Methyl Alcohol	8-hour	26,000[c]	≥ 266.8	e	≥ 266.8
Nitric Acid	8-hour	500[c]	≥ 175.8	e	≥ 175.8
Tetrachloroethylene	8-hour	17,000[c]	≥ 49.9	e	≥ 49.9
Trichlorotrifluoroethane	8-hour	562,000[c]	≥ 174.9	e	≥ 174.9

E4 3774

[a] Compounds listed are the major pollutants of concern (Y-12 MMES, 1991b).
[b] Federal standard (40 CFR 50).
[c] Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (Y-12 MMES, 1992b).
[d] Baseline Concentration values are from table 4.1.4.2-1.
[e] Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (Y-12 MMES, 1992b).
[f] Data unavailable.

Noise generated by renovation of existing buildings and operations is not expected to increase offsite noise levels. Noise generated by renovation work, and from operational facilities, equipment, and machines, would not cause ambient noise levels at the site boundary to exceed EPA guidelines, which are set to protect the public and workers from the effects of broadband environmental noise and to prevent hearing loss.

Although no increase in annoyance is expected offsite from construction and operations, measures would be implemented onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and a hearing protection program would be conducted.

4.1.4.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at ORR in the vicinity of Y-12.

Surface Water. There are four major sub-drainage basins on ORR which flow into the Clinch River: Poplar Creek, East Fork Poplar Creek, Bear Creek, and White Oak Creek (Y-12 DOE, 1990b). Each drainage basin takes the name of the major stream flowing through the area.

Discharges from Y-12 affect water quality and flow in Kerr Hollow Quarry, McCoy Branch, East Fork Poplar Creek, and Bear Creek (Y-12 MMES, 1991b). Y-12 is located at the headwaters of Bear Creek and East Fork Poplar Creek. Bear Creek, East Fork Poplar Creek, and the Clinch River are shown in figure 3.2.7-2.

Water levels in the Clinch River in the vicinity of ORR are regulated by a system of dams operated by the Tennessee Valley Authority; fluctuations of the river affect the lower reaches of some of the tributary streams at ORR. The system of dams also controls flooding in the Clinch and Tennessee rivers near ORR. Norris Dam, constructed in 1936, is approximately 31 miles upstream of ORR. Melton Hill Dam, completed in 1963, controls the flow of the Clinch River near ORR. Watts Bar Dam is on the Tennessee River near the lower end of the Clinch River (Y-12 DOE, 1986).

Tennessee Valley Authority has performed flood studies along the Clinch River, Bear Creek, and East Fork Poplar Creek (Y-12 TVA, 1991). Portions of Y-12 are subject to flooding, from both the 100-yr and 500-yr floods.

Water is taken from the Clinch River at a pump station at river mile 41.7 (Melton Hill Lake). This pump station provides the water supply for the DOE water treatment system that serves Y-12, ORNL, the Scarboro facility, and the city of Oak Ridge. Total withdrawals from the Clinch River by Y-12 operations are approximately 7 MGD (see table 3.2.7-2).

Effluents from the facilities include surface water runoff, cooling water discharges, and treatment plant effluents. The current Y-12 NPDES permit includes 240 discharges that require compliance monitoring. The Y-12 NPDES permit expired in May 1990; the application for renewal was submitted in November 1989 (Y-12 MMES, 1991b). It is expected that the draft permit will be available in early 1993 (Y-12 DOE, 1992b). The Federal Facilities Agreement between DOE and EPA addresses selection of corrective measures and schedules for implementation of activities to reduce the impacts from current and historical operations on the receiving streams at ORR (Y-12 DOE, 1990b). The current Y-12 wastewater generation rate is approximately 12.4 MGY (table 3.2.7-1).

Surface Water Quality. The streams and creeks on ORR are classified for usage purposes by the Tennessee Department of Conservation. Most of the streams on ORR are classified for fish and aquatic life, irrigation and livestock watering, and wildlife (TN DOC, 1991).

Water quality in ORR streams is affected by treated sanitary wastewater discharges, cooling water blowdown, stormwater, and surface runoff and groundwater transport of contaminants from land disposal of wastes (Y-12 MMES, 1991c). The surface water bodies monitored by the three installations include White Oak, Bear, East Fork Poplar, and Poplar Creeks, which are all tributaries of the Clinch River (Y-12 MMES, 1991b). Water samples are collected and analyzed for radiological and nonradiological parameters in accordance with the NPDES permit requirements. Routine surface water monitoring not required by the NPDES permit is also performed (Y-12 MMES, 1991b).

The 1990 monitoring results for the Clinch River (downstream of all ORR outfalls) are presented in table 4.1.4.3-1. As noted in the table, the maximum concentration of plutonium-239/240 exceeded 4

TABLE 4.1.4.3–1.—*Summary of Surface Water Quality Monitoring Near Y-12*

Receiving Water: Clinch River—1990				
Parameter	Unit of Measure	Water Quality Criteria	Existing Water Body Concentration[f]	
			Average	Maximum
Barium	mg/L	1[b]	0.033	0.33
Bicarbonate	mg/L	NA	99	99
Bis(2-Ethylhexyl)phthalate	mg/L	NA	<0.04	0.37
Boron	mg/L	NA	0.023	0.023
Calcium	mg/L	NA	29	29
Cesium-137	pCi/L	120[d]	0.827	8.01
Chemical Oxygen Demand	mg/L	NA	5.17	7
Chloride	mg/L	250[c]	3.7	3.7
Chromium	mg/L	0.05[a]	0.010	0.014
Copper	mg/L	1[c]	0.004	0.014
Cyanide	mg/L	0.2[b]	<0.091	0.1
Dissolved Solids	mg/L	500[c]	143.67	158
Fluoride	mg/L	4[b]	0.1	0.1
Magnesium	mg/L	NA	8.2	8.2
Iron[e]	mg/L	0.3[c]	0.66	0.66
Manganese[e]	mg/L	0.05[c]	0.035	0.066
Neptunium-237	pCi/L	1.2[d]	0.0153	0.36
Nickel	mg/L	0.1[b]	0.02	0.05
Nitrate	mg/L	10[b]	0.458	0.7
pH[e]	pH units	6.5-8.5[c]	NA	8.8
Plutonium-238	pCi/L	1.6[d]	0.16	0.45
Plutonium-239	pCi/L	1.2[d]	0.0843	0.57
Plutonium-239, 240[e]	pCi/L	1.2[d]	0.306	1.67
Potassium	mg/L	NA	1.7	1.7
Sodium	mg/L	NA	4.18	5.2
Sulfate	mg/L	250[c]	20.83	23
Suspended solids	mg/L	NA	8.33	18
Technetium-99	pCi/L	4,000[d]	11.2	399
Temperature	Degrees Celsius	NA	16.88	22.1
Titanium	mg/L	NA	0.011	0.011
Zinc	mg/L	5[c]	0.008	0.02

E4 4019

[a] Tennessee state water quality standards.
[b] Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
[c] Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Standards (40 CFR 143).
[d] U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
[e] Concentration exceeded water quality criteria; however, these criteria are listed for the comparison only. Water quality standards do not affect plant activities until they are translated into end-of pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards–they do not constitute enforceable limits.
[f] Samples were analyzed for 120 parameters including radionuclides, volatile and semivolatile organic compounds, metals, and standard water quality characteristics. Only those parameters having average maximum concentrations greater than the instrument detection level are presented. Less than symbol (<) indicates concentration below the analysis detection limit.
NA None applicable.

Source: Y-12 MMES, 1991b.

percent of the DOE Derived Concentration Guides. The DOE guide is expressed at 4 percent to correlate to EPA's drinking water standards, which are set at concentrations that yield no more than 4 mrem/yr dose equivalent; this is not an enforceable limit. The average and maximum iron concentrations, the maximum manganese concentration, and pH also exceeded water quality criteria. However, monitoring at Melton Hill Dam indicated that the maximum concentrations of iron, manganese, and pH also exceeded water quality criteria upstream of ORR.

In 1990, Y-12 was 98 percent in compliance with NPDES permit limits with 97 noncompliances. The three major areas of noncompliance were treatment facilities (29 percent), creek outfalls (27 percent), and administrative errors (22 percent). Y-12 was well within limits for all radiological parameters (Y-12 MMES, 1991b).

No nonradiological parameters were detected in exceedance of permit limitations at NPDES monitoring locations for Kerr Hollow Quarry. Exceedances for oil and grease were noted for the Bear Creek and McCoy Branch NPDES discharges. At McCoy Branch, pH also exceeded the permit limitations. In East Fork Poplar Creek, noncompliances were noted for oil and grease, pH, total suspended solids, cyanide, nickel, iron, and temperature (Y-12 MMES, 1991b).

Corrective actions relating to the NPDES program include identifying candidate facilities for the installation of wastewater treatment technologies and the removal of sources of nonpoint pollution. The water quality of the streams at ORR is expected to improve as remediation of nonpoint sources of contamination, such as inactive waste sites and waste storage areas, is completed. These projects include the rehabilitation of sanitary sewer lines to prevent infiltration of contaminated groundwater, the removal and/or treatment of effluents to storm drains to remove residual chlorine, and the remediation of sites that may be contributing to surface water contamination. Regulation and monitoring of discharges that are not currently regulated are also expected to occur under a new NPDES permit (Y-12 MMES, 1991b).

Groundwater. ORR is located in an area of sedimentary rocks of widely varying hydrological character. Shallow groundwater is in close hydraulic communication with surface waters, and solution features are common in the carbonate hydrostratigraphic units. With respect to the shallow aquifer system, groundwater basins in the region are restricted to small areas because of the topography and geologic structure characteristic of the Valley and Ridge Province.

Aquifers at ORR include surficial and bedrock aquifers. The surficial aquifer consists of man-made fill, alluvium, and residuum from weathered bedrock. Bedrock aquifers occur in carbonates and low-yield sandstones, siltstones, and shales.

Carbonate rocks are the most important aquifers in terms of water production and storage capacity. Water in the carbonate rock units is produced primarily from the zone of solution, which is in the upper 350 feet of the units. The noncarbonate sandstones and shales, although fractured, are not as productive hydrologically as the carbonate rocks and decrease greatly in their ability to transmit water at depths greater than 100 feet. The Copper Ridge Dolomite and the Maynardville Limestone form the major aquifer system in Bear Creek Valley.

Depth to groundwater varies because of steep gradients of beds and variations in topography. Depths to water at most places are from a few feet to about 200 feet.

Recharge occurs over most of the area but is most effective where overburdened soils are thin or permeable. In the area near Y-12, recharge into the carbonate rocks is mainly along Chestnut Ridge.

Groundwater Quality. Background groundwater quality at ORR is generally good in the surficial aquifer zones and poor (because of high total

dissolved solids) in the bedrock aquifer at depths over 1,000 ft. Water in the surficial aquifer is typically a nearly neutral to moderately alkaline calcium bicarbonate type (Y-12 Moore, 1988).

Groundwater in Bear Creek Valley near Y-12 contains contamination. Contamination at Y-12 includes hazardous chemicals and radionuclides (mostly uranium), used primarily in the weapons production process. The contaminated sites in need of environmental restoration include past-practice waste disposal sites, waste storage tanks, spill sites, and contaminated inactive facilities (Y-12 DOE, 1991b). The groundwater quality in the surficial aquifer at ORR is summarized in table 4.1.4.3-2. A map showing the extent of groundwater contamination at Y-12 is not available.

Groundwater Use. Because of the abundance of surface water and its proximity to the points of use, almost no groundwater is used at ORR. Only one supply well exists on the reservation; it provides a

TABLE 4.1.4.3–2.—*Summary of Groundwater Quality Monitoring at Y-12*

Parameter	Unit of Measure	Water Quality Criteria	1991 Existing Conditions[a]
Alkalinity - HCO_3	mg/L	NA	35-245
Aluminum	mg/L	0.05-0.2[d]	0.062-2.4
Barium	mg/L	1[c]	0.083-0.21
Boron	mg/L	NA	0.016-0.063
Calcium	mg/L	NA	4.5-71
Chloride	mg/L	250[b]	<1-6.2
Chromium	mg/L	0.05[b]	<0.01-0.034
Copper	mg/L	1[d]	<0.004-0.012
Fluoride	mg/L	2[c]	0.2
Gross Alpha	pCi/L	15[c]	1.35-12.60
Gross Beta	pCi/L	15[c]	1.59-27.40
Iron	mg/L	0.3[b]	0.26-4.6
Lead	mg/L	0.015[c]	<0.004-0.0096
Magnesium	mg/L	NA	6.4-20
Manganese	mg/L	0.05[c]	0.011-0.086
Nickel	mg/L	0.1[c]	<0.01
Nitrate-N	mg/L	10[c]	<0.2-2.74
pH	pH units	6.5-8.5[d]	7.13-7.9
Potassium	mg/L	NA	1.9-2
Sodium	mg/L	NA	4.4-18
Strontium	mg/L	NA	0.022-0.099
Sulfate	mg/L	250[c]	9.2-20
Total Dissolved Solids	mg/L	500[d]	94-350
Uranium	pCi/L	20[c]	<0.001-0.032
Vanadium	mg/L	NA	<0.005
Zinc	mg/L	5[d]	0.0077-0.027

E4 3363

[a] All data are from wells GW-655, 683, and 685 near the Y-12 site. Less than symbol (<) indicates concentration below analysis detection limit.
[b] Tennessee state water quality standards.
[c] Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
[d] Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).

NA: No specified limit

Source: Y-12 HSW, 1992.

supplemental supply during extended drought to an aquatics laboratory. There are no sole-source, Federally protected, or EPA Class I aquifers beneath ORR. All aquifers at ORR are considered Class II.

Groundwater Rights. The State of Tennessee does not issue permits or allotments or otherwise regulate groundwater use.

Environmental Consequences. The consolidation of nonnuclear activities would occur within existing buildings. A description of the functions to be transferred to Y-12 and the facility locations selected to house these activities is presented in section 3.3.4.

Surface Water. Relocating beryllium and pit support functions to Y-12 would utilize portions of the current plant that are above the 500-year floodplain (Y-12 DOE, 1992b). Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Because consolidation of activities at Y-12 would occur within existing buildings, no adverse impacts to surface water from runoff during the modification phase are expected (Y-12 DOE, 1991b).

Modification activities would require an additional 200 GPD of water (table 3.3.4-3), which is less than a 1-percent increase in the current water demand at Y-12 of 7 MGD. Operations for the beryllium and pit support functions would require an additional 1,000 GPD of water (table 3.3.4-5). This would result in an increase of less than 1-percent in the current demand.

The additional sanitary wastewater discharged by the transferred processes would be approximately 3,600 GPY (table 3.3.4-4). This increase would represent less than 1 percent over the current sanitary wastewater generation rate of approximately 12.4 MGY. The wastewater generated from the transferred operations would be conveyed to the Y-12 Central Pollution Control Facility or the Y-12 West End Treatment Facility for processing (Y-12 DOE, 1991b). The approximately 3,600 GPY of additional treated wastewater would be discharged to East Fork Poplar Creek. If the entire estimated annual discharge were released in a single day to East Fork Poplar Creek, there would be an increase of less than 1 ft^3/s of the average flow of 51.4 ft^3/s. If the total amount were released to Bear Creek in, one day, it would result in a similar negligible change in stream flow. No adverse impacts to the flow of receiving waters are expected.

Surface Water Quality. The site was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. Future NPDES permits would be written after review of the current water quality and how it is affected by discharges from Y-12, including the transferred technologies. In addition, discharges from the treatment plants are required to meet all permit limits; therefore, no impacts to water quality are expected.

Groundwater. No groundwater would be used at Y-12 given the plentiful surface water supplies; therefore, no impact on groundwater levels are expected.

Groundwater Quality. Because there would be no direct discharge of process waste to groundwater, and wastewater would be treated at either the Y-12 Central Pollution Control Facility or at the Y-12 West End Treatment Facility before being released to surface waters, no impacts on groundwater quality are expected.

4.1.4.4 *Geology and Soils*

Affected Environment. ORR lies in the Valley and Ridge Province of east-central Tennessee. The topography consists of alternating valleys and ridges that have a northeast-southwest trend, with most of the reservation facilities occupying the valleys. The area is drained by the Clinch River, which bounds the reservation on the northeast, southeast, and southwest. Y-12 lies in Bear Creek Valley.

All faults in the vicinity of ORR have been inactive since the late Paleozoic period. There is no evidence of capable faults in the ORR area.

The Oak Ridge area lies at the boundary between Seismic Zones 1 and 2A (ICBO, 1991). Since the New Madrid earthquakes of 1811 to 1812, 26 other earthquakes (MMI III to VI) have been felt in the Oak Ridge area. The Charleston earthquake of 1886 had an MMI of VI at Oak Ridge. An earthquake centered in Giles County, Virginia, in 1886 produced an MMI of IV to V at Oak Ridge. The closest seismic event occurred in 1930, 5 miles east, and had an MMI of V at the site (Y-12 Staub, 1991).

Y-12 lies on soils of the Armuchee-Montevallo-Hamblen, Fullerton-Claiborne-Bodine, and Lewhew-Armuchee-Muskinghum associations. Soil erosion due to past land use has ranged from slight to severe. Wind erosion is slight and shrink-swell potential is low to moderate. Finer-textured soils of the Armuchee-Montevallo-Hamblen association, when drained, have been designated prime farmland (Y-12 USDA, 1942; 1981).

Environmental Consequences. All new functions would be accommodated in existing structures; therefore, no impact on geologic features is expected.

Major seismic activity and associated mass movement and subsidence are unlikely to occur during the renovation or operation phases, because although ground shaking has occurred at ORR due to earthquakes in other parts of the country, faults in the area have not been active since the late Paleozoic. Renovation and remodeling of plant facilities to accommodate the functions to be transferred would be performed according to the appropriate seismic design requirements; therefore, the earthquake activity hazard would not increase.

Because there would be no outdoor construction, relocation of functions to Y-12 would have no impact on the soils of the site.

4.1.4.5 *Biotic Resources*

Affected Environment. No natural terrestrial habitat occurs within the intensively developed Y-12 area, but the undeveloped ORR lands surrounding the area provide habitat for terrestrial wildlife typical of eastern Tennessee (Y-12 ORNL, 1991b). ORR, including undeveloped areas surrounding Y-12, has been designated as a Wildlife Management Area and public deer hunts are conducted. Several areas within ORR have also been designated as a NERP (section 4.1.4.1) and support a variety of short-term and long-term ecological research activities.

NWI maps identify several wetlands in the undeveloped lands surrounding Y-12. Artificial ponds near the east and west borders of Y-12 are open-water wetlands. The Bear Creek channel southwest of Y-12 is an intermittent streambed wetland bordered by a wide swath of forested wetlands (Y-12 FWS, 1981). A more detailed wetlands inventory performed for ORR confirms the existence of these wetlands and also shows several small or narrow areas of wetlands within and surrounding the Y-12 area (Y-12 ORNL, 1991a).

Lands within and surrounding Y-12 drain to the Clinch River, which forms the eastern and southern boundary of ORR. Bear Creek, a tributary to the Clinch River, originates immediately southwest of Y-12 as an intermittent stream (Y-12 FWS, 1981). East Fork Poplar Creek originates immediately northeast of Y-12. After leaving the Y-12 area, it flows first northwest and then southwest before entering Poplar Creek. Because of headwater contamination, aquatic diversity is reduced in the upper reaches of Bear Creek (Y-12 Loan, 1985). Minnows, suckers, and bluegills are the predominant types of fish found in both Bear Creek and East Fork Poplar Creek; however, overall, the diversity and number of species present is greater in the latter stream (Y-12 Ryan, 1988).

Several Federally- and state-listed threatened and endangered species may occur in natural habitats

on ORR (Y-12 Kroodsma, 1987). The peregrine falcon (*Falco peregrinus*), a Federally- and state-listed endangered species, may occur as a rare migrant or winter visitor. Two Federally- and state-listed endangered bat species, the Indiana bat (*Myotis sodalis*) and the gray bat (*Myotis grisescens*), are potential residents at ORR. Although no bald eagles (*Haliaeetus leucocephalus*), a Federally- and state-listed endangered species, are known to nest on ORR despite the presence of large lakes that provide suitable habitat, they have been seen on the site on rare occasions.

Aquatic habitats on ORR and in the adjoining reach of the Clinch River are unsuitable for several Federal and state-listed endangered or threatened mollusk and fish species known to occur in Anderson and Roane Counties (Y-12 Kroodsma, 1987).

Environmental Consequences. Temporary land disturbance could result from renovation of the Y-12 facilities. This disturbance would be limited to laydown areas on lawns and paved areas within Y-12 that, due to the high degree of land development, are of no significant value as habitat for terrestrial wildlife. No natural vegetation or terrestrial wildlife habitats surrounding Y-12 would be lost or modified. The relocated beryllium functions would be consistent with the existing industrial mission of Y-12 and would not result in an increased human presence in natural habitats in the surrounding areas of ORR.

Renovation activities would be limited to previously developed areas, and therefore would not affect wetlands.

No aquatic habitat within or in the vicinity of Y-12 would be affected by the relocated beryllium functions. Minor increases in water withdrawal from the Clinch River and water discharged to its tributaries resulting from the consolidation facilities (section 4.1.4.3) would not significantly affect aquatic habitats associated with these water bodies. Any additional wastewater would be discharged in compliance with NPDES permit limits.

No terrestrial or aquatic areas potentially providing habitat to Federally-listed or Tennessee-listed threatened or endangered species would be affected by the Proposed Action. DOE has initiated discussions with the FWS and Tennessee Department of Environment and Conservation to determine whether the relocated beryllium functions would pose any impacts to threatened or endangered species at ORR or surrounding areas.

4.1.4.6 *Cultural Resources*

Affected Environment. The prehistoric chronology of the Oak Ridge area has been divided into five time periods: Paleoindian (10,000-8000 B.C.), Archaic (8000-900 B.C.), Woodland (900 B.C.-A.D. 900), Mississippian (A.D. 900-1450), and Protohistoric (A.D. 1450-1673) (Y-12 Chapman, 1985). More than 20 cultural resources surveys have been conducted on ORR (Y-12 ORNL, 1984). About 90 percent of the reservation has received at least reconnaissance-level studies; less than 5 percent has been intensively surveyed. Most studies have occurred along the Clinch River and adjacent tributaries. Prehistoric sites recorded include villages, burial mounds, camps, quarries, chipping stations, limited activity locations, and shell scatters (Y-12 Chapman, 1985). Over 65 prehistoric sites have been recorded at ORR (Y-12 Fielder, 1974; Y-12 Schroedl, 1990). About 10 prehistoric sites may be considered potentially eligible for the NRHP; most sites have not yet been evaluated.

The history of the region has been previously documented (Y-12 Robinson, 1950; Y-12 Creekmore, 1967; Y-12 Hall, 1989). In 1942, 866 tracts of land and the communities of Scarboro and Wheat were acquired for the Manhattan Project (Y-12 Fielder, 1977). Construction of the Clinton Engineer Works began in 1943. The Y-12 Electromagnetic Plant; the X-10 area, containing the experimental air-cooled plutonium pile and separation facilities; and the K-25 gaseous diffusion plant were completed by 1945 (Y-12 DOE, 1990a). The town of Oak Ridge was a planned community, designed in three

phases. By 1945, the town had a population of 75,000, which greatly exceeded the original planned community estimate of 13,000 (Y-12 Johnson, 1981; Y-12 Robinson, 1950). Several historic resources surveys have been conducted at ORR (Y-12 ORNL, 1984; Y-12 Fielder, 1977). Historic resources include archaeological remains and standing structures. Documented structures include cabins, barns, churches, gravehouses, springhouses, storage sheds, smokehouses, log cribs, privies, henhouses, and garages. Archaeological remains consist primarily of foundations, roads, and trash scatters. Sixty-five pre-1942 cemeteries also occur at ORR (Y-12 Robinson, 1950). Over 240 historic resources have been recorded at ORR and about 20 of those sites may be considered potentially NRHP-eligible (Y-12 Fielder, 1977; Y-12 Schroedl, 1990). The X-10 Graphite Reactor, Freels' cabin, and two church structures are considered eligible for, or listed on, the NRHP. Several buildings and facilities at ORR are associated with the Manhattan Project and may be potentially eligible for the NRHP.

The Overhill Cherokee occupied portions of the Tennessee, Hiwassee, Clinch, and Little Tennessee River valleys by the 1700's. Conflicts with the British, and later the Americans, resulted in the loss of Cherokee villages and eventual treaties and land concessions. By 1838, most of the remaining Cherokee were forcibly moved to the Oklahoma territory (Y-12 Chapman, 1985). By 1866, Colonel William Thomas established the Qualla Cherokee Reservation in North Carolina (Y-12 Creekmore, 1967). Resources which may be important to Native American groups include prehistoric and historic villages, ceremonial lodges, cemeteries, burials, and traditional plant gathering areas.

Environmental Consequences. All beryllium technology and pit support functions relocated to Y-12 would be accommodated within three existing structures with no new construction. Therefore, no NRHP-eligible prehistoric or historic resources, or important Native American resources would be affected by renovation or operation activities.

4.1.4.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at Y-12 is based on an ROI where 94 percent of Y-12 employees lived in 1991. The ROI includes Anderson (33 percent), Blount (2 percent), Knox (36 percent), Loudon (6 percent), and Roane (17 percent) counties in Tennessee. Within these counties, the following key cities have been included in the analysis: Clinton (7 percent), Knoxville (32 percent), and Oak Ridge (21 percent) (see figure 3.2.5.3-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.4-1 through E3.4-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 42 percent, increasing from 195,220 in 1970 to 277,630 in 1990. Total employment increased from 196,657 to 326,059 between 1970 and 1990, an annual growth rate of 3 percent. The unemployment rates for 1970 and 1990 were 3.3 percent and 4.6 percent, respectively. For the same years, personal income increased from approximately $1.5 billion to $9 billion (an annual average of 9 percent), and per capita income increased from $3,228 to $15,892.

Although employment levels at ORR have since 1970 and are projected to increase further, employment at the Y-12 Plant has decreased. Between 1970 and 1990, employment at the Y-12 Plant decreased from 6,776 to 6,599 (Y-12 DOE, 1991c). As of September 30, 1992, employment levels at Y-12 have decreased to 5,384. The proposed Fiscal Year 1994 budget projects a

reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to approximately 4,200 by the year 2000 (DOE, 1993c). In 1992, the total Y-12 payroll was estimated to be more than $184 million (Y-12 DOE, 1991c). Under the No Action baseline, the total payroll is projected to decrease to $145 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 319,000 by 2000 and 330,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 7.0 percent and 7.1 percent, respectively. For the same years, personal income is projected to increase from approximately $12.9 billion to $16.5 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $21,000 in 2000 to $24,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 23 percent to 568,450. During the same period, the Tennessee population increased 24 percent. The population in the five-county ROI is projected to increase from an estimated 626,000 in 2000 to 694,000 by 2020, at an annual rate of less than 1 percent.

The largest county population increase (35 percent) occurred in Blount County between 1970 and 1990, while during the same years, populations in Anderson and Knox counties increased 13 percent and 22 percent, respectively. Population in Blount County is estimated to increase 9 percent between 1990 and 2000 and 11 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Anderson County population is projected to increase 15 percent between 1990 and 2000 and 11 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The population in Knox County is expected to increase approximately 9 percent by 2000 and an additional 11 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, the city of Clinton had the greatest increase in population (87 percent) in the ROI. For the same years, the Oak Ridge and Knoxville populations decreased 15 percent and 5 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 49 percent from 156,925 to 233,181. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 10 percent by the year 2000 and an additional 11 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (54 percent) occurred in Knox County, while the smallest increase (23 percent) occurred in Blount County. The number of housing units in Knox County is expected to increase approximately 5 percent by 2000 and an additional 11 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Blount County is expected to increase about 4 percent by 2000 and an additional 11 percent by 2020, an annual increase of 2 percent.

In 1990, the homeowner vacancy rates averaged 2 percent in the ROI and ranged from approximately 1 percent in Anderson County to 2 percent in Blount County. The vacancy rates for rental units averaged 8 percent and ranged from about 7 percent in Loudon County to 10 percent in Roane County.

Community Infrastructure and Services. The water supply systems operated by ORR, Clinton, Alcoa, Maryville, Knoxville, the First Utility District of Knox County, the West Knox Utility District, the Hallsdale-Powell Utility District, the Loudon Utilities Board, the Tellico Area Service System, the Lenoir City Utilities Board, Rockwood, Harriman, and Kingston maintain about 96 percent of the capacity of the 17 major public systems in the

ROI. All of these systems utilize surface water for their raw water supplies.

In Anderson County, ORR's system (32.1 MGD capacity) had 1991 average daily demands of 57 percent of capacity. Clinton's system (about 2.3 MGD capacity), also in Anderson County, had 1988 average daily demands of 65 percent of capacity. In Blount County, the systems operated by Alcoa (24 MGD capacity) and Maryville (6 MGD capacity) had 1991 average daily demands of 31 percent and 50 percent of capacity, respectively. In Knox County, the systems operated by Knoxville (63.6 MGD capacity), the First Utility District of Knox County (14 MGD capacity), the West Knox Utility District (8.5 MGD capacity), and the Hallsdale-Powell Utility District (about 6.3 MGD capacity) had 1991 average daily demands of 52 percent, 42 percent, 47 percent, and 64 percent of capacity, respectively. Loudon Utilities Board's (8.7 MGD capacity) and the Tellico Area Service system's (3.5 MGD capacity), both in Loudon County, had 1991 average daily demands of 56 percent and 37 percent of capacity, respectively. The Lenoir City Utilities Board's system (3 MGD capacity), also in Loudon County, had 1988 average daily demands of 32 percent of capacity. In Roane County, the systems operated by Rockwood (6 MGD capacity) and Kingston (2 MGD capacity) had 1991 average daily demands of 28 percent and 20 percent of capacity, respectively. Harriman's system (3 MGD capacity), also in Roane County, had 1988 average daily demands equal to 55 percent of capacity. All of these systems are projected to have average daily demands of less than 68 percent of capacity in 1995 and less than 70 percent of capacity in 2000.

Oak Ridge, Clinton, Maryville, Knoxville, the Hallsdale-Powell Utility District, the First Utility District of Knox County, the West Knox Utility District, the Loudon Utilities Board, the Lenoir City Utilities Board, Rockwood, Harriman, and Kingston operate wastewater treatment systems in the ROI. In Anderson County, the systems operated by Oak Ridge (about 5.9 MGD capacity) and Clinton (about 2.1 MGD capacity) had 1991 average daily demands of 85 percent and 34 percent of capacity, respectively. In Blount County, the Maryville system (10 MGD capacity) had 1991 average daily demands of 62 percent of capacity. In Knox County, the systems operated by Knoxville (about 62.9 MGD capacity), the First Utility District of Knox County (5 MGD capacity), the West Knox Utility District (4 MGD capacity), and the Hallsdale-Powell Utility District (about 5.6 MGD capacity) had 1991 average daily demands of 70 percent, 94 percent, 62 percent, and 70 percent of capacity, respectively. The Loudon Utilities Board's (7.6 MGD capacity) and Lenoir City Utilities Board's system's (2 MGD capacity) in Loudon County had 1991 average daily demands of 67 percent and 56 percent of capacity, respectively. In Roane County, the systems operated by Rockwood (1.5 MGD capacity) in 1991 and Harriman (1.5 MGD capacity) in 1988 had average daily demands of 100 percent of capacity. Kingston's system (1 MGD capacity), also in Roane County, had 1991 average daily demands of 8 percent of capacity.

The Oak Ridge system is projected to have average daily demands of 88 percent of capacity in 1995 and 91 percent of capacity in 2000. The First Utility District of Knox County plans to expand its system capacity to 10 MGD and is projected to have average daily demands of less than 55 percent of capacity in 1995 and in 2000. The Harriman and Rockwood systems are currently operating at capacity and both are projected to have average daily demands of 103 percent and 107 percent of capacity in 1995 and 2000, respectively. All other systems are projected to have average daily demands of less than 74 percent of capacity in 1995 and less than 80 percent of capacity in 2000.

Eleven school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 1,122 students in the Clinton City Elementary School District to 54,943 students in the Knox County School District. In 1990, 7 out of the 11 school districts operated between 105 percent and 127

percent of capacity. Among these seven districts were Roane County (127 percent), Anderson County (116 percent), and Knox County (109 percent). The remaining from districts operated between 91 percent and 99 percent of capacity. On average, school districts in all counties were operating above capacity, and the ROI average was 110 percent of capacity. Current capacities are expected to be further exceeded by the years 1995 and 2000 with the No Action future baseline. The largest increases are expected to occur in the school districts located in Roane County, where enrollments are projected to exceed current capacities by 37 percent in 1995 and 47 percent in 2000. Knox County is currently expounding school facilities. Other planned expansions in the near future are not known. The average pupil-to-teacher ratio for the ROI was 19:1, and expenditures averaged $3,031 per pupil. The statewide average pupil-to-teacher ratio was 19:1, and expenditures averaged $3,518 per pupil (TN DEd, 1990).

Fifteen hospitals serve the five-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 1,332 physicians served the ROI. The physician-to-population ratio for the ROI was 2.3:1,000, and ranged from 0.6:1,000 in Roane County to 2.9:1,000 in Knox County. The statewide physician-to-population ratio was 2.1:1,000 (AMA, 1990).

Twelve city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agencies in the five-county ROI were in the city of Knoxville, with 296 sworn officers or 1.8 sworn officers per 1,000 persons; and in Knox County, with 165 sworn officers or 0.5 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.3 per 1,000 persons (FBI, 1991).

Thirty fire departments and 1,342 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in the city of Knoxville (363 firefighters; 2.2 firefighters per 1,000 persons) and in Knox County Rural Metro (292 firefighters; 0.9 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.4 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to the Y-12 Plant is via Bear Creek Valley Road. Tennessee State Routes 58, 62, 95, and 162 pass through ORR and are open to the public.

Estimated traffic along segments providing access to Y-12 is projected to contribute to differing service level conditions in accordance with population growth. Tennessee State Route 95, however, and to a lesser extent Tennessee State Routes 61, 170, and Bear Creek Valley Road, would typically experience traffic congestion, with volumes approaching the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in minor congestion. In addition, estimated truck traffic into Y-12 for delivery of supplies and removal of wastes would typically average 40 trips per day. However, the additional traffic volumes associated with continued operation of Y-12 are relatively minor and would not substantially affect local transportation conditions.

Road reconstruction, widening, modification of interchanges, and new interchange construction projects are planned for segments of Bear Creek Valley Road, Scarboro Road, and Tennessee State Routes 58, 62, and 95 (TN DOT, 1992a and b; Y-12 DOE, 1989).

No public transportation service exists in the city of Oak Ridge. Other modes of transportation within the ROI include railways and waterways. Railroad service in the ROI is provided by CSX Transportation and the Norfolk Southern Corporation. Two branch lines serve ORR. Waterborne transport in the ROI is via the Clinch

River, which provides an alternative mode of transportation to the Oak Ridge area. The Clinch River waterway has rarely been used for DOE business and no designated port facilities exist for such purpose.

The McGhee Tyson Airport in Knoxville, 40 miles from ORR, receives jet air passenger and cargo services from both national and international carriers. The closest air transportation facility to Oak Ridge is Atomic Airport in Oliver Springs. Numerous other private airports are located throughout the ROI (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. The construction, modification, and installation of facilities and equipment for the Proposed Action at the Y-12 Plant would require 80 additional employees during peak construction (Y-12 DOE; 1992a). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 10 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993c). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 167 jobs would be created indirectly during peak construction and 13 additional jobs during operations. This direct and indirect employment would lead to the in-migration of 58 persons during peak construction and 13 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force.

Under the No Action alternative, the current Y-12 employment level of 5,384 is projected to decline to 4,200 by the year 2000, a decrease of 1,184. The addition of 10 full time equivalent jobs to Y-12 would be realized as a result of the Proposed Action. The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.4.7-1. In the year 2000, this project-related population growth from in-migration would represent a less than 1-percent increase over the projected ROI baseline population of 626,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1-percent change in population during peak construction would create the need for only an estimated 22 additional housing units. For operations in the year 2000, the less than 1-percent change in population would not create a need for additional housing units beyond a 1-percent increase. In past years, housing units have been built at an annual rate of 2 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

Under the No Action future baseline, two small wastewater systems (Harriman and Rockwood) would exceed their current capacities by 1995. However, the estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. School districts in all counties are currently operating above capacity. However, these school capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the Proposed Action would not add more than 1 percent to school enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over

TABLE 4.1.4.7–1.—*Y-12 Plant Proposed Action Economic and Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	297,792	NA	319,419	NA
Baseline Unemployment Rate	5.8%	NA	7.0%	NA
Baseline Personal Income (Thousands $)	$10,779,496	NA	$12,862,302	NA
Baseline Per Capita Income ($/Person)	$18,070	NA	$20,547	NA
Baseline Employment	280,496	NA	297,032	NA
Direct Jobs	80	0.03	10	0.00
Indirect Jobs	167	0.06	13	0.00
In-Migrating Workforce	26	0.01	5	0.00
Total In-Migration	58	0.01	13	0.00
Population Increase				
Anderson County	21	0.03	5	0.01
Clinton	5	0.05	1	0.01
Oak Ridge	13	0.05	3	0.01
Blount County	2	0.00	0	0.00
Knox County	22	0.01	5	0.00
Knoxville	20	0.01	4	0.00
Loudon County	3	0.01	1	0.00
Roane County	10	0.02	2	0.00
ROI (County Total)	58	0.01	13	0.00

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; TN DES 1991; DOE, 1993c.

the No Action baseline. Additional commercial truck traffic into Y-12 would be negligible relative to historic levels, and this truck traffic would occur during nonpeak hours. Impacts to the local transportation network serving Y-12 would be negligible.

4.1.4.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the Y-12 waste management baseline is provided in section 3.2.7.3. Because no TRU wastes are associated with any of the proposed consolidation activities, no further discussion of TRU waste generation or management is presented.

Waste management activities at Y-12 include the operation of seven processing facilities: packaging, certification, and staging; industrial waste compaction; classified waste treatment; oil/solvent treatment; sludge and soil processing; Class III LLW treatment; and, decontamination. Y-12 has submitted RCRA permit applications to environmental regulators for each hazardous waste treatment, storage, or disposal facility. As of 1990, 20 Part B permit applications and six postclosure applications have been filed for Y-12 facilities. After the issuance of final RCRA permits by the State of Tennessee, Y-12 facilities would be fully permitted under RCRA and subject to stringent guidelines specified in 40 CFR Part 264. The facilities are inspected regularly by EPA, the State of Tennessee, DOE, and/or internal auditors to ensure RCRA compliance. Y-12 is currently operating under RCRA interim status.

At Y-12, waste minimization has been implemented using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Y-12 has initiated a Chlorinated Solvents Reduction Program to evaluate opportunities to reduce or eliminate the use of

chlorinated solvents in plant operations. The program focuses on less hazardous chemicals as substitutes for methylene chloride, tetrachloroethylene, methyl chloroform, and trichlorofluoroethane, which are the most widely used chlorinated solvents in the plant. Y-12 reduced its purchases and use of these chemicals by 97 percent, from 89,000 gallons in 1985 to 3,090 gallons in 1991. Several projects contributed to this reduction including the substitution of a nonhazardous, water-based coolant for tetrachloroethylene and the use of ultrasonic cleaners to replace methyl chloroform in degreasing operations. In late 1990, the use of a nonchlorinated solvent (Solvent 140) was initiated for cleaning and degreasing operations. The use of this solvent has decreased the use of chlorinated solvents by several thousands of gallons.

Additionally, Y-12 has developed a process which could potentially reduce the volume of RCRA hazardous sludge at the West End Treatment Facility by approximately 95 percent. This process neutralizes and removes precipitates as the first step in the West End Treatment Facility process to remove hazardous constituents from the process stream. Solids generated in subsequent steps and operations in the treatment process would be nonhazardous solid waste.

Environmental Consequences. The beryllium technology and pit support functions would generate various types of waste due to construction related building modifications and equipment installation. No mixed waste would be generated as a result of relocated nonnuclear functions. Approximately 807 ft^3 of LLW metallic, LLW nonmetallic, classified, and nonhazardous nonmetallic wastes would be generated as a result of the modification and installation of facilities and equipment for the Proposed Action at Y-12.

All radiologically contaminated non-RCRA metallic waste would be transferred to the Y-12 salvage yard. Where possible, the metallic waste would be placed into boxes for storage at the salvage yard.

Site preparation and demolition work would generate approximately 575 ft^3 of classified wastes, which may include LLW and hazardous materials, both metallic and nonmetallic. These wastes would be bagged if hazardous and placed in six 4 ft x 6 ft x 4 ft metal boxes for classified storage.

Floor and wall penetrations, roof demolition, and construction scraps in radioactive areas would generate approximately 192 ft^3 of nonmetallic LLW. The nonmetallic, non-RCRA, non-TSCA LLW would be sent to a local commercial compaction/ incineration facility for processing to greatly reduce the volume of material to be stored. After processing, the nonmetallic LLW would be placed in 4 ft x 6 ft x 4 ft metal boxes. The boxes would be maintained outdoors in the old salvage yard and would eventually be transferred to the above-grade storage pads.

The building modifications would result in various beryllium-contaminated metallic wastes (duct work, conduit, etc.) and construction debris, which would be stored in 4 ft x 6 ft x 4 ft metal boxes in a special facility at Y-12 site. Some of the piping removed as a result of the modifications may be contaminated with asbestos. The pipes would be treated the same as beryllium-contaminated wastes. The various pieces of equipment currently located in the area designated to become the beryllium technology facility are contaminated. This equipment would be cleaned externally, and where necessary, some equipment would be disassembled and placed in metal boxes for permanent storage in a special facility.

It is anticipated that in the near future, metallic LLW wastes can also be sent offsite for volume reduction through compaction or smelting operations which would greatly reduce storage space required. Noncompactible metallic wastes may also be decontaminated through chemical leaching processes or surface cleaning methods. Some small amount of LLW with a very low radioactivity content may meet the waste acceptance criteria for

onsite disposal. The majority of the waste would require eventual disposal in an offsite LLW landfill. Waste containing dusts or other friable material would be stabilized in grout before storage.

Construction and new equipment installation debris from non-radioactive areas would generate 40 ft^3 of noncontaminated nonmetallics such as concrete and wood. These wastes would be disposed of onsite in the Y-12 Sanitary Landfill #2.

As outlined in appendix B, section B.4, the transfer of the beryllium technology and pit support work from RFP to Y-12 would generate some liquid and solid wastes. Approximately 4,210 gallons of the additional beryllium-contaminated liquid hazardous waste are aqueous wastes that can be treated onsite. Aqueous wastes would be generated by machining operations, ultrasonic cleaning, and powder-handling operations. This aqueous waste would be shipped to the Y-12 Central Pollution Control Facility for beryllium removal. The batch operation nature of the Central Pollution Control Facility and the anticipated volume of beryllium operations generated process water are such that the Central Pollution Control Facility would have adequate capacity to treat the additional waste stream without any resulting environmental impacts.

Can dissolution operations would generate less than 500 GPY of beryllium-contaminated nitric acid solutions. These aqueous wastes would be sent to the Y-12 West End Treatment Facility. The West End Treatment Facility has 3 million gallons of tank treatment capacity and 1.5 million gallons of sludge storage tank capacity, which is adequate to treat the additional waste stream without any resulting environmental impacts.

Quantities of excess beryllium recyclable scrap would be consolidated into ingot form and stored onsite in the short-term or sold to commercial buyers. No adverse environmental impacts are expected.

Beryllium-contaminated solid wastes cannot currently be placed in the Y-12 landfill because it is only permitted for beryllium oxide. Therefore, the wastes must either be treated and converted to beryllium oxide prior to burial or the landfill permit must be modified by the State of Tennessee to include the addition of beryllium. If Y-12 is not successful in amending its permits, this waste would be processed at a local commercial facility, via compaction or incineration, to significantly reduce the volume of wastes to be stored.

Beryllium machining operations would generate less than 100 gallons annually of liquid organic waste. Machining and other operations would generate some amounts of beryllium-contaminated combustibles and other solid wastes such as filters. While some of the beryllium-contaminated solids could be sent offsite to a local commercial incinerating/compacting facility for volume reduction, small quantities of beryllium-contaminated organic liquid and solid wastes would be stored long-term onsite. This would require continuous management of the waste. An alternative would be to process the liquid organics in the K-25 Plant TSCA incinerator and ship solids offsite to a "secure" (RCRA-type) hazardous landfill permitted to handle such waste. The ability to ship either waste form offsite is predicated on being able to declare a "no-radiation added" status for the waste streams. A rigorous readiness review of the waste-generating facilities, processes, and equipment, and their origins, is required to obtain the desired status. While dedicated, uranium-free areas would be set up to handle the operations generating the waste streams identified, and certain processing equipment would be moved from RFP and/or other areas of Y-12. Whether these economically desirable equipment moves would impact the ability to declare a "no-radiation added" status is unknown at this time. However, if "no-radiation added" status cannot be declared, then the wastes would be processed as low-level radioactive contaminated wastes.

Pit support function components would be manufactured in radiological areas and on uranium-contaminated equipment; thus, the liquid (water based machining coolants) and solid (scrap metals)

wastes would be processed as LLW. The relocated pit support function would increase the quantity of LLW generated at Y-12, but the amount is expected to be small (less than 1 percent).

While clean scrap metal was sold to the public in 1990, Y-12 is now restricted from sending any scrap metals offsite. Scrap metal sorting continues, however, in anticipation of future provisions for clean scrap metal consolidation/recycling/resale.

Each of the functions transferring to Y-12 from RFP have been subject to RFP programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, Y-12 would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

In summary, the magnitude of additional waste streams generated as a result of the increases in nonnuclear manufacturing activities at Y-12 are well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.4.9 *Human Health: Facility Operations and Accidents*

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.1. Information specific to Y-12 is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (4.1.4.2 and 4.1.4.3, respectively), the chemical pollutant levels from Y-12 operation to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Radiological pollutant levels to which the public is exposed are well below applicable permit, regulatory, and DOE operational requirements (Y-12 MMES, 1991b).

A review of the recent Y-12 annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Environmental Consequences. The Air and Water Resources sections discuss the chemical releases associated with relocating the beryllium technology and pit support functions identified in section 3.3.4 to Y-12. As shown, the cumulative impacts resulting from existing releases and the releases of chemicals associated with relocating the beryllium technology and pit support function at Y-12 are below applicable permit, regulatory, and DOE operational requirements.

Water from processes that generate hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge. Furthermore, discharges of wastewater through NPDES-permitted outfalls which can be attributed to the activities to be relocated at Y-12 are expected to be below NPDES limits. Water quality would not be adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at Y-12, all possible HAPs were examined and only chlorine and trichlorotrifluoroethane were identified for further analysis based on their toxicity, concentration, and frequency of use. The Hazard Index, a summation

of the Hazard Quotient for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects are expected (non-cancer) to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction,(see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for Y-12 (see table F-17) were 0.0186 onsite (worker effects) and 0.0005 at the site boundary (effect on the public) on an annual basis. The incremental change Hazard Indexes due to the Proposed Action were both 0 for onsite and at the site boundary. Therefore, the Proposed Action would not contribute to the cumulative Hazard Indexes at the Y-12 site.

Consolidation of the nonnuclear activities at Y-12 would not increase radionuclide emissions.

In summary, these analyses show that no adverse health effects are expected from the release of hazardous chemicals/chemical pollutants at Y-12 as a result of the Proposed Action.

Beryllium compounds are currently stored at Y-12. The transfer of the beryllium technology function to Y-12 would result in a maximum increase of less than 2 percent in the total beryllium inventory. Additionally, there have been significant improvements in the safety procedures for handling beryllium, and the crystal structure of beryllium now used in industry results in a much lower toxicity (Rossman, 1991) than the form of beryllium used between 1940 and 1950. Employee exposure limits will be maintained below applicable standards and acceptable concentrations established by OSHA.

As discussed in section 3.3.4, the beryllium technology and pit support functions involve activities and chemicals that are the same as or similar to those that are currently being performed in Y-12 facilities designed for these activities. Therefore, the current accident profile at Y-12 would not change as a result of relocating these functions to Y-12.

4.1.5 Sandia National Laboratories, New Mexico

A detailed discussion of SNL's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.8. The functions and processes associated with the Proposed Action to be consolidated at SNL and the proposed facility modifications required to support each relocated function are discussed in section 3.3.5. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at SNL and the environmental assessment methodologies for each resource or issue discussed below is presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on SNL, is also provided in the chapter 4 introduction and in section 4.1.

4.1.5.1 *Land Resources*

Affected Environment. SNL is located approximately 7 miles southeast of downtown Albuquerque, NM (figure 3.2.8-1). Generalized land uses at SNL and in the vicinity are shown in figure 4.1.5.1-1. There are no prime farmlands on SNL. The residential distribution of SNL employees is discussed in section 4.1.5.7.

SNL has developed 13 functional operations zones. The affected environment consists of 2 TAs, at the western end of SNL, designated TA-I and TA-III (figure 3.2.8-2). These TAs are within the following functional zones: Administration, Component Development, Defense Programs, Energy Programs, Exploratory Systems, Micro-Electronics, Parking, Pedestrian Corridors, Pulsed Power Sciences,

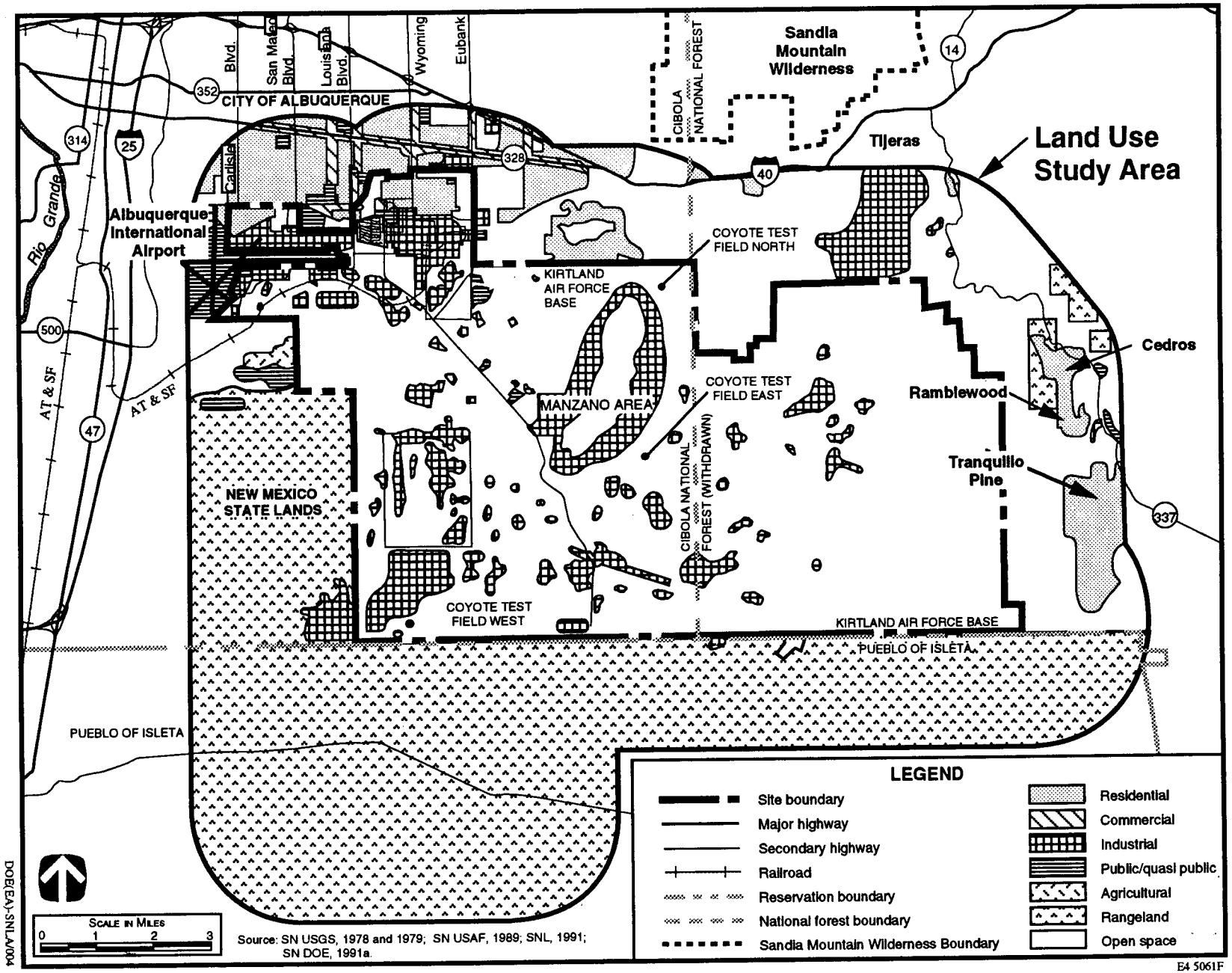

FIGURE 4.1.5.1–1.—*Generalized Land Use at Sandia National Laboratories, New Mexico, and Vicinity.*

Research, Site Support, Technical Support, and Testing (SNL, 1989).

TA-I is the most intensively developed of the SNL TAs, containing administrative and support facilities; project engineering, research, and component activities; and special laboratories and shops (SN DOE, 1991d).

The Kirtland Air Force Base (KAFB) cantonment, the most heavily developed area on the base, is adjacent to TA-I. U.S. Air Force (USAF) accompanied base housing is located west and north of TA-I. Various KAFB facilities and operations, including flight operations, are located west of TA-I. USAF flight operations are collocated with the civilian commercial aircraft operations of Albuquerque International Airport. The runway and taxi ways are owned and managed by the city of Albuquerque (SN USAF, 1990). The airport Accident Potential Zone (APZ)-1 extends east beyond the runway clear zone to the edge of the TA-I boundary, with APZ-2 extending across TA-I (SN DOE, 1991d). Flight operations of the airport are regulated by the Federal Aviation Administration, which does not use APZs (SN Greiner, 1989).

The USAF granted an exemption for the development of an all-new Air Installation Compatible Use Zone study at KAFB. The base, however, is directed to monitor all development in its vicinity to ensure compatibility with base flying missions (SN USAF, 1978; 1987a and b). The USAF Air Installation Compatible Use Zone Land Use Guidelines reflect land use recommendations. The Land Use Guidelines for APZ-1 and APZ-2 do not recommend uses that are highly labor intensive; involve explosive, fire, toxic, corrosive, or other hazardous characteristics; or that occupy high-density offices (SN USAF, 1985).

DOE has analyzed the probability of an aircraft crashing into the Explosives Components Facility, which is under construction within APZ-2. DOE has concluded, in an EA prepared for the project, that a 10^{-2} to 10^{-4} probability exists, and issued a FONSI (SN DOE, 1992a). Planning for other DOE facilities has utilized the same methodology and findings.

The land north of SNL, except for vacant land on both sides of Tijeras Canyon east of TA-I and some unmanned utility facilities, is part of the urbanized city of Albuquerque. The urban land use consists of a mixture of residential, commercial, industrial, institutional, and various supporting public uses. The closest residence to the KAFB boundary is 20 feet to the north. An industrial park is currently being developed immediately east of the KAFB Eubank Gate and TA-I. Commercial uses are primarily concentrated along Central Avenue and Gibson Boulevard, north of the site (SN USAF, 1990). SNL does not contain any public recreation facilities.

The viewshed consists mainly of the south side of Albuquerque, Cibola National Forest, and rural rangeland. Development of the SNL and KAFB facilities has heavily disturbed the character of the landscape within their respective areas. The facilities are brightly lit at night and highly visible from various viewpoints. Viewpoints affected by DOE facilities are primarily associated with the residential areas in southeast Albuquerque and short sections of northbound I-25 and westbound I-40. Visual impacts to the following areas are lessened because of distance: 2 to 3 miles from the residential area to the northeast, 3 to 5 miles from the I-25 viewpoint, and 2 to 3 miles from I-40. The impact from I-40 is also lessened by intervening urban development.

The developed SNL and KAFB facilities are consistent with a Class 5 VRM area designation. The remainder of SNL ranges from a Class 3 to Class 4 VRM designation, except for the DOE-leased U.S. Forest Service land. The Forest Service has identified the DOE withdrawal area as ranging from management Class R (Retention) to Class PR (Partial Retention) (SN USDA, 1978). These classes are equivalent to VRM Class 1, Class 2, and Class 3.

Environmental Consequences. Neutron generators, cap assemblies, thermal batteries, and milliwatt heat source surveillance functions would be sited within modified existing buildings at SNL (see section 3.3.5 and figure 3.3.5-1). The introduced facilities would be consistent with the SNL Site Development Plan and compatible with other ongoing operations within their respective technical areas. An existing laydown area of approximately 2 acres would be used for renovation activities in TA-I (figure 3.3.5-1). The laydown area, existing Building 957, and Building 905 are sited within the USAF APZ-2. A recently approved environmental assessment and FONSI for Building 905 determined there were no known land use conflicts (SN DOE, 1992a) and, consequently, no land use impacts are anticipated for these facilities. The proposed Shelf Life Storage Facility would be situated within Building 6730 in a remote area of TA-III (figure 3.3.5-1). The siting and proposed use of this building are consistent with Federal plans, policies, and controls (SNL, 1989 and SN DOE, 1992d).

The number of in-migrating employees described in section 4.1.5.7 would be small enough that existing accommodations of the host community of Albuquerque should be able to absorb the increase without significant development of land for residential use. Offsite land requirements would be approximately 4 acres during the modification phase and 13 acres during the operations phase.

There are extensive public and private recreational facilities in the region that could easily absorb the increased demand resulting from project-related in-migration. Impacts to regional recreational facilities would be negligible. Because relocated facilities would be placed in modified existing buildings, the impacts to visual resources would be negligible.

4.1.5.2 *Air Quality and Acoustics*

Affected Environment. The climate at SNL and in the surrounding region is characteristic of a semiarid steppe (Trewartha, 1954). The annual average temperature in the area is 56.2 °F; temperatures vary from an average daily minimum of 22.3 °F in January to an average daily maximum of 92.8 °F in July. The average annual precipitation is 8.1 inches (NOAA, 1991b).

Ambient Air Quality. SNL is located within the Albuquerque-Mid Rio Grande New Mexico Intrastate AQCR. Portions of the AQCR are designated as nonattainment by the EPA for CO (40 CFR 81.332). The AQCR is designated attainment for the other criteria pollutants. The NAAQS and New Mexico State ambient air quality standards are given in table D2.1.1-1.

Ambient concentration limits for HAPs/toxics have been promulgated by the New Mexico Environmental Improvement Board. These limits are enforced by the Bernallio County Albuquerque City Air Control Board. The emission rates of HAPs/toxics from existing SNL facilities during 1991 are listed in table D2.1.8-3. The HAPs/toxics described in this section are currently used at SNL or those anticipated to be used under the Proposed Action.

Ambient air quality near SNL is monitored for PM_{10}, CO, and NO_2. The data from the monitoring stations are presented in table D2.1.8-1. To achieve a conservative estimate, the maximum background concentrations as measured at these stations were used in the analysis. Note that the New Mexico ozone standard is exceeded. This is common in urban areas.

The principal sources of criteria air pollutants at SNL are the steam plant, paint shops, toxic machine shop, process development laboratory, and the emergency diesel generator plant, at TA-I; and the explosive testing at TA-II (SNL, 1988). Other emissions include fugitive particulate emissions from waste-burial activities, other process emissions, vehicular emissions, and temporary emissions from various construction activities. HAP/toxics emissions at SNL occur from laboratories and miscellaneous

operations and consist primarily of TCA, toluene, and xylene. The emission inventories are included in tables D2.1.8-2 and D2.1.8-3.

Normal operations result in the emission of radioactive materials at SNL. These emissions include 160,000 pCi of tritium annually (SNL, 1991). The health effects of these emissions are discussed in section 4.1.5.9. Tritium is the only radionuclide that may be affected by nonnuclear consolidation activities.

Air quality under ambient and No Action conditions at SNL is shown in table 4.1.5.2.-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of ozone, baseline air quality concentrations at SNL do not exceed, and are not expected to exceed, any applicable guidelines or regulations. It is believed that the contribution of SNL operations to ozone concentrations is negligible.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources within SNL include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, vehicles, and explosives detonation). Explosives testing is conducted at TA-III and in nearby Coyote Test Field. Sound-level measurements have not been made at SNL for explosives testing. Sound levels from aircraft operations at Albuquerque Airport/KAFB have been analyzed (SN USAF, 1990; SN Greiner, 1989). At the site boundary adjoining the urban areas of Albuquerque, noise from sources at SNL would be barely distinguishable from background noise levels. The acoustic environment along the SNL site boundary adjoining urban areas of Albuquerque and in the nearby residential areas was assumed to be that of an urban location with typical DNL in the range of 58 to 72 dBA (EPA, 1974), except where levels are higher due to aircraft operations. The primary sources of noise in these areas are traffic and aircraft operations. The acoustic environment in the rural areas adjoining SNL was assumed to be that of a rural location with typical DNL in the range of 35 to 50 dBA (EPA, 1974), except where higher due to aircraft operations and explosive testing.

The State of New Mexico has not established specific numerical environmental noise standards applicable to SNL. The city of Albuquerque has adopted a Noise Ordinance that specifies a maximum sound level in residential areas as described in appendix D, section D.2.2.8. Noise levels at residences near SNL, especially those along major roads, may exceed EPA guidelines for residential areas due to traffic and aircraft noise.

Environmental Consequences.

Air Quality. Renovation and modification activities (section 3.3.5) would temporarily increase particulate matter emissions such as dust and dirt, and vehicle emissions. This increase, although relatively small when compared to overall site emissions and when added to existing levels, is not expected to exceed applicable air quality standards.

Air emissions from the manufacture of neutron generators would result from production operations. Available information indicates that no additional emissions of criteria pollutants are associated with the transfer of these activities (FDI, 1993). Hazardous/toxic air pollutant emissions from the manufacture of neutron generators are about 4 tons per year. The potential emission rates are listed in

TABLE 4.1.5.2–1.—*SNL Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline ($\mu g/m^3$)	Maximum Background Concentration ($\mu g/m^3$)[g]	No Action Concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)[h]
Carbon Monoxide (CO)	8-hour	10,000[b]	7,557[c]	5.8	7,762.8
	1-hour	15,000[b]	13,740[c]	12.2	13,752.2
Hydrogen Sulfide (H_2S)	1-hour	14[b]	j	f	j
Lead (Pb)	Calendar Quarter	1.5[a]	j	f	j
Nitrogen Dioxide (NO_2)	Annual	94[b]	k	1.8	≥1.8
	24-hour	188[b]	j	20.3	≥ 20.3
Ozone (O_3)	1-hour	118[b]	192.3[c]	f	192.3
Particulate Matter (PM_{10})[d]	Annual	50[a]	35.8[c]	0.03	35.8
	24-hour	150[a]	104[c]	0.3	104.3
Sulfur Dioxide (SO_2)	Annual	52[b]	j	0.004	≥ 0.004
	24-hour	262[b]	j	0.04	≥ 0.04
	3-hour	1,300[a]	j	0.1	≥ 0.1
Total Reduced Sulfur	1-hour	4[b]	j	f	j
Total Suspended Particulates (TSP)	Annual	60[b]	j	f	j
	30-day	90[b]	j	f	j
	7-day	110[b]	j	f	j
	24-hour	150[b]	j	f	j
Hazardous Air Pollutants and Other Toxic Compounds[i]					
1,1,1-Trichloroethane	8-hour	l	j	0.7	≥ 0.7
Acetone	8-hour	5,900[e]	j	0.3	≥ 0.3
Amyl Acetate	8-hour	5,300[e]	j	f	j
Hydrogen Chloride	8-hour	70[e]	j	0.04	≥ 0.04
Isopropyl Acetate	8-hour	9,500[e]	j	f	j
Isopropyl Alcohol	8-hour	9,800[e]	j	0.1	≥ 0.1
Methyl Alcohol	8-hour	2,600[e]	j	0.1	≥ 0.1
Methylene Chloride	8-hour	2,610[e]	j	0.04	≥ 0.04
Toluene	8-hour	3,750[e]	j	0.6	≥ 0.6
Trichloroethylene	8-hour	250[e]	j	0.1	≥ 0.1
Trichlorotrifluoroethane	8-hour	l	j	0.1	≥ 0.1
Xylene	8-hour	4,350[e]	j	0.6	≥ 0.6

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a Federal standard (40 CFR 50).
b State standard (NM EIB, 1981).
c Ambient air quality monitoring data for 1991 (SNL, 1991).
d Particulate matter less than 10 microns in diameter.
e State standard (NM EIB, 1991a).
f Not estimated because the potential release is negligible.
g The maximum of the concentrations as provided from the ambient air quality network.
h The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
i The compounds listed are the major pollutants of concern (SN DOE, 1991b).
j Data unavailable.
k Data not representative.
l No state standard.

table D3.1.1-2. Ambient air quality impacts of these emissions, none of which exceeds the applicable standards or guidelines, are shown in table 4.1.5.2.-2.

Relocation of the thermal battery manufacturing facility would not require any major new construction (FDI, 1993). Therefore, no construction-related air quality impacts would occur with this function.

Air emissions from operation of the thermal battery backup production functions would be negligible. Small-volume batch cleaning operations would be performed using aqueous terpene-based cleaners (e.g., citracline or d'limonene) (SN FDI, 1992). Cleaning operation releases would cause negligible impacts on air quality.

Consolidation of the nonnuclear activities at SNL would increase tritium emissions. An additional 5 curies of tritium would be released annually (PI DOE, 1991b). The health effects of these emissions are discussed in section 4.1.5.9. The Proposed Action would only affect radionuclide tritium emissions.

Acoustic Conditions. The effect of the Proposed Action on noise levels during construction and operations has been evaluated for the major traffic routes around SNL. The changes in traffic volumes are expected to result in an increase of less than 1 dB in peak-hour sound levels along Eubank Boulevard, Gibson Avenue, and Louisiana Boulevard. Changes in sound levels along other routes are expected to be minor. The increase in noise levels along the major access routes are expected to cause little or no increase in annoyance to surrounding communities or individuals.

Noise generated by renovation of existing buildings and onsite operations activities are not expected to increase in offsite noise levels. Noise generated by renovation work, and from operational facilities, equipment, and machines, is not expected to cause ambient noise levels at the site boundary to exceed EPA guidelines set to protect the public from the effect of broadband environmental noise and against hearing loss.

Construction workers and personnel working at any of the reconfigured facilities at SNL would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at SNL.

Although no increase in annoyance is expected to occur offsite from construction and operations, measures would be implemented onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and a hearing protection program conducted.

4.1.5.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at SNL.

Surface Water. SNL is located within KAFB on the Albuquerque East Mesa. The mesa slopes gently southwest to the Rio Grande, the primary drainage channel for the area. The average flow of the Rio Grande is 1,008 ft^3/s (SN DOE, 1988). No perennial streams flow through the SNL area. The two primary surface channels at SNL are Tijeras Arroyo and the smaller Arroyo del Coyote (figure 3.2.8-2). The Arroyo del Coyote joins the Tijeras Arroyo to discharge into the Rio Grande approximately 5 miles from the western edge of KAFB. Both arroyos flow intermittently during spring snowmelt or following thunderstorms (SN DOE, 1988). Springs in the eastern mountains provide a perennial flow in the upper reaches of Tijeras Arroyo. Most of this flow evaporates or percolates into the soil before reaching KAFB.

TABLE 4.1.5.2–2.—*Contribution to Air Quality from Proposed Action and Total Concentrations at SNL with Comparison to Applicable Regulations or Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[e]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Carbon Monoxide (CO)	8-hour	10,000[c]	7,762.8	f	7,762.8
	1-hour	15,000[c]	13,722.2	f	13,522.2
Hydrogen Sulfide (H_2S)	1-hour	14[c]	g	f	g
Lead (Pb)	Calendar Quarter	1.5[b]	g	f	g
Nitrogen Dioxide (NO_2)	Annual	94[c]	≥1.8	f	≥1.8
	24-hour	188[c]	≥20.3	f	≥20.3
Ozone (O_3)	1-hour	118[c]	192.3	f	192.3
Particulate Matter (PM_{10})	Annual	50[b]	35.8	f	35.8
	24-hour	150[b]	104.3	f	104.3
Sulfur Dioxide (SO_2)	Annual	52[b]	≥0.004	f	≥0.004
	24-hour	262[b]	≥0.04	f	≥0.04
	3-hour	1300[c]	≥0.1	f	≥0.1
Total Reduced Sulfur	1-hour	4[c]	g	f	g
Total Suspended Particulates (TSP)	Annual	60[c]	g	f	g
	30-day	90[c]	g	f	g
	7-day	110[c]	g	f	g
	24-hour	150[c]	g	f	g
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,1,1-Trichloroethane	8-hour	d	≥0.7	0.5	≥1.2
Acetone	8-hour	5,900[c]	≥0.3	0.4	≥0.7
Amyl Acetate	8-hour	5,300[c]	g	0.4	≥0.4
Hydrogen Chloride	8-hour	70[c]	≥0.04	f	≥0.04
Isopropyl Acetate	8-hour	9,500[c]	g	0.2	≥0.2
Isopropyl Alcohol	8-hour	9,800[c]	≥0.1	f	≥0.1
Methyl Alcohol	8-hour	2,600[c]	≥0.1	f	≥0.1
Methylene Chloride	8-hour	2,610[c]	≥0.04	1.0	≥1.0
Toluene	8-hour	3,750[c]	≥0.6	0.6	≥1.1
Trichloroethylene	8-hour	250[c]	≥0.1	0.5	≥0.7
Trichlorotrifluoroethane	8-hour	d	≥0.1	0.6	≥0.7
Xylene	8-hour	4,350[c]	≥0.6	f	≥0.6

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[a] Compounds listed are the major pollutants of concern (SN DOE, 1991b).
[b] Federal standard (40 CFR 50).
[c] State standard (NM EIB, 1981; NM EIB, 1991a).
[d] No state standard.
[e] Baseline Concentrations are from table 4.1.5.2–1.
[f] Design report indicates that the additional emission of this pollutant will be less than 100 lb/yr (0.01 lb/hr) (SN FDI, 1992).
[g] Data unavailable.

The primary component of the natural drainage system, Tijeras Arroyo, separates TA-I, -II, and -IV from TA-III, -V, and the Coyote Test Field. Stormwater runoff is drained from the SNL Technical Areas by a combination of overland flow, natural channels, open drainage ditches, culverts, and storm sewers.

High peak flows of short duration characterize floods in the area. High-intensity summer thunderstorms produce the greatest flows, but flooding is not considered a high probability at KAFB. The southeast corner of TA-IV and the east side of TA-II lie within the 500-year floodplain of Tijeras Arroyo (SNL, 1989).

SNL contains over 15 miles of sewer lines interconnected with those of KAFB. SNL has five categorical pretreatment operations and three general wastewater streams discharging to the city of Albuquerque wastewater treatment plant. Discharges by SNL are regulated by the city of Albuquerque Public Works Department, Liquid Waste Division, under the authority of the city's Sewer Use and Wastewater Control Ordinance. The city's ordinance is approved by the EPA in accordance with the CWA, as amended (SNL, 1991). Total flow from SNL is estimated to be 200 MGY (table 3.2.8–1).

To comply with EPA regulations, the city of Albuquerque has implemented an industrial wastewater pretreatment program. This program requires SNL to obtain permits for wastewater discharges to the city's wastewater treatment plant. These permits specify the required quality of discharges and the frequency of reporting the results of the monitoring (SNL, 1991).

In 1990, SNL did not comply with permit limits on 18 different occasions. Seven noncompliances for fluoride and four noncompliances for pH occurred at Building 858. A compliance schedule to correct these violations was submitted to the city of Albuquerque and the corrective construction was started on September 4, 1990. The remaining seven noncompliances were for pH at different discharge points (SNL, 1991).

SNL discharges stormwater from oil storage tank areas and building basements to two lagoons, permitted under the New Mexico Water Quality Control Commission Regulations as implemented by the New Mexico Environmental Improvement Board. However, the discharge plan does not list any limits for sample parameters.

Surface Water Quality. As a part of the annual surface water monitoring program, samples are obtained from stations upstream and downstream of SNL in the Rio Grande and from Coyote Springs. The upstream station on the Rio Grande is at Corrales Bridge, and the downstream station is at the Isleta Indian Reservation, considerably downstream of the influent point of Tijeras Arroyo (SNL, 1991). Stormwater flowing into Tijeras Arroyo is the only significant surface water flow into the Rio Grande from the site; stormwater monitoring is conducted twice a year at SNL. Rio Grande water samples are analyzed for gross alpha, gross beta, total uranium, cesium-137, and tritium. Results from the 1990 annual monitoring are presented in table 4.1.5.3-1. Concentrations of radionuclides in surface waters do not exceed applicable standards. No nonradiological monitoring is conducted in Tijeras Arroyo or in the Rio Grande.

Groundwater. SNL lies within the north-south trending Albuquerque basin. The principal aquifer of the Albuquerque basin is the Valley Fill aquifer. The Valley Fill consists of unconsolidated and semiconsolidated sands, gravels, silts, and clays that vary in thickness from a few feet adjacent to the mountain ranges to over 21,000 feet at a point 5 miles southwest of the KAFB airfield (SN Engineering, 1981). The Valley Fill aquifer is considered a Class IIa aquifer, having a current source of drinking water and waters having other beneficial uses.

The regional water table is separated by a fault complex that divides the area into a deep region on

TABLE 4.1.5.3–1.—*Summary of Surface Water Quality Monitoring at SNL*

Receiving Water: Rio Grande—1990			
Parameter	**Unit of Measure**	**Water Quality Criteria[d]**	**Average Existing Water Body Concentration[a]**
Cesium-137	pCi/L	120[c]	<10.0
Gross alpha	pCi/L	15[b]	12.8
Gross beta	pCi/L	50[b]	10.0
Tritium	pCi/L	20,000[b]	<450.0
Uranium, total	mg/L	NA	0.00000389

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a Only yearly average radionuclide concentrations were provided for all monitoring locations. Less than symbol (<) indicates concentration below analysis detection limit.
b Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
c U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
d Drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards-they do not constitute enforceable limits.

NA None Applicable

Source: SNL, 1991.

the west side of the complex and a shallower region on the east side. The depth to groundwater ranges from 50 to 100 feet on the east side of the fault complex and from 380 to 500 feet on the west side (SN DOE, 1992b). Based on available data, the apparent direction of groundwater flow west of the fault complex is generally to the north and northwest. The direction of groundwater flow east of the fault complex typically is west toward the fault system (SNL, 1991).

Sources of recharge to the aquifer include precipitation, snowmelt along the margins of the basin, underflow from adjacent areas such as the Hagen Basin, and seepage from streams, canal drains, surface reservoirs, and applied crop irrigation water.

Groundwater Quality. Groundwater monitoring at SNL has been conducted since 1985. Overall, the groundwater in this region has been classified as a calcium bicarbonate chemical type with a pH ranging from 6.08 to 8.84 and an alkalinity range of 49 to 0.40 mg/L. The east side wells are characterized by lower pH than the west side wells. Currently, no monitoring wells are in the proposed project area. The closest well is located approximately 0.25 miles southeast of the area and has an August 1990 depth-to-water reading of 498 feet.

The Chemical Waste Landfill has been identified as a source of groundwater contamination. The groundwater near the Mixed Waste Landfill may contain some groundwater contamination. A monitoring well network was established at the Chemical Waste Landfill in the summer of 1985. A monitoring well network was established at the Mixed Waste Landfill beginning in 1988, but sampling did not begin until late 1990. These areas are not located near buildings that house DOE DP activities.

Concentrations of TCE and metals were found above the water quality criteria established by the New Mexico Water Quality Regulations at the Chemical Waste Landfill. Elevated concentrations of total organic compounds (TOC) and phenolics were found at the Mixed Waste Landfill (SN DOE, 1992b). It is possible that the results for phenolics are inaccurate, since this parameter was also detected in blank samples. Because these areas are not located near buildings that house DOE DP activities, a map

of the areas of groundwater contamination was not provided. Groundwater monitoring results for radiological parameters are summarized in table 4.1.5.3-2. All parameters are less than water quality criteria.

Groundwater Usage and Rights. No groundwater rights have been established through the Office of the State Engineer. SNL uses approximately 1 MGD of water (see table 3.2.8-2). Thirty percent of the water used at SNL is purchased from the city of Albuquerque and the rest is pumped from KAFB wells. KAFB pumped over 1.6 billion gallons of water from its production wells in 1990 (SN DOE, 1992b), of which 0.7 MGD or 256 MGY was used by SNL.

The city of Albuquerque has annual consumptive water rights of 7.2 BGY. Half of the water that is pumped from the ground is discharged to the Rio Grande. In addition, the city of Albuquerque also has 15 BGY consumptive water rights to the San Juan River.

KAFB has groundwater rights of 2 BGY. They also have the option of purchasing 10 percent of their water from the city of Albuquerque. Currently, they are operating at an 80 percent capacity.

Environmental Consequences. A description of the functions to be transferred to SNL and the facility locations selected to house these activities is presented in section 3.3.5.

Surface Water. Nonnuclear functions would be relocated to portions of TA-I and -III that are above the 500-year floodplain (SNL, 1989). Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

The additional wastewater generated by the transferred processes is approximately 3.2 MGY (table 3.3.5-4). This wastewater increase represents less than 2 percent over the current sanitary wastewater generation rate of 200 MGY. There would be no impacts to surface water flow because all wastewater would be collected and discharged to the city of Albuquerque's sewer systems. Treated wastewater would meet or exceed standards of the city of Albuquerque, Sewer Use and Wastewater Control Ordinance (SN FDI, 1992).

Surface Water Quality. SNL was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. There would be no new waste streams added or special waste handling capability required. There would be no impacts to surface water quality because all wastewater would be discharged to the city of Albuquerque's sewer systems. Furthermore, there would be no change in stormwater runoff due to the Proposed Action.

TABLE 4.1.5.3–2.—*Summary of Groundwater Quality Monitoring at Sandia National Laboratories, New Mexico*

Parameter	Unit of Measure	Water Quality Criteria	1990—Existing Conditions[c]		
			Base Well No.1	Base Well No. 7	Base Well No. 11
Cesium-137	pCi/L	120[b]	<10	<13	<10
Gross Alpha	pCi/L	15[a]	5.13	<2.8	<5.6
Gross Beta	pCi/L	50[a]	3.26	3.58	5.25
Tritium	pCi/L	20,000[a]	<0.45	<0.45	<0.45

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[a] Maximum Contaminant Level (MCL) EPA National Primary Drinking Water Regulations, (40 CFR 141).
[b] U.S. Department of Energy, 4 percent of DOE Derived Concentration Guidelines (DCG) for Water (DOE Order 5400.5).
[c] Less than symbol (<) indicates concentration below analysis detection limit.

Source: SNL, 1991.

Groundwater. Water requirements for both the modification and operations phases of relocated functions would be supplied from local groundwater sources at KAFB. During the modification phase, approximately 3,900 GPD of water would be required (table 3.3.5-3). This amount is less than 1 percent of the current groundwater withdrawal (1 MGD) from the KAFB wells. It is projected that an additional 25,000 GPD of water would be required to operate the facilities (table 3.3.5-5). This amount is less than 3 percent of the current groundwater withdrawal from KAFB wells.

Groundwater Quality. There are no plans for direct discharge of process wastes to groundwater. Given normal safeguards and precautions, there would be no impacts to groundwater quality.

4.1.5.4 *Geology and Soils*

Affected Environment. SNL lies on a sequence of sedimentary, igneous, and Precambrian basement rocks. The northern and western sections of SNL rest on Miocene to Quaternary gravels, sands, silts, and clays deposited in the basin formed by uplift of the mountains to the east. The eastern portion of SNL is primarily underlain by Precambrian rocks (SN SAIC, 1985).

The eastern portion of SNL is cut by the Tijeras, Hubble Springs, Sandia, and Manzano faults. Both the Tijeras and Sandia faults, which intersect on the site, are considered capable faults (SN ES, 1981).

SNL is located in Seismic Zone 2B (ICBO, 1991). The facility is situated in a region of high seismic activity but low magnitude and intensity. Available records indicate that more than 1,100 earthquakes have occurred during the past 127 years. However, during the past century, only three have caused damage at Albuquerque. Intensities have been as high as an MMI of VII, which can cause damage. Possible geological concerns include potential ground shaking and rupturing associated with regional seismic activity and the two capable faults intersecting on the site. Statistical studies indicate that a nondamaging earthquake (MMI less than III) may be expected every 2 years, with a damaging event every 100 years.

Modification and renovation of existing facilities to accommodate the new functions would be in accordance with standards for DOE facilities in Seismic Rise Zone 2B, including standards DOE 6430.1A and 4 CRL 15910.

SNL is located on soils of the Bluepoint-Kokan, Madurez-Wink, Tijeras-Embudo, Kolob-Rock outcrop, and the Seis-Orthids associations (SN USDA, 1977). The Bluepoint-Kokan soils are excessively drained, sandy, and gravelly soils. The Madurez-Wink soils are well-drained and loamy. The Tijeras-Embudo soils are well-drained, loamy, and gravelly. The Kolob-Rock outcrop association in the eastern portion of SNL includes deep, moderately to very steep, well-drained, loamy, and stony soils and basalt, sandstone, and limestone rock outcrops. The Seis-Orthids association includes shallow to moderately deep soils on level to very steep slopes that are well-drained, very cobbly, stony, and very stony, loamy.

The hazard of blowing soils on the terraces and pediments is severe. Future water erosion hazards are moderate on the alluvial fans, foothills, and highlands (SN USDA, 1977). Although no soils are classed prime farmland, finer grained soils of the Bluepoint-Kokan Soil Association along Tijeras Arroyo are classified Farmland of Statewide Importance (Irrigated) by the State of New Mexico.

Environmental Consequences. All new functions would be accommodated in existing modified structures. During implementation, approximately two acres would be temporarily required for a laydown area. The extent of disturbance is not considered significant and no impacts to geologic features would occur.

No geological hazards or soil conditions would adversely affect modification of the buildings or operations of new functions at SNL. Major seismic activity and associated mass movement and subsidence are unlikely to occur during the implementation or operational phases, because seismic activity in the region is generally of low frequency and magnitude. Renovation of plant facilities to accommodate the new functions would meet standards for Seismic Risk Zone 2B in the Uniform Building Code (ICBO, 1991).

4.1.5.5 *Biotic Resources*

Affected Environment. Most undeveloped lands within TA-I and -III of SNL support grassland vegetation (SN DOE, 1992e). Terrestrial wildlife using grassland habitats on SNL are typical of similar habitats in central New Mexico. The size and diversity of wildlife populations is thought to be limited by the poor availability of water (SN DOE, 1992e). An inventory of wildlife species on KAFB (including SNL) has been recently updated (SN DOE, 1990).

No wetland inventories have been performed for SNL and no NWI maps have been published. Several springs exist on KAFB including Sol se Mete Spring, Coyote Springs, and G Spring (SN DOE, 1992e). These are associated with canyons and arroyos. No springs exist in TAs I-V and none are located within permitted land to which SNL has access.

Potential aquatic habitat within KAFB is limited to arroyos and canyons and the few springs associated with them. The nearest major perennial aquatic habitat is the Rio Grande, located approximately 5 miles to the west.

No Federally-listed threatened or endangered species are known to occur on SNL. The peregrine falcon (*Falco peregrinus*), a Federally- and state-listed endangered species, could potentially occur in the mountainous areas of KAFB surrounding SNL, but the likelihood is low because of the poor quality habitat for this species. The grama grass cactus (*Pediocactus papyracanthus*), a Federal Candidate Category 2 and state-listed endangered species, is known to occur in grasslands on KAFB similar to those occurring on SNL. The spotted bat (*Euderma maculatum*), also a Federal Category 2 and state endangered species, has a low probability of occurrence on SNL. SNL lies within the breeding range of several Federal Candidate bird species (SN DOE, 1992e).

Environmental Consequences. Temporary land disturbance could result from renovation of SNL facilities under the Proposed Action. The disturbances would be limited to laydown areas on lawns and paved areas within existing developed areas that are of minimal value as habitat for terrestrial wildlife. No undeveloped areas within SNL would be disturbed by the Proposed Action.

Very small releases of tritium to the atmosphere could occur during operations (SN FDI, 1992). However, as discussed in section 4.1.5.9, these releases would not significantly affect human health. Because studies have indicated that no other organisms are more sensitive than man to radiation (SN NRC, 1979), the radionuclide releases would not significantly affect terrestrial organisms.

No areas potentially containing wetlands or other aquatic habitats would be affected by renovation or operation of the new facilities. Water demands would be met through groundwater withdrawal and not from surface water withdrawal within or surrounding SNL. Process wastewater would be discharged to the local municipal system rather than to the natural surface waters containing aquatic habitats (SN FDI, 1992).

No terrestrial or aquatic areas potentially providing habitat for Federal- or New Mexico-listed threatened or endangered species would be affected by the Proposed Action. DOE has initiated discussions with the FWS and the New Mexico Department of Game and Fish to ensure that renovation or operation

of the facilities would not affect any listed or special status species in the vicinity.

4.1.5.6 *Cultural Resources*

Affected Environment. The prehistoric chronology for the SNL area consists of three broad time periods: Paleoindian (10,000-5500 B.C.), Archaic (5500 B.C.-A.D. 1), and Anasazi (A.D. 1-1600) (SN Mariah, 1988; SN Hoagland, 1992). Prehistoric site types include pueblos, pithouse villages, rockshelters, hunting blinds, agricultural terraces, quarries, lithic and ceramic scatters, lithic scatters, and hearths. About 22 percent of SNL/DOE-controlled lands have been intensively inventoried for cultural resources (SN Hoagland, 1992); another 28 percent received less intensive surveys. Because techniques and procedures varied greatly between projects in these areas, most surveys are not considered adequate (SN Hoagland, 1992; SN Mariah, 1988). All five DOE TAs have been intensively surveyed; no prehistoric sites were recorded. Sixty-four prehistoric sites have been recorded in DOE-owned or -controlled lands beyond the five TAs. About 88 percent of these sites are considered eligible or potentially eligible for the NRHP.

The history of the region has been previously documented (SN Mariah, 1988; SN Furman, 1990; SN Hoagland, 1992). Historic resources identified in the vicinity of SNL are associated with early mining, ranching and sheepherding activities, commercial ventures, or transportation routes (SN Mariah, 1988). All five DOE TAs have received intensive cultural resources inventory; two historic sites were recorded. These sites were small historic trash scatters and are not eligible for the NRHP. Twenty-three historic resources have been recorded in DOE-owned or -controlled lands outside of the five TAs; about 65 percent are considered eligible or potentially eligible for the NRHP.

SNL was established in 1945 as the Z Division of the Los Alamos Scientific Laboratory (SN Furman, 1990; SN Hoagland, 1992). TA-I originally consisted of temporary WWII structures and wooden framed buildings; more permanent buildings were constructed in 1948. Construction in TA-II was initiated in 1948, including two buildings (Buildings 904 and 907) used to assemble the first hydrogen bomb. Test facilities were developed in TA-III from 1954 through 1960 (SN Furman, 1990; SN Hoagland, 1992). Numerous buildings and structures in TAs -I, -II, and -III were built between 1945 and 1960; most are associated with the AEC, and as such, may be considered NRHP-eligible. Buildings in TAs -III, -IV, and -V may also qualify for eligibility to the NRHP when they are 50 years old. The New Mexico SHPO has requested that buildings in these areas be evaluated at that time. Buildings 904 and 907 may be considered potentially NRHP-eligible because of their association with the assembly of the first hydrogen bomb (SN Hoagland, 1992).

Native Americans with concerns in this area include the Sandia Pueblo, north of Albuquerque, and the Isleta Pueblo, south of KAFB (SN Brandt, 1979; SN Ellis, 1979; SN Hoagland, 1992). Native American resources on SNL/DOE-controlled lands may consist of prehistoric sites with ceremonial features such as kivas, village shrines, petroglyphs, or burials; all of these site types or features would be of concern to local groups. Consultation with the Isleta and Sandia Pueblos has been initiated by DOE for this project and is an ongoing process (SN Hoagland, 1992).

Environmental Consequences. Native Americans with concerns in the project area and the SHPO were provided copies of the Preapproval Review Copy of the EA. The New Mexico SHPO and Native Americans were asked to review the EA and submit comments on the potential of the Proposed Action having any effects on important Native American resources or NRHP-eligible prehistoric or historic resources. Only one Native American group responded to the request for comments. Based on the response of Native American groups and the New Mexico SHPO to the preapproval review

process for the EA, no important Native American resources or NRHP-eligible prehistoric or historic resources were identified. Therefore, no adverse effects to cultural resources are expected.

4.1.5.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at SNL is based on an ROI where 96 percent of the SNL employees lived in 1991. The ROI includes Bernalillo (91 percent), Valencia (3 percent), and Sandoval (2 percent) counties in New Mexico. Within the ROI, the key city of Albuquerque (86 percent) has also been included in the analysis (see figure 3.2.5.4-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.5-1 through E3.5-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 132 percent, increasing from 133,798 in 1970 to 310,252 in 1990. Total employment increased from 124,605 to 293,905 between 1970 and 1990, an annual growth rate of 4 percent. The unemployment rates for 1970 and 1990 were 6.9 percent and 5.3 percent, respectively. For the same years, personal income increased from approximately $1.3 billion to $9.4 billion (an annual average of 10 percent), and per capita income increased from $3,438 to $15,992.

Between 1970 and 1990, employment levels at SNL increased from 6,440 to 7,536, representing 3 percent of the ROI employment in 1990 (SN DOE, 1991c). Changes in mission requirements have historically led to fluctuations in employment levels over the period. For example, employment decreased to 5,542 in 1975 and increased to 7,051 by 1985. As of September 30, 1992, employment levels at SNL had increased to 8,473. The prepared Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. With the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to increase to 8,500 by the year 2000 (DOE, 1993c). In 1992, the total SNL payroll was estimated to be approximately $399 million (SN DOE, 1991c). Under the No Action baseline, the total payroll is projected to be approximately $401 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 380,000 by 2000 and 408,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 6.0 percent and 5.9 percent, respectively. For the same years, personal income is projected to increase from approximately $14.1 billion to $19.0 billion, an annual average of less than 2 percent. Per capita income is projected to increase from an estimated $21,000 in 2000 to $25,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 58 percent to 589,131. During the same period, the New Mexico population increased 49 percent. The population in the 3-county ROI is projected to increase from an estimated 682,000 in 2000 to 771,000 by 2020, an annual rate of less than 1 percent.

The largest county population increase (262 percent) occurred in Sandoval County between 1970 and 1990, while during the same years, populations in Valencia and Bernalillo counties increased 12 percent and 52 percent, respectively. In the same period, the population in the city of Albuquerque increased 58 percent. Population in Sandoval County is estimated to increase 8 percent between 1990 and 2000 and 12 percent between 2000 and 2020, an annual growth rate of less than 1 percent.

The Valencia County population is projected to increase 1 percent between 1990 and 2000 and 12 percent between 2000 and 2020, an annual growth rate of less than 1 percent. Population in Bernalillo County is projected to increase approximately 18 percent by 2000 and an additional 13 percent by 2020, an annual growth rate of about 1 percent.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 110 percent from 114,977 to 241,683. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 16 percent by the year 2000 and an additional 13 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase (395 percent) in housing units occurred in Sandoval County, while the smallest increase (45 percent) occurred in Valencia County. The number of housing units in Sandoval County is expected to increase approximately 19 percent by 2000 and an additional 12 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Valencia County is expected to increase about 12 percent by 2000 and an additional 12 percent by 2020, an annual increase of less than 1 percent.

In 1990, homeowner vacancy rates averaged 2 percent in the ROI and ranged from 2 percent in Bernalillo County to 3 percent in Valencia County. The vacancy rates for rental units averaged 10 percent and ranged from about 8 percent in Sandoval County to 15 percent in Valencia County.

Community Infrastructure and Services. The water supply system operated by Albuquerque maintains about 92 percent of the total capacity of the 5 systems identified in the ROI. Albuquerque draws all of its raw water supplies from groundwater and had 1991 average daily demands of 42 percent of its 280 MGD capacity. Albuquerque is projected to experience average daily demands of 44 percent of capacity in 1995 and 47 percent of capacity in 2000.

Albuquerque's wastewater treatment system has a current capacity of 61 MGD, about 90 percent of the combined capacity of the 5 systems identified in the ROI. The 1991 average daily demands on Albuquerque's system were 87 percent of capacity. Albuquerque plans to increase its system capacity to 72 MGD by 1993 and is projected to have average daily demands of 78 percent of capacity in 1995 and 83 percent of capacity in 2000.

Six school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 514 students in the Jemez School District to 86,653 students in the Albuquerque School District. School districts with enrollments of over 1,000 were operating between 80 percent and 100 percent of capacity. School districts in Bernalillo and Sandoval counties were operating, on average, at 74 percent and 100 percent of capacity, respectively. However, current capacities are projected to be exceeded by 1995 and 2000 under the No Action future baseline. The largest increases are expected to occur in the school districts in Sandoval County, where enrollments are projected to exceed current capacities by 159 percent in 1995 and 169 percent in 2000. Smaller increases are expected to occur in the Albuquerque School District in Bernalillo County, where enrollments are projected to exceed the current capacity by 28 percent in 1995 and 39 percent in 2000. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,192 per pupil. The statewide average pupil-to-teacher ratio was 18:1, and expenditures averaged $3,137 per pupil (NM DEd, 1990).

Twenty hospitals serve the three-county ROI. In 1990, Valencia County hospitals were operating close to capacity, while Bernalillo and Sandoval County hospitals were operating well below capacity (AHA, 1990). In 1990, a total of 1,724 physicians served the ROI. The physician-to-population ratio for the ROI was 2.9:1,000 and ranged from 0.6:1,000

in Valencia County to 3.4:1,000 in Bernalillo County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990, DOC, 1991b).

Five city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county region was in the city of Albuquerque, with 793 sworn officers, or 2.1 sworn officers per 1,000 persons. Other large agencies are in Bernalillo County with 209 sworn officers (0.4 sworn officers per 1,000 persons) and Sandoval County with 26 sworn officers (0.4 sworn officers per 1,000 persons). The average number of sworn officers in the ROI was 1.8 per 1,000 persons (FBI, 1991).

Four fire departments and 1,152 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in the city of Albuquerque (450 firefighters; 1.2 firefighters per 1,000 persons) and in Bernalillo County (390 firefighters; 0.8 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.0 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to SNL is provided by Louisiana Blvd., Wyoming Blvd., Eubank Blvd., Gibson Blvd., and South Valley Rd. via Broadway Blvd.

Estimated traffic along segments providing access to SNL is projected to contribute to differing service level conditions in accordance with population growth. Eubank, Gibson, Louisiana, Wyoming, and, to a lesser extent, Broadway, Boulevards would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted and potential disruptions to traffic flow could be caused by accidents or maintenance activities, resulting in considerable congestion. In addition, estimated truck traffic into SNL for delivery of supplies and removal of wastes would typically average 120 trips per day. However, the additional traffic volumes associated with continued operation of SNL are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to SNL (NM Hwy, 1991a and b).

Other modes of transportation within the ROI include public transportation systems and railways. Public transport to SNL is provided by Sun Tran (SN AED, 1989). Rail service to SNL and KAFB is provided via a spur from the Atchison, Topeka, and Santa Fe Railroad (NM Hwy, 1991c). No navigable waterways exist within the ROI.

The Albuquerque Aviation Department owns and operates the Albuquerque International Airport, located on KAFB. Albuquerque International Airport receives jet air service from both national and local carriers. Numerous smaller private airports are also located throughout the ROI (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 385 to 390 new jobs (DOE, 1993d). The analysis presented in table 4.1.5.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 385 new jobs. The estimate of 390 new jobs is 2 percent higher than the 385 new jobs used in the following analysis, and this higher estimate would result in slightly more economic benefits than the 385 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at SNL would require 95 additional employees during peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of

TABLE 4.1.5.7–1.—*Sandia National Laboratories, New Mexico, Proposed Action Economic And Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	343,299	NA	379,866	NA
Baseline Unemployment Rate	5.6%	NA	6.0%	NA
Baseline Personal Income (Thousands $)	$11,517,012	NA	$14,078,925	NA
Baseline Per Capita Income ($/Person)	$18,168	NA	$20,640	NA
Baseline Employment	323,981	NA	357,135	NA
Direct Jobs	95	0.03	385	0.11
Indirect Jobs	218	0.07	555	0.16
In-Migrating Workforce	31	0.01	203	0.06
Total In-Migration	70	0.01	515	0.08
Population Increase				
Bernalillo County	67	0.01	491	0.09
Albuquerque	63	0.02	463	0.10
Sandoval County	1	0.00	10	0.02
Valencia County	2	0.00	13	0.03
ROI (County Total)	70	0.01	514	0.08

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM DES, 1991; FDI, 1993; DOE, 1993c.

approximately 385 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 218 jobs would be created indirectly during peak construction and 555 additional jobs during operations. This direct and indirect employment would lead to in-migration of 70 persons during peak construction and 515 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force.

Under the No Action alternative, the current SNL employment level of 8,473 would be projected to increase to 8,500 by the year 2000, an increase of 27. The addition of 385 full time equivalent jobs at SNL would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.5.7-1. In the year 2000, this project-related population growth from in-migration would represent an increase of less than 1 percent over the projected ROI baseline population of 682,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1-percent change in population during peak construction would create the need for only an estimated 27 additional housing units. For operations in the year 2000, the less than 1-percent change in population would not create a need for additional housing units beyond a 1-percent increase. In past years, housing units have been built at an annual rate of 4 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. Some existing public education facilities are currently approaching 100 percent of capacity. Although school enrollments will exceed capacities by the years 1995 and 2000 these capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into SNL would be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving SNL would be negligible.

4.1.5.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the SNL waste management baseline is provided in section 3.2.8.3. Because no TRU wastes are associated with any of the proposed nonnuclear consolidation activities, no further discussion of TRU waste generation and management is presented.

LLW at SNL is generated in both technical and remote test areas as a result of research and development activities. Most of the LLW consists of contaminated equipment and combustible decontamination materials and cleanup debris. All generated LLW is temporarily stored at generator sites or above ground in transportation containers at the TA-III disposal site. All LLW packages are currently onsite pending approval of transport by commercial carriers to the NTS for burial.

Mixed wastes include radioactively contaminated oils and solvents, and radioactively contaminated or activated lead or other heavy metals. Other mixed wastes may be generated as a result of weapons tests. The 6,000 ft^2 Radioactive and Mixed Waste Management Facility will have a centralized packaging and storage function for LLW and mixed waste. Mixed waste will be stored at the facility until accepted for disposal at the NTS or Waste Isolation Pilot Plant site. Processing at the Radioactive and Mixed Waste Management Facility will include activities required to comply with the waste acceptance criteria and Federal regulations. Wastes are stored at this facility until suitable treatment and disposal facilities are available for the disposal of these wastes in accordance with the provisions of RCRA. SNL is aiding DOE in developing a compliance agreement to be negotiated with the EPA, Region VI Field Office. DOE and SNL are assessing their responsibilities as outlined in the *Federal Facilities Compliance Act* and may enter into similar agreements with the State of New Mexico.

Hazardous/toxic chemical wastes are generated at SNL by the numerous research and development activities conducted throughout the facilities. The Hazardous Waste Management Facility can store 70,000 gallons of liquid and solid hazardous wastes at one time. There are no active onsite disposal facilities for hazardous/toxic wastes at SNL. All RCRA-regulated wastes are packaged, manifested, and shipped offsite by DOT-registered transporters for disposal at RCRA-permitted treatment and disposal facilities.

SNL contains over 15 miles of sewer lines interconnected with those of KAFB. Pretreated industrial wastewater effluent and sanitary sewage are discharged to the city of Albuquerque sewer system in compliance with NPDES permit discharge limits. Solid sanitary waste is collected and taken to the KAFB sanitary landfill on a regular basis.

At SNL, the initial stages of waste minimization and pollution prevention have been implemented using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. A Waste Minimization and Pollution Prevention Awareness Plan was completed in December 1991. In 1993, process waste assessments on all processes at SNL are expected to be completed, and formal waste minimization opportunity assessments will be initiated. Halogenated solvent substitution is currently being evaluated for a number of research processes.

Environmental Consequences. Any equipment to be moved to SNL from another site as a result of the Proposed Action would be decontaminated prior to shipment.

Construction debris and scrap metals would result from demolition of existing interior utilities and partitions, and would be disposed of as sanitary waste, or sold/recycled as scrap. No radioactive contamination is present, only chemical residues resulting from the use of mineral acids in the facility. Debris from modifying Building 870 may contain as much as 10 yd of concrete and 50 tons of steel contaminated by previous operations. These materials would be managed and disposed of as hazardous waste, packaged and manifested in accordance with all applicable regulatory requirements, and shipped by a DOT-registered transporter to an offsite RCRA-permitted disposal facility. Building 870 may also generate 120 yd of asbestos. Buildings 841, 860, 878, and 894 may generate 10, 10, 5, and 2 yd of asbestos, respectively. Asbestos waste would consist primarily of floor tile, pipe insulation, and ceiling tile, and would be disposed of in an approved asbestos landfill in accordance with the provisions of TSCA.

Soil excavation within Building 870 would occur as a result of removing portions of existing foundations and concrete footings and constructing new footings and foundations to support the new second-story addition. The soils in the potential excavation area are suspected to be contaminated; however, the characteristics and extent of the contamination and the volume of soil needing excavation and possible treatment and disposal is unknown at this time.

Soil excavation would also be required for the replacement of sanitary and industrial drains within the building. As required, the soils would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. If soils are found to be contaminated, the location would be referred to the SNL Environmental Restoration Program for subsequent management. Management of potentially contaminated soil would involve an area inspection, characterization, and evaluation of cleanup alternatives (if necessary). Cleanup action and compliance follow-up would be conducted as necessary to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities may have additional project cost implications, no adverse affects to the SNL waste management program are expected.

Wastes generated as a result of the relocated functions are outlined in appendix B, section B.5. Operation wastes from the manufacture of neutron generators may be in the form of liquids, gases, or solids. Effluent wastewaters in the form of liquid sanitary sewage, process and industrial wastewater, and radioactive wastewater (tritiated water) would result from the manufacture of the neutron generators. No increase in sanitary sewage is expected from the operation of the thermal battery facility because no additional increase in personnel is required. Existing sanitary tie-ins and the chemical drain system would be utilized because no increase in chemical wastewater volume is expected from the battery facility.

Sanitary sewage would be sent directly to KAFB sanitary sewer system and then to the city of

Albuquerque sanitary sewer to be treated at the municipal wastewater treatment facility. The estimated sanitary sewage flow attributed to the Proposed Action is 35,000 GPD (12.25 MGY based on 350 days per year). The city of Albuquerque sanitary sewer and municipal wastewater treatment plant has adequate capacity to handle the estimated (less than 1-percent increase) sanitary sewage flow. However, the 35,000 GPD increase represents a change in flow characteristics for one of the existing SNL permits. Permit modification will require routine review and approval by the city of Albuquerque.

A chemical drain system in Building 870 serves all nonradioactive chemical and industrial wastewater streams in the building. The chemical drain system would utilize gravity drainage through double-walled pipe in accessible concrete trenches, or utilize the gravity system to lined collection sumps from which it would be pumped through an above ground piping system. The chemical drain system would transport process and industrial wastewater to the chemical wastewater collection/neutralization facility outside the building. This facility neutralizes the acidic or basic wastewater to standards meeting or exceeding the city of Albuquerque's Wastewater Utility Division, Sewer Use and Wastewater Control Ordinance. Chemical wastewater volume due to the Proposed Action is estimated at 70,000 GPD (24.5 MGY based on 350 days per year).

There are no low-level or mixed wastes generated from thermal battery production or milliwatt heat source surveillance. Approximately 1,252 gal/yr of additional liquid hazardous waste (less than 1-percent) and 209 ft^3/yr of additional solid hazardous wastes (less than 5 percent) from the consolidation functions would be generated at SNL. Waste would be accumulated in local accumulation areas and then transferred to the existing onsite permitted hazardous waste storage area. The hazardous wastes from the Thermal Battery Facility would require the Chemical and Waste Storage Building to manage an additional four to five 55-gallon drums per month. The Chemical and Waste Storage Building has a maximum capacity of 1,090 drums. Because hazardous wastes are periodically shipped offsite, the consolidation would not adversely affect SNL hazardous waste management operations.

It was estimated that less than 100 GPY of wastewater, potentially contaminated with tritium, would be generated by neutron generator operations at SNL. These wastes would be collected at the source in drums. This water would be treated by solidification or an approved alternate technology and disposed of at an approved site. The 294 ft^3 of additional solid LLW represents a less than 13-percent increase.

The cap assemblies operation proposed for transfer to SNL would result in the generation of a small quantity of solid LLW scrap from machining operations. This scrap material may possibly exhibit the characteristic of toxicity, in which case it would be classified as a mixed waste. No liquid radioactive or liquid mixed waste is expected to be generated. The expected generation rate of the solid LLW scrap is approximately 18 grams per year. The scrap contains minute quantities of radioactive and hazardous substances. In an 18 gram quantity of this solid waste, the radioactive component, which has a relatively low specific activity, has an estimated weight of 100 milligrams (mg) and the hazardous component, which is a compound of arsenic, has an estimated weight of 18 mg. It is unlikely that this waste material exhibits the characteristic of toxicity, as described in 40 CFR 261.24 (which is necessary for it to be classified as a mixed waste), because the arsenic compound is found in the scrap material in an insoluble form (the radioactive constituent is also bound). However, the toxicity characteristic leaching procedure (TCLP) must be performed in accordance with appendix II of 40 CFR 261 to make this determination. If the solid material is determined to be a mixed waste, treatment of this waste, if necessary to eliminate the characteristic of toxicity, would have to be identified prior to generation or it would have to be included in a Federal Facility Compliance Agreement, consistent with the *Federal Facility Compliance Act.*

Each of the functions transferring to SNL from Mound and Pinellas have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, SNL would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site specific reduction goals, and strategies for preventing or minimizing generation of pollutants.

The additional waste streams generated as a result of the increases in nonnuclear manufacturing activities at SNL would be well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.5.9 *Human Health: Facility Operations and Accidents*

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.1. Information specific to SNL is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (4.1.5.2 and 4.1.5.3, respectively), the chemical pollutant levels from SNL operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public associated with radiological releases are also well below applicable permit, regulatory, and DOE operational requirements (SNL, 1991).

A review of the recent SNL annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Environmental Consequences. The Air and Water Resources sections discuss the chemical releases associated with relocating the neutron generators, cap assemblies, thermal batteries, and special products functions identified in section 3.3.5 to SNL. As shown, the cumulative impacts resulting from existing releases and the release of chemicals associated with relocating these functions at SNL are below applicable permit, regulatory, and DOE operational requirements.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated to remove the toxicants before combining with sanitary wastewater and discharge to the city of Albuquerque wastewater treatment plant. Furthermore, all stormwater releases of the pollutants are below NPDES limits and surface water quality is not adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at SNL, all possible HAPs were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, chromium trioxide, methylene chloride, nickel chloride, toluene, TCA, and TCE. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is

independent of a cancer risk which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for SNL (see table F-18a) were 0.0479 for onsite (worker effects) and 0.0024 at the site boundary (effect on the public) on an annual basis and the incremental changes in Hazard Indexes due to the Proposed Action were 0.046 for onsite and 0.0023 at the site boundary. Therefore, the Proposed Action cumulative Hazard Indexes at the site are well below a value of 1.0.

Two of the chemicals identified, methylene chloride and TCE, are considered to be carcinogens and the cancer risk to individuals for each was calculated. The combined risk for the carcinogens was calculated as 6.0×10^{-6} onsite (worker) and 3.0×10^{-7} at the site boundary (public) (see table F-18b). The incremental change due to the Proposed Action contributed the entire risk; however, the concentrations of methylene chloride and TCE did not include mitigation controls on the emissions and a single source term was used. Therefore, the excess cancer risk to workers is a conservative estimate. Worker exposure to these solvents will be minimized through a combination of engineering and administrative controls. Control options under consideration include the use of fume hoods, glove boxes, substitution with less toxic solvents, process changes, and elimination of unnecessary solvent cleaning steps. These controls ensure that no worker is exposed beyond the PELs as established by OSHA.

A series of engineering and administrative controls will be implemented at SNL to ensure that worker exposures to these chemicals are kept As-Low-As-Reasonably-Achievable. No worker will be exposed above the PELs established by OSHA. Releases of radioactive materials from SNL result in a total maximum individual annual dose on the public of 0.002 mrem effective dose equivalent (SNL, 1991). The resulting risk of potential fatal cancers associated with 1 year of operations would be 8.9×10^{-10} to that individual. The dose increment associated with the increase in tritium emissions would be 0.022 mrem effective dose equivalent and would result in an increased risk of 9.8×10^{-9} potential fatal cancers from 1 year of operation. Risks less than 10^{-6} are considered acceptable by EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

The average doses to workers at SNL associated with tritium-handling activities would be less than those at SRS since the tritium inventories and level of tritium-handling activities at SNL would be much less than those at SRS. Based on worker dose experience at SRS (see section 4.1.2.9), the average dose to workers at SNL is expected to result in incremental and cumulative doses of less than 0.011 and 0.281 mrem, respectively. This would result in an incremental and cumulative cancer risk of less than 4.9×10^{-9} and 1.3×10^{-7}, respectively.

In summary, these analyses show that a small excess cancer risk to workers is possible from the normal release of hazardous chemicals/chemical pollutants at SNL as a result of the Proposed Action. These impacts would be mitigated using a combination of engineering and administrative controls.

Accidents associated with the neutron generators and activities similar to the cap assemblies, thermal batteries, and special products functions at SNL have been analyzed previously and are documented in an EA (SN DOE, 1992a). The accidents analyzed included the release of tritium. Both natural and man-made external initiating events were considered (e.g., human errors, fires, explosions, and airplane crashes). Safety procedures and requirements have been developed and implemented for these activities at SNL. These procedures and requirements establish the safety conditions under which operations must be performed. Additionally, due to the projected reduction in workloads, operations and inventories of neutron generators, cap assemblies, thermal batteries, and special products functions currently at SNL would be reduced. Therefore, even including the operations and inventories that would be moved from other DOE sites to SNL, operations

and inventories would be below those that currently exist at SNL.

Currently, SNL operations consume 1,152,000 ft^3 of hydrogen per year. SNL's current storage capacity for hydrogen is 76,000 ft^3. Therefore, storage is recharged approximately 15 times per year to meet the current demand for hydrogen. The functions proposed to be relocated to SNL would result in the consumption of an additional 2,118,000 ft^3 of hydrogen per year. No new storage capacity for hydrogen would be constructed as part of the Proposed Action. While the increased demand for hydrogen would result in a higher recharge rate, the storage and distribution systems and practices would not change as a result of the Proposed Action.

As discussed in section 3.3.5, the neutron generators, cap assemblies, thermal batteries, and special products functions involve operations and use of chemicals that are the same as or similar to those currently being performed and used at SNL. Even if there were no projected reduction in workloads, the annual usage of chemicals that are of concern because of their hazardous nature, methylene chloride and TCE, would increase by only 9 and 10 percent, respectively. Therefore, the current accident profile at SNL would not change as a result of relocating these functions to SNL.

4.1.6 Closeout Complex Missions at Mound

A detailed discussion of Mound's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.2. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at Mound and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on the closeout of Complex missions at Mound, is also provided in the chapter 4 introduction and in section 4.1.

4.1.6.1 *Land Resources*

Affected Environment. Mound is located in Miamisburg, OH, approximately 10 miles south-southwest of Dayton (figure 3.2.2-1). Generalized land uses at Mound and in the vicinity are shown in figure 4.1.6.1-1. Residential distribution of Mound employees is discussed in section 4.1.6.7.

Mound is subdivided into a 183-acre northern half and a 123-acre southern half. The northern half consists of a heavily industrialized area with a high density of 120 buildings, an internal road network and parking lots, a government-owned railroad spur, a spoils area, and a small testing ground and surrounding buffer zone. The Main Hill Area, SM/PP Hill Area, and the Valley Area are located in the northern half (figure 3.4.1-2). The southern half, called the "New Property Area," is a former farm, which currently consists of wooded areas, old fields, and a parking lot.

Mound is located within the center of the urban service area defined by the *Comprehensive Development Plan for Montgomery County* (Montgomery County, 1988). County policies encourage development inside the urban service area boundaries, but discourage development outside them; the intent is to preserve prime farmland. There are no prime farmlands on Mound. Mound, which is zoned industrial, is located on the southwest corner of developed Miamisburg (Miamisburg, 1991).

Residential use adjacent to the Mound site is generally low density. The closest residence is 46 feet east of the Mound boundary. Much of the adjacent land use consists of the Mound Golf Course and Mound Park (both municipal facilities). Mound does not contain any public recreation facilities.

Construction and operations of the DOE facilities have heavily disturbed the landscape character of

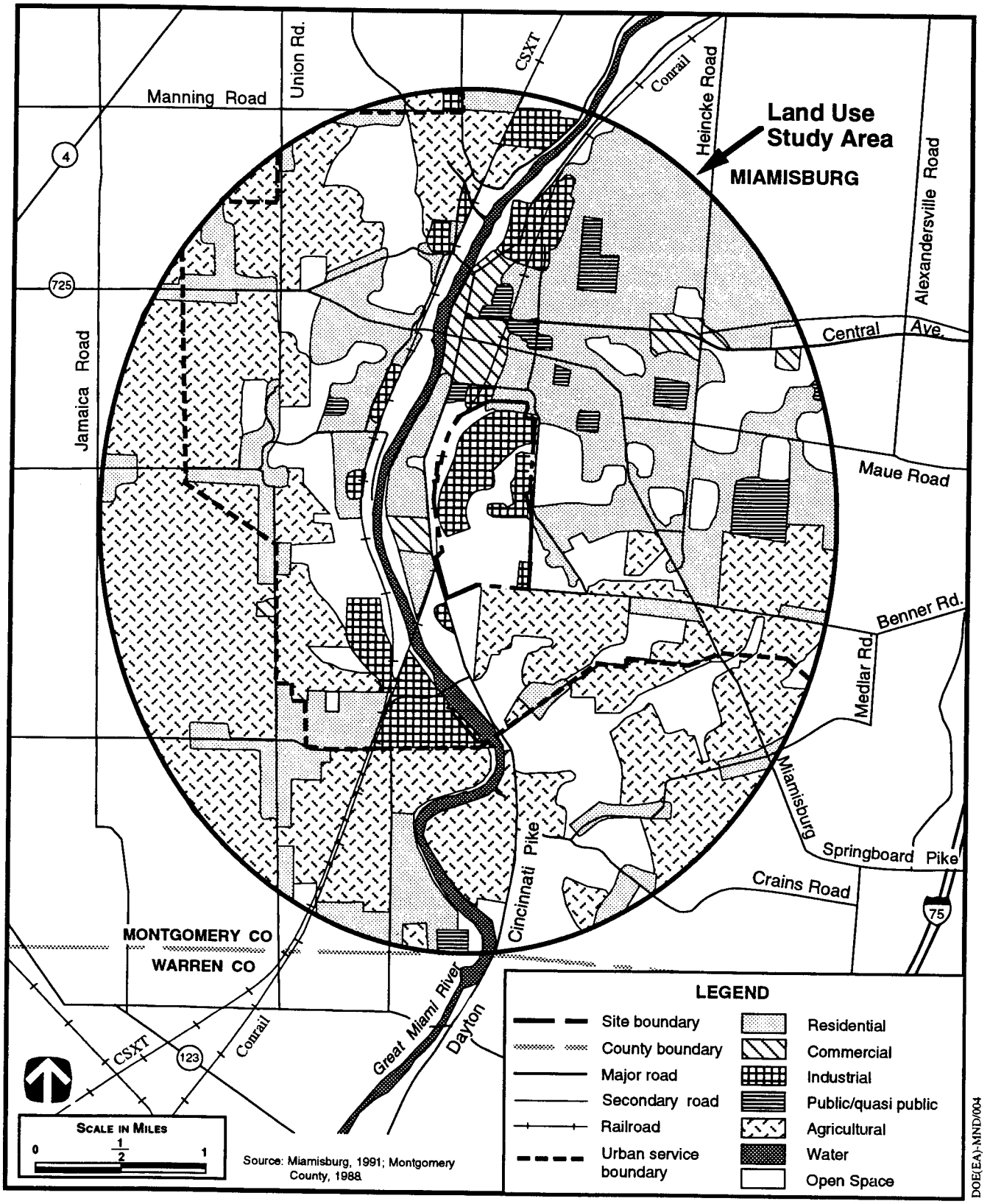

FIGURE 4.1.6.1–1.—*Generalized Land Use at the Mound Plant and Vicinity.*

the site. Development on the site has mainly occurred on the northern portion. Most of the buildings are one to two stories; the tallest is approximately five stories. The most visually dominant features on the site include six stacks and two water tanks. The facilities, including the stacks and water tanks, are brightly lit at night and are highly visible. The majority of the development at Mound is on one of the highest points (940+ feet elevation) along this reach of the Great Miami River. Substantial portions of Mound are visible from 3 to 4 miles away, especially from the north and east. Views from the south are much more limited. Views from the west are limited by the high ridgeline that forms the west side of the river valley, generally 1 to 1.5 miles from the plant. Viewpoints impacted by DOE facilities include portions of downtown Miamisburg, Central Avenue, Miamisburg Road, Lower Miamisburg Road, Riverview Avenue, Miamisburg Mound State Memorial (immediately adjacent to the east boundary), Mound Golf Course, Hill Grove Cemetery, and various residential areas. The developed portion of the site is consistent with a Class 5 VRM designation.

Environmental Consequences. Land use at Mound would not change during the closeout period; therefore, no onsite land use impacts are expected. Future use of Mound surplus facilities would be evaluated in the transition process.

Closeout of Complex missions at Mound would not adversely impact the comprehensive planning and zoning of the city of Miamisburg, Montgomery County, and surrounding jurisdictions. A review of socioeconomic data in section 4.1.6.7 indicates no adverse impacts to regional recreational resources due to changes in employment at the plant. There are no construction or demolition activities planned as part of the closeout; therefore, the physical appearance of Mound would remain essentially unchanged and the VRM classification of the existing landscape would not be affected.

4.1.6.2 *Air Quality and Acoustics*

Affected Environment. The climate at Mound and in the surrounding region is characterized as being humid, continental, with warm summers, moderately cold winters, and moderate annual precipitation evenly distributed throughout the year (Trewartha, 1954). The annual average temperature in the area, as measured at the Dayton NWS station, is 51.9 °F; temperatures vary from an average daily minimum of 18.8 °F in January to an average daily maximum of 84.9 °F in July (NOAA, 1991a). Annual average precipitation is 34 inches. About 20 inches of snowfall are typically recorded per year. Maximum monthly precipitation measured at the Dayton NWS station ranged from 5.69 inches in September to 10.89 inches in June.

Ambient Air Quality. Mound is located within the Metropolitan Dayton Intrastate AQCR. The region is under the authority of the Regional Air Pollution Control Agency (RAPCA), which conducts a program to monitor ambient levels of criteria pollutants. This AQCR is designated as attainment by the EPA with respect to SO_2, NO_2, and CO (40 CFR 81.336). However, several counties within the AQCR, have been classified as nonattainment for TSP and O_3. The NAAQS and Ohio state ambient air quality standards for criteria pollutants, which are the same, are listed in table D2.1.1-1.

The Ohio EPA has standards for existing pollutants regulated by NESHAP. As of July 1991, the Ohio EPA has not promulgated standards for the additional 189 HAPs specified in the CAA. However, the Ohio EPA uses the American Conference of Governmental Industrial Hygienists list of pollutant TLV. The HAPs/toxics described in this section are those currently used at Mound or those anticipated to be used under the Mound consolidation alternative.

Ambient air quality near Mound is monitored by the RAPCA monitoring program and that of the Southwestern Ohio Air Pollution Control Agency

(MD RAPCA, 1987-1991). The data for 1987 through 1991 are presented in table D2.1.2-1.

The principal sources of criteria air pollutants at Mound are the two boilers associated with the steam plant and the Keystone heat exchanger. Other sources include fugitive particulates from process emissions, emissions from laboratory operations, and vehicular emissions. Predominant HAP/toxic emissions from Mound include acetone and TCA. The emission inventories for Mound are presented in tables D2.1.2-2 and D2.1.2-3.

Normal operations in 1990 resulted in the emission of radioactive materials at Mound. These emissions included 1,823 curies of tritium (MD DOE, 1991a). The health effects of these emissions are discussed in section 4.1.6.9.

The air quality under ambient and No Action conditions at Mound is shown in table 4.1.6.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a

TABLE 4.1.6.2–1.—*Mound: Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline ($\mu g/m^3$)	Maximum Background Concentration ($\mu g/m^3$)[f]	No Action Concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)[g]
Carbon Monoxide (CO)	8-hour	10,000[a]	4,466[c]	1.0	4,467
	1-hour	40,000[a]	13,971[c]	2.0	13,973
Lead (Pb)	Calendar Quarter	1.5[a]	h	e	h
Nitrogen Dioxide (NO_2)	Annual	100[a]	h	0.4	≥ 0.4
Ozone (O_3)	1-hour	235[a]	h	e	h
Particulate Matter (PM_{10})	Annual	50[a]	29[c]	0.6	29.6
	24-hour	150[a]	93[c]	5.5	98.5
Sulfur Dioxide (SO_2)	Annual	80[a]	15.7[c]	0.002	15.7
	24-hour	365[a]	70.7[c]	0.01	70.7
	3-hour	1,300[a]	120.4[c]	0.02	120.4
Hazardous Air Pollutants and Other Toxic Compounds[d]					
1,1,1-Trichloroethane	1-hour	1,310[b]	h	42.5	≥ 42.5
Acetone	1-hour	42,380[b]	h	56.6	≥ 56.6
Ammonia	1-hour	405[b]	h	25.9	≥25.9
Hydrogen Chloride	1-hour	179[b]	h	16.5	≥16.5
Isopropyl Alcohol	1-hour	23,405[b]	h	20.9	>20.9
Trichlorotrifluoroethane	1-hour	182,619[b]	h	17.5	≥17.5

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a Federal standard (40 CFR 50).
b State standard (Ohio EPA, 1991).
c Ambient air quality monitoring data (MD RAPCA, 1987-1991).
d The compounds listed are the major pollutants of concern.
e Not estimated because the potential release is negligible.
f The maximum of the concentrations as measured from the area ambient monitoring stations.
g The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
h Data unavailable.

conservative estimate of effects of the No Action alternative on air quality. Baseline air quality concentrations from Mound do not exceed, and are not expected to exceed, any applicable guidelines or regulations.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources at Mound include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, vehicles, and explosive detonation). No sound-level measurements have been made around Mound. At the site boundary, away from most of these industrial facilities, noise from these sources would be barely distinguishable from background noise levels. The acoustic environment along the Mound site boundary is assumed to be that of a suburban or urban location with typical DNL in the range of 53 to 62 dBA (EPA, 1974). Sound levels in the more rural areas south of the plant may be more typical of a rural area with typical DNL in the range of 35 to 50 dBA. Some noise from explosives detonation can occasionally be heard at the western site boundary. The primary source of noise at the site boundary and in nearby residential areas is traffic. During peak traffic periods, vehicles traveling to and from Mound are a major contributor to traffic noise in the residential areas near the plant.

The State of Ohio has not established specific numerical environmental noise standards applicable to Mound. The city of Miamisburg has set maximum sound-level limits for residential, commercial, and industrial property boundaries as described in appendix D, section D2.2.2. Maximum sound levels at a residential property boundary are limited to 60 dBA during the hours of 7 a.m. to 9 p.m. and 50 dBA during the hours of 9 p.m. to 7 a.m.

Although sound levels at nearby residences may exceed the city of Miamisburg noise limits and the EPA guideline level for residential areas, they result primarily from traffic noise and not noise from Mound facilities.

Environmental Consequences.

Air Quality. Mission closeout of Complex missions at Mound would reduce emissions of criteria, hazardous and toxic air pollutants. The air quality in the vicinity of Mound would likely improve with the reduction of pollutant sources (table 4.1.6.2-1). Closeout of Complex missions would also reduce emissions of tritium.

Acoustic Conditions. Mission closeout would reduce staff levels and, therefore, traffic volumes on nearby streets in Miamisburg. Some minor reduction in traffic noise levels would also be expected. A minor reduction in sound levels in the community is expected to result from elimination of noise sources on the site.

4.1.6.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at Mound.

Surface Water. The Great Miami River borders Mound to the west and is the predominant hydrological feature in the region (figure 3.2.2-1 and 3.2.2-2). The river is classified for recreation, agriculture, and water supply uses. There are no natural surface water bodies onsite (MD DOE, 1979), although there is a drainage basin in a valley between the two highest areas of the facility. The basin is small with relatively steep slopes, so runoff is rapid and poses no threat to structures. The Great Miami River has an average flow of 2,436 ft^3/s for the 45 years of record (MD DOE, 1987a). In 1990, the flow in the Great Miami River averaged 3,369 ft^3/s, with a minimum of 489 ft^3/s and a maximum of 23,385 ft^3/s (MD DOE, 1991a).

As part of the flood mitigation program, a flood control system was constructed along the Great Miami River and its tributaries. This system, managed by the Miami Conservancy District, includes five dams (four are located above Miamisburg). All existing facilities are located 710 feet above mean sea level (MSL) and the 500-year floodplain is estimated at 703.1 feet above MSL. Levees constructed along the banks of the Great Miami River near the Mound facility have crest elevations ranging from 705 to 706.5 feet above MSL (DOE, 1988).

The site has three principal wastewater collection systems: sanitary wastewater, stormwater (which receives significant amounts of noncontact cooling water), and radioactive wastewater. Each system leads to a treatment unit before ultimately discharging to the Great Miami River. The units are the sanitary wastewater treatment plant, the stormwater retention pond, and the radioactive waste treatment plant. Existing sanitary wastewater generation is estimated at approximately 47 MGY (table 3.2.2-2). Effluent streams are monitored to ensure no undetected discharges occur (MD DOE, 1987a).

The effluents from the sanitary wastewater treatment plant and the radioactive waste treatment plant are combined into one pipeline just outside Mound and discharged to the Great Miami River (MD DOE, 1987a). Stormwater discharges through a culvert into the abandoned Miami-Erie Canal. It then empties into a drainage ditch and enters the river 1 mile south of where the wastewater pipeline discharges. No municipal system in the Great Miami River basin uses surface water for a public water supply below the Mound discharges, although surface waters are used by manufacturing and power companies along the basin for processing and heat exchange (MD DOE, 1979).

Surface Water Quality. Routine surface water monitoring, in accordance with EPA guidelines and the requirements of the NPDES permit, consists of sample collection at various discharge points (outfalls) within the facility and along the Great Miami River. The effluent locations have been sampled for total toxic organics, NPDES-required nonradiological parameters, and radionuclides. The surface waters have been analyzed for radiological parameters only (MD DOE, 1991a).

In 1990, 813 effluent samples were collected for analysis. Four occasions of noncompliance with permit limits were detected, all involving the biochemical oxygen demand of the wastewater treatment plant effluent. The exceedances occurred in January and February 1990, and had no measurable impact on the water quality of the Great Miami River (MD DOE, 1991a). There were no parameters that exceeded water quality criteria.

In 1990, river water sampling locations for radionuclides were selected to be representative of water after mixing with the Mound effluents. Water samples were analyzed regularly for tritium, plutonium-238, uranium-233/234, and uranium-238. The 1990 surface water monitoring results for downstream locations on the Great Miami River are presented in table 4.1.6.3-1 (MD DOE, 1991a). There were no parameters that exceeded water quality criteria.

Groundwater. There are three aquifer units in the area, including outwash, glacial till, and limestone. The most important is the outwash aquifer unit, which lies at a depth of 5 to 15 feet below the ground. It consists of 200 feet of fine sand, coarse sand, gravel, and cobbles that were deposited by streams. The glacial till aquifer unit lies at a depth of 20 to 40 feet below the ground surface. It consists of 30 feet of poorly sorted silt, sand, and gravel in a clay matrix. The number of till zones and their lateral extents vary, and the thickness of the zones range from 10 to 50 feet. The bedrock aquifer unit lies at a depth greater than 50 feet below the ground surface. It consists of 50 feet of interbedded limestone and shale. These rocks are exposed east of Mound.

TABLE 4.1.6.3–1.—*Summary of Surface Water Quality Monitoring at Mound Plant*

Receiving Water: Great Miami River—1990				
Parameter	Unit of Measure	Water Quality Criteria[c]	Existing Water Body Concentration	
			Average	Maximum
Plutonium-238	pCi/L	1.6[b]	0.00081	0.00563
Tritium	pCi/L	20,000[a]	40	220
Uranium-233, 234	pCi/L	20[b]	0.07	0.22
Uranium-238	pCi/L	24[b]	0.09	0.18

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[a] Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
[b] U.S. Department of Energy Derived Concentration Guides (DCG) for Water. DCG values are based (DOE Order 5400.5) on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
[c] Drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards—they do not constitute an enforceable limit.

Source: MD DOE, 1991a.

TABLE 4.1.6.3–2.—*Summary of Groundwater Quality Monitoring at Mound Plant*

Parameter	Unit of Measure	Water Quality Criteria	1990—Existing Conditions[a]	
			Average	Maximum
Plutonium–238	pCi/L	1.6[c]	0.0044	0.044
Tritium	pCi/L	20,000[b]	3,300	4,600
Uranium–233/234	pCi/L	20[c]	0.19	0.27
Uranium–238	pCi/L	24[c]	0.17	0.23

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[a] Samples were taken onsite at the Mound Plant.
[b] Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
[c] U.S. Department of Energy 4 percent of Derived Concentration Guides (DCG) for Water (DOE Order 5400.5).

Source: MD DOE, 1991a.

The aquifers that lie beneath the plant are considered Class II, current and potential sources of drinking water and waters having other beneficial uses.

Groundwater flow is toward the central valley area from both the east and west, then southwest down the valley. The general hydraulic gradient in the outwash aquifer under the valley floor is southwest at 5 to 10 feet per mile. The groundwater level varies seasonally and yearly, and ranges from 681 to 696 feet. The groundwater table has declined under conditions of heavy use and drought but recovers when conditions reverse. Mound's water supply is taken from three onsite wells (MD DOE, 1987b).

Groundwater Quality. The water quality of the aquifers near Mound and in the region as a whole is good. Scattered areas may contain objectionable concentrations of iron and manganese.

Water samples are periodically collected from community supplies in the surrounding area, private wells, and Mound's onsite wells. The wells onsite at Mound are analyzed for plutonium-238, uranium-233/234,-238, and tritium (table 4.1.6.3-2). Analyses show that plutonium concentration levels in all cases are well below DOE and EPA limits. Samples from some locations have been analyzed for uranium; concentrations and isotopic ratios are typical of naturally occurring background levels in the shales and other rocks of the area. Tritium levels are within EPA maximum contaminant levels. Nonradioactive pollutant levels are also within water quality criteria.

Groundwater Use. The lower Great Miami River Valley is an important user of groundwater. The many supply wells in the region furnish approximately 97 percent of the regional water supply. The wells range in yield from a few to 3,000 gallons per minute (gpm). The most important production is from the thicker, cleaner portions of the outwash aquifer; nearly all municipal supplies are from this source. The upland till areas supply water to small domestic and farm units.

The major regional use of groundwater is municipal; other uses include industrial and noncommunity domestic; there is no agricultural use. Mound has three production wells onsite that supply mainly drinking and process water from the glacial till aquifer. Current groundwater use is approximately 0.5 MGD (table 3.2.2-3).

Groundwater Rights. Groundwater rights in Ohio are held by the landowner. Mound has the right to develop its own wells and withdraw water in quantities sufficient to meet its needs.

Environmental Consequences. Closeout activities for Mound would require no new construction and all current DP operations would cease.

Surface Water. Because existing facilities are not located in the 500-year floodplain, closeout would not affect floodplain areas.

Because no surface water is used at Mound and wastewater discharges would be reduced, no adverse impacts would be anticipated to water flow rates in the Great Miami River.

Surface Water Quality. Because surface water discharges would be reduced, there would be no adverse impacts on water quality from closeout activities.

Groundwater. By closing out Complex missions at Mound, a reduction of demand for local water supply would occur.

Groundwater Quality. Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances during closeout activities. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from transition activities associated with closeout of Mound Complex missions.

4.1.6.4 *Geology and Soils*

Affected Environment. Mound is located in the central stable interior. There are no capable faults at or in the vicinity of Mound. The closest capable fault is over 50 miles away and has not been active for over 60 years. The Mound area is in Seismic Zone 1 (ICBO, 1991). Historic earthquakes, including the New Madrid shocks of the 19th century, have resulted in a MMI of V or less in the Miamisburg area (Nuttli, 1990). There are no geologic concerns that would affect operations at Mound. Slopes are stable and seismic hazards pose little or no threat to Mound.

Soils that underlie Mound belong to the Milton-Ritchey-Millsdale association and are typically silt and clay loams formed on glacial till over limestone (MD USDA, 1976). Many of these soils rest on slopes of 2 to 6 percent, and some soils lie on slopes exceeding 25 percent. Miamian silt loams (2 to 6 percent slopes) and Milton silt loams (2 to 6 percent slopes) are designated prime farmland.

Most soils at Mound are moderately to severely eroded and are unsuitable for cultivation or have severe limitations because of the risk of erosion.

Environmental Consequences. The proposed closeout of Complex missions at Mound would not result in adverse impacts on the geologic features of the area, nor would the geology have any impacts on mission closeout activities at the plant.

However, the proposed mission closeout could result in minor beneficial impacts on the soils of the area.

Hazardous, radioactive, and mixed waste sources would be eliminated from the plant, thus decreasing future soil contamination potential.

4.1.6.5 *Biotic Resources*

Affected Environment. Terrestrial habitats at Mound are generally limited to the southwestern portion of the plant and to several slopes separating developed areas. The western half of the site supports a matrix of mowed grass, deciduous forest, and scrub-shrub communities in various stages of succession. Land surrounding the site is urbanized or under cultivation (section 4.1.6.1).

Wetland boundaries have not been delineated at the plant site. Wetlands at the Mound site are likely limited to a small area of seeps, narrow intermittent stream channels, some drainage ditches, and man-made ponds (MD DOE, 1991a).

No perennial streams occur on the site. Aquatic species found in the Great Miami River, located approximately one-half mile from the site, are listed in an EIS prepared earlier by the DOE (MD DOE, 1979). Recreational fishing is common in the river. Wastewater and stormwater are treated prior to discharge to the Great Miami River. Aquatic habitats in the vicinity of Mound are not significantly affected by Mound operations (MD DOE, 1987a).

The only Federally–listed threatened or endangered species potentially occurring in the vicinity of Mound is the Indiana Bat (*Myotis sodalis*) (a Federally- and state-listed endangered species). Although no bats have been officially recorded on the site, the Indiana Bat is known to occur in the surrounding area (MD FWS, 1991). Suitable habitat is thought to include riparian areas and nearby woodlots, especially those with dead trees or trees with peeling bark, such as the shagbark hickory (*Carya illinoisensis*) (MD DOE, 1991b).

Environmental Consequences. Closeout of Complex missions at Mound under the Proposed Action would not adversely affect biotic resources. Closeout of these missions would result in a reduction of existing operations impacts to natural habitats on and surrounding the site.

4.1.6.6 *Cultural Resources*

Affected Environment. The prehistoric chronology in western Ohio consists of five time periods: Paleoindian (10,000-8000 B.C.), Archaic (8000-1000 B.C.), Woodland (1000 B.C.-A.D. 700), Mississippian (A.D. 700-1600), and Protohistoric (A.D. 1600-1795) (MD Riordan, 1987; MD Willey, 1966). Site types identified in the area of Mound include burial mounds, villages, campsites, and limited activity sites. The Miamisburg Mound, an Adena burial mound, is located 400 feet east-southeast of Mound in the Miamisburg Mound State Memorial Park. This mound, a symmetrical conical earthwork, is one of the two largest Adena mounds recorded and is listed on the NRHP. About 62 percent of the Mound area has been developed or disturbed. In 1987, all undeveloped sections in the plant area were surveyed for cultural resources or assessed for the probability of containing sites (MD Riordan, 1987). Only one isolated artifact was recorded during the study.

The history of the region has been previously documented (MD Anson, 1970; MD Riordan, 1987; MD Kneeper, 1989). Archaeological remains of an 1865-1914 homestead were recorded on Mound property during the 1987 cultural resources survey (MD Riordan, 1987). The site lacked physical integrity and was recommended as not eligible for the NRHP; the Ohio SHPO concurred.

Prior to World War II, the Mound area was primarily used for agriculture. In 1943, the Manhattan Project developed the Dayton Project at three locations in Dayton, OH. Expansion of this project soon required the construction of facilities at Mound in 1946; the plant became operational in 1949 (History Associates, 1987). The buildings and facilities at Mound are not regarded as exhibiting architectural

integrity, nor are they representative of a particular style. It is unlikely that their documentation would contribute to the broad historical context of nuclear production. Therefore, the existing facilities are not likely to be considered eligible for the NRHP.

Native American groups who occupied or traversed the area include the Mosopelea, Shawnee, Miami, and Huron or Wyandot (MD Anson, 1970; MD Howard, 1981; MD Riordan, 1987). Site types which may be of concern to Native American groups include villages, burials, and cemeteries.

Environmental Consequences. The closeout of Complex missions at Mound does not include ground disturbance or building modifications and, therefore, would not affect cultural resources.

4.1.6.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at Mound is based on an ROI where 88 percent of Mound employees lived in 1991. The ROI includes Butler (9 percent), Montgomery (65 percent), and Warren (14 percent) counties in Ohio. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Carlisle (2 percent), Centerville (10 percent), Dayton (18 percent), Germantown (2 percent), Miamisburg (15 percent), and Middletown (6 percent) (see figure 3.2.2-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.6-1 through E3.6-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 27 percent, increasing from 380,253 in 1970 to 481,700 in 1990. Total employment increased from 360,836 to 456,100 between 1970 and 1990, an annual growth rate of about 1 percent. The unemployment rates for 1970 and 1990 were 5.1 percent and 5.3 percent, respectively. For the same years, personal income increased from approximately $3.8 billion to $16.6 billion (an annual average of 8 percent), and per capita income increased from $4,132 to $16,947.

Mound is located within the limits of the city of Miamisburg, which imposes a local income tax on all employees who work in Miamisburg, regardless of their place of residence. In 1992, the city's income tax collections totaled $7.5 million, of which almost $1.6 million (about 21 percent of the total) was contributed by 2,230 Mound employees. The city's total receipts in 1992 were $32.5 million, which includes beginning year balances and internal transfers. Without these transfers, total actual revenue in 1992 would be about $21.1 million. The total income tax collections represent 35 percent of these total actual revenues, and the Mound employees' contribution accounted for about 7 percent.

The importance of the local income tax for Miamisburg is largely due to the city's reliance on these revenues for the General Fund (almost $8.7 million), which accounts for approximately half of the total budget. Almost $4.8 million (66 percent) of the total income tax revenue accounts for 55 percent of the General Fund. Eighty-five percent of the Mound employee total income tax receipts is dedicated to the General Fund. The Mound employees' portion of the income tax revenue represents almost 16 percent of the General Fund (Miamisburg, 1993). General property taxes are the second major source of revenue, accounting for about 10 to 15 percent of the General Fund, while the balance comes from a variety of taxes, fines and forfeitures, and licenses and permits.

Between 1970 and 1990, employment at Mound increased from 1,875 to 2,138, representing less than 1 percent of the ROI employment in 1990 (MD EG&G, 1991b). Changes in mission requirements have historically led to fluctuations in employment levels over the period. For example, employment rose to 2,398 by 1985. As of September 30, 1992, employment at Mound had decreased to 1,719. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to 1,600 by the year 2000 (DOE, 1993c). In 1992, the total Mound payroll was estimated to be more than $48.4 million (MD EG&G, 1991b). Under the No Action baseline, the total payroll would be projected to be approximately $46 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 521,680 by 2000 and 523,780 by 2020. The unemployment rates for 2000 and 2020 are both projected to be 5.6 percent. For the same years, personal income is projected to increase from approximately $22.3 billion to $27.9 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $22,000 in 2000 to $26,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 7 percent to 979,197. During the same period, the Ohio population increased 2 percent. The population in the three-county ROI is projected to increase from an estimated 1,009,000 in 2000 to 1,084,000 by 2020, at an annual rate of less than 1 percent.

The largest county population increase (34 percent) occurred in Warren County between 1970 and 1990, while during the same years, population in Montgomery County declined 5 percent. Population in Warren County is estimated to increase 2 percent between 1990 and 2000 and 8 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Montgomery County population is projected to increase approximately 4 percent between 1990 and 2000 and an additional 7 percent between 2000 and 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Centerville had the greatest increase in city population (104 percent) in the ROI. For the same years, the Carlisle, Miamisburg, and Germantown populations increased 28 percent, 21 percent, and 20 percent, respectively, while the Dayton and Middletown populations decreased 25 percent and 6 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 35 percent from 290,740 to 391,809. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 3 percent by the year 2000 and an additional 7 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (69 percent) occurred in Warren County, while the smallest increase (22 percent) occurred in Montgomery County. The number of housing units in Warren County is expected to increase approximately 14 percent by 2000 and an additional 8 percent by 2020, an annual increase of less than 1 percent. The demand for housing units in Montgomery County is expected to decrease by 1 percent by 2000 and increase about 7 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 1 percent in the ROI and ranged from approximately 1 percent in Warren County to 2 percent in Butler County. The vacancy rates for rental units averaged 8 percent and ranged from 6 percent in Warren County to 8 percent in Butler and Montgomery counties.

Community Infrastructure and Services. The water supply systems operated by Dayton, Miamisburg, West Carrollton, Germantown, Hamilton,

Middletown, Franklin, and Warren County maintain about 96 percent of the total capacity of the 10 systems identified in the ROI. All of these systems draw their raw water supplies from groundwater.

Dayton (192 MGD capacity), Miamisburg (4.3 MGD capacity), West Carrollton (3.6 MGD capacity), and Germantown (1.3 MGD capacity) all operate systems in Montgomery County and had 1991 average daily demands of 45 percent, 49 percent, 38 percent, and 32 percent of capacity, respectively. The Franklin (4.7 MGD capacity) and Warren County (4.5 MGD capacity) systems in Warren County had 1991 average daily demands of 11 percent and 62 percent of capacity, respectively. Hamilton (25 MGD capacity) and Middletown (20 MGD capacity) operate systems in Butler County and had 1991 average daily demands of 70 percent and 55 percent of capacity, respectively.

Hamilton plans to increase its system capacity to 42 MGD by 1997, and the average daily demands on this system are projected to be about 72 percent of capacity in 1995 and 44 percent of capacity in 2000. Warren County's system is projected to have average daily demands of about 64 percent of capacity in 1995 and 65 percent of capacity in 2000. The other systems are all projected to have average daily demands of less than 56 percent of capacity in 1995 and less than 57 percent of capacity in 2000.

Dayton, Montgomery County, the Miami Conservancy District North Regional, the Miami Conservancy District Franklin Regional, Miamisburg, West Carrollton, Warren County, Hamilton, Middletown, Butler County, and Fairfield operate wastewater treatment systems in the ROI. In Montgomery County, Dayton (72 MGD capacity), Montgomery County (33 MGD capacity), the Miami Conservancy District North Regional (about 11 MGD capacity), West Carrollton (about 4.3 MGD capacity), and Miamisburg (3 MGD capacity) had 1991 average daily demands of 76 percent, 61 percent, 58 percent, 35 percent, and 67 percent of capacity, respectively. In Warren County, the Miami Conservancy District Franklin Regional (4.5 MGD capacity) and the Warren County system (about 3.6 MGD capacity) had 1991 average daily demands of 67 percent and 66 percent of capacity, respectively. Hamilton (32 MGD capacity), Middletown (26 MGD capacity), Butler County (10 MGD capacity), and Fairfield (10 MGD capacity), all in Butler County, had 1991 average daily demands of 69 percent, 81 percent, 81 percent, and 49 percent of capacity, respectively.

Butler County plans to increase its system capacity to 14 MGD by 1995 and is projected to have average daily demands of about 63 percent of capacity in 1995 and 2000. The other systems are projected to have average daily demands of less than 82 percent of capacity in both 1995 and 2000.

Thirty-three school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 1,073 students each in the New Miami and Wayne school districts to 27,662 students in the Dayton School District. The school districts operated between 62 percent and 103 percent of capacity. Those school districts operating over 100 percent of capacity were Mason (103 percent), Edgewood City (101 percent), and Huber Heights (101 percent). Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,956 per pupil. The statewide average pupil-to-teacher ratio was 17:1, and expenditures averaged $4,349 per pupil (OH DEd, 1990a, b, and c).

Fourteen hospitals serve the three-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 1,841 physicians served the ROI. The physician-to-population ratio for the ROI was 1.9:1,000, and ranged from 0.7:1,000 in Warren County to 2.5:1,000, in Montgomery County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Thirteen city, county, and state law enforcement agencies provide police protection in the ROI. In

1990, the largest law enforcement agency in the three-county ROI was in the city of Dayton, with 594 sworn officers or 3.3 sworn officers per 1,000 persons. Other large agencies are in Montgomery County with 183 sworn officers or 0.3 sworn officers per 1,000 persons and Butler County, with 89 sworn officers or 0.3 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.1 per 1,000 persons (FBI, 1991).

Forty fire departments and 2,286 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Montgomery County (912 firefighters; 1.6 firefighters per 1,000 persons) and in the city of Dayton (424 firefighters; 2.3 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.3 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to Mound is provided by Mound and Benner roads. All onsite roads, except for Mound Avenue, are DOE-owned and -controlled, with access restricted to employees and official visitors.

Estimated traffic along segments providing access to Mound is projected to contribute to differing service level conditions in accordance with population growth. Benner and Mound roads, as well as 6th Street, would generally support congestion-free traffic flow. Main Street, however, would typically experience some congestion. Along this roadway, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in some congestion. In addition, estimated truck traffic into Mound for delivery of supplies and removal of wastes would typically average 170 trips per day. However, the additional traffic volumes associated with continued operation of Mound are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to Mound (OH DOT, 1992).

Other modes of transportation within the ROI include public transportation systems, railways, and waterways. Public transport to Mound is provided by the Dayton Regional Transit Authority. A plant bus system provides transportation between facilities on the site. Major railroads in the ROI include Consolidated Rail Corporation (Conrail), CSX Transportation, and the Norfolk Southern Corporation. A Conrail spur line accesses the site from the west via Miamisburg. The Great Miami River is located on the west side of Mound but is not considered a navigable waterway.

Dayton International Airport (29 miles north of the site) and the Greater Cincinnati International Airport (69 miles south of the site) serve the ROI. Both provide passenger and cargo service via national and international carriers. Numerous smaller airports are located in the ROI (DOT, 1991).

Environmental Consequences. The employment figures for the Proposed Action are shown in table 3.3-1 in section 3.3. As a result of ongoing planning and the proposed Fiscal Year 1994 budget figures, DOE has revised the estimate of post consolidation work force figures which reflect a loss of 1,020 jobs instead of 1,070 jobs (DOE, 1993c and d). The analysis presented in table 4.1.6.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 1,070 lost jobs. The estimate of 1,020 lost jobs is 5 percent lower than the 1,070 job loss used in the following analysis, and the lower job loss estimate would result in slightly lower negative economic consequences. The Proposed Action would result in minor decreases in economic activity and employment in the ROI. Based on the employment requirements for the transferred functions from Mound, employment would decrease in the ROI by an estimated 2,846 jobs (1,070 direct and 1,776 indirect). This reduction in jobs would not increase the unemployment rate in the year 2000 beyond the

projected baseline level of 5.6 percent. Earnings in the ROI would be reduced by about $93.1 million, with a related decrease in the total personal income of $119.3 million.

It is estimated that the city of Miamisburg would lose $760,000 in income tax revenue in the year 2000 as a result of the loss of direct employment at Mound. This represents a 10-percent loss in total income tax revenue, a 9-percent loss in General Fund revenue, and a loss of almost 4 percent in total actual revenues. There will also be a small loss due to indirect employment losses in Miamisburg.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.6.7-1. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 1,009,000. The cities of Germantown, Miamisburg, and Carlisle would be the most affected. Germantown and Miamisburg would each lose about 1 percent of their projected populations, and Carlisle would lose about 2 percent of its projected population.

The less than 1-percent change in population after phasing out the nonnuclear functions would create an estimated 568 additional vacant housing units, which is a less than 1-percent increase. The smaller cities of Miamisburg, Germantown, and Carlisle would be the most affected, but with no more than a 2-percent increase in the number of vacant housing units.

The less than 1 percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for

TABLE 4.1.6.7–1.—*Mound Plant Proposed Action Economic and Population Characteristics*

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	521,680	NA
Baseline Unemployment Rate	5.6 %	NA
Baseline Personal Income (Thousands $)	$22,344,200	NA
Baseline Per Capita Income ($/Person)	$22,146	NA
Baseline Employment	492,213	NA
Direct Jobs Lost	1,070	0.22
Indirect Jobs Lost	1,776	0.36
Out-Migrating Workforce	560	0.11
Total Out-Migration	1,421	0.14
Population Decrease		
Butler County	149	0.05
Middletown	94	0.20
Montgomery County	1,050	0.18
Centerville	162	0.74
Dayton	283	0.15
Germantown	74	1.45
Miamisburg	246	1.33
Warren County	222	0.19
Carlisle	93	1.87
ROI (County Total)	1,421	0.14

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; OH BES, 1991; DOE, 1993c.

police and fire services in the ROI counties and cities would not be affected, and local traffic conditions would improve slightly.

4.1.6.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the Mound waste management baseline is provided in section 3.2.2.3 and appendix A, section A.2. Because there are no TRU wastes associated with any of the Complex activities at Mound that would be closed out due to the Proposed Action, no further discussion of TRU waste management or generation is presented. However, disposal of existing TRU waste and waste generated as a result of transition activities would be addressed in the EM transition plan.

Generation of all waste types at Mound is expected to decrease with time, as production operations are expected to be reduced. Additionally, Mound's Pollution Prevention Program would systematically reduce waste generation through specific waste minimization projects and the use of process waste assessments.

All radioactive and mixed waste management activities conducted at Mound, including requirements for handling, storage, and shipping of LLW and mixed waste, are covered by many DOE orders, Federal and state statutes, and regulations such as RCRA (see chapter 5). All solid LLW is stored onsite in LLW management facilities, and transported by commercial carriers in closed vans to NTS for burial. Mixed waste is containerized and stored in Building 23 at Mound, pending completion of waste characterization and identification of an acceptable waste treatment/ disposal option by DOE. It is anticipated that Mound's Glass Melter thermal treatment unit would be available for treatment of much of this waste in 1994.

The addition of a new facility, which incorporates 7,800 ft^2 of storage space, when combined with the existing 2,400 ft^2 of Building 72, would result in 10,200 ft^2 of available hazardous waste storage area. The storage area would meet RCRA and TSCA facility standards. All waste stream residue generated at Mound that is not reclaimed or recycled onsite is manifested and shipped under contract with DOT-registered transporters to RCRA or TSCA-permitted offsite treatment and disposal facilities.

Mound has implemented a waste minimization and pollution prevention program using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Process solvent substitution has been evaluated for a number of production processes and the paint shop has converted to using water-based paints as practical. Additionally, onsite and offsite recycling is being employed for wastes such as spent circuit etch solution, lead acid batteries, and discard chemicals.

Environmental Consequences. Closeout of Complex missions at Mound would reduce annual onsite hazardous waste management by approximately 50,900 lb for DP operations. Over 99 percent of the reduction would be due to decreased generation and landfilling of industrial wastewater pretreatment sludge. The remaining less than 1 percent of the hazardous waste reduction is due to generation and disposal by incineration of bulk acid liquids.

Closeout of Complex missions would also initiate closure of existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Ohio EPA. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to RCRA-permitted treatment and disposal facilities. Equipment, structures, and soils (if contaminated) must also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements.

Existing inventories of TRU waste, LLW, mixed waste, and classified waste would be shipped offsite

to DOE disposal facilities certified to accept such wastes.

Even with the closeout of Complex functions, Mound will need to continue to treat alpha wastewater from plutonium D&D activities and discharge pretreated process wastewater and sanitary wastewater effluents into the Great Miami River.

The Burn Area at Mound would no longer treat explosive/reactive wastes. Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, scrap, and metal containers would no longer be generated. Trash that would have been disposed of in the local sanitary landfill by a commercial contractor would cease, extending the operating life of the landfill.

4.1.6.9 *Human Health: Facility Operations and Accidents*

Affected Environment. As discussed in the Air and Water Resources sections for Mound (4.1.6.2 and 4.1.6.3, respectively), the chemical pollutant levels from Mound operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public from radiological releases are also well below applicable permit, regulatory, and DOE operational requirements (MD DOE, 1991a).

A review of the recent Mound annual environmental reports and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge to remove toxicants. Furthermore, all releases of the pollutants are below NPDES limits and water quality is not adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

All possible HAPs from Mound were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, ammonia, trichlorotrifluoroethane, isopropyl alcohol, and TCA. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The existing Hazard Indexes for Mound (see table F-15a) were 0.0011 onsite (worker effects) and 0 at the site boundary (effect on the public) on an annual basis. No chemicals posing a potential cancer risk were identified.

Releases of radioactive materials from Mound result in a total maximum individual annual dose of 0.16 mrem effective dose equivalent (MD DOE, 1991a). The resulting risk of potential fatal cancers associated with 1 year of operations would be 7.1×10^{-8}. Risks less than 10^{-6} are considered acceptable by the EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

Environmental Consequences. Closeout of Mound Complex missions would result in no additions of hazardous material to, but rather the transfer of DP operations from, Mound to other DOE sites. Consequently, closeout would result in a

decrease in adverse effects at Mound. The impacts at the DOE facilities that would receive the relocated DP missions from Mound are discussed in their respective sections.

4.1.7 Closeout Complex Missions at Pinellas

A detailed discussion of the current missions at Pinellas, facility/process description, and waste treatment and management activities is provided in section 3.2.3. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at Pinellas and the environmental assessment methodologies for each resource area discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on the closeout of Complex missions at Pinellas, is also provided in the chapter 4 introduction and section 4.1.

4.1.7.1 *Land Resources*

Affected Environment. Pinellas is located in the unincorporated Greater Seminole Area of Pinellas County, adjacent to the northwestern city limits of Pinellas Park. The city limits bound portions of the plant on the north, east, and south (Pinellas County, 1989). Pinellas County is the most highly urbanized county in the State of Florida. Urban land use surrounding the plant is shown in figure 4.1.7.1-1. The residential distribution of Pinellas employees is discussed in section 4.1.7.7. There are no prime farmlands on Pinellas.

Pinellas is a heavily industrialized facility. There is one principal building (Building 100) surrounded by other accessory structures and parking lots which occupy approximately 55 acres, while another 42 acres are essentially open space. The remaining 3 acres are occupied by the Pinellas Childcare Development Center/Partnership School with a maximum enrollment of 240 children and a staff of 25 to 30. The school is located approximately 150 feet east of Building 100 (PI DOE, 1990a).

The comprehensive plans of Pinellas County and the city of Pinellas Park have policies encouraging industrial development inside the boundaries of their defined industrial areas. Pinellas County has zoned the Pinellas site as "Light Manufacturing and Industrial District (M-1)." Approximately 57 acres of additional M-1 zoned land abuts the site on the north; of the 57 acres, 43 are vacant. The city portion of the industrial area is zoned both M-1 and "Industrial Planned Use Development." An additional 39 acres of an inactive landfill zoned "Public" (owned by the Pinellas County School Board) is also located north of the plant. The school board has also acquired 40 acres of a former industrial plant, zoned M-1, east of the plant.

The closest residences to the plant site perimeter are two caretaker facilities located approximately 550 feet and 610 feet north. A 270-unit apartment complex is located approximately 910 feet north. The nearest single-family residential subdivisions are located approximately 1,015 feet northeast and northwest of the plant perimeter. Other than the playground of the school, there are no recreation areas at Pinellas.

The natural landscape of the plant and vicinity has been altered to that of a highly developed area. Viewpoints of the plant site are limited to roads and adjoining property that present clear, unobstructed views of the plant facility. The Lake Allen area, an expanding residential area north of the plant, has views of the facilities. The facilities, however, are mostly screened by a strip of woodland, with only higher structures, such as outdoor security lighting, antennas, towers, and some tanks and roofs, visible from the residential subdivisions. The Pinellas landscape is consistent with a Class 5 VRM designation.

Environmental Consequences. Land use within the Pinellas site would not change during the Complex mission closeout; therefore, no onsite land

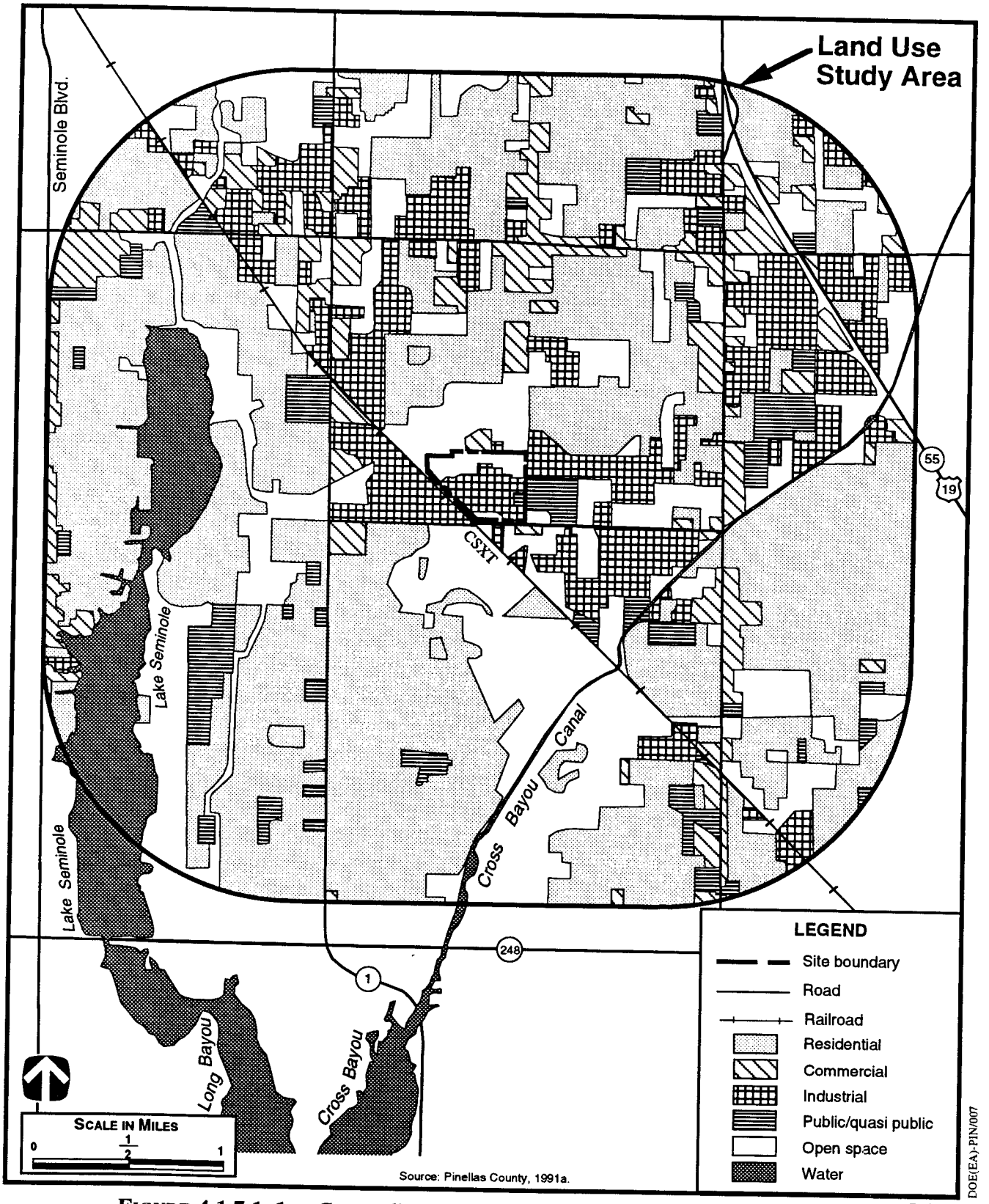

FIGURE 4.1.7.1–1.—*Generalized Land Use at the Pinellas Plant and Vicinity.*

use impacts are expected. Future use of Pinellas surplus facilities would be evaluated in the transition process.

Closeout of Complex missions at Pinellas would not adversely impact the comprehensive planning and zoning of Pinellas County, the city of Pinellas Park, and surrounding jurisdictions. A review of socioeconomic data in section 4.1.7.7 indicates no adverse impacts to regional recreation resources due to changes in employment at the plant. No construction or demolition activities are planned as part of the missions closeout; therefore, no affect to visual resources or VRM classifications is expected.

4.1.7.2 *Air Quality and Acoustics*

Affected Environment. The climate at Pinellas and in the surrounding region is subtropical marine, characterized by long, humid summers and mild winters (Trewartha, 1954). The annual average temperature in the area as measured at the Tampa NWS station is 72 °F; temperatures vary from an average daily minimum of 49.5 °F in January to an average daily maximum of 90.3 °F in August (NOAA, 1991b). Annual average precipitation is 47 inches, with most occurring between June and September.

Ambient Air Quality. Pinellas is located within the West Central Florida Intrastate AQCR. This AQCR is designated as attainment by EPA for all criteria pollutants with the exception of O_3 (40 CFR 81.310). The NAAQS and Florida State Ambient Air Quality Standards (which are the same as the NAAQS) are listed in table D2.1.1-1. Pinellas does not conduct any onsite or offsite ambient monitoring for criteria pollutants or HAPs (PI DOE, 1989).

The Florida Department of Environmental Regulation has standards for the existing HAPs regulated by the NESHAPs. In addition, the Florida Department of Environmental Regulation maintains a working list of toxics that is used as a tool in regulatory and air permitting analyses. This list, published in January 1992, is Revision 3 of the *Draft Florida Air Toxics Permitting Strategy Guidelines* (FL DER, 1992) and covers 751 compounds including all 189 HAPs listed under Title III of the CAA. The HAPs/toxics described in this section are those currently used at Pinellas or those anticipated to be used under Pinellas consolidation alternative.

Ambient air quality within and near Pinellas is monitored by the state for each of the criteria pollutants. The ambient air quality data for SO_2, O_3, and CO collected at these stations during 1990 are presented in table D2.1.3-1. The O_3 standard is exceeded primarily due to vehicular emissions, which is typical of most urban areas.

The principal sources of criteria air pollutants at Pinellas are the boilers and diesel generators in Building 500. Buildings 100, 700, and 1040 are sources of particulate and solvent emissions (PI DOE, 1992d). Other sources include vehicular emissions (PI DOE, 1989). The emission inventories for criteria pollutants at Pinellas are included in table D2.1.3-2.

HAPs/toxics emitted to the atmosphere from the plant include methylene chloride, diethanolamine, and TCE, as well as cadmium, Pb, and mercury (PI DOE, 1992d). HAP/toxic sources include laboratories, coating and plating operations, production and test facilities, and various manufacturing operations. The Pinellas emissions inventory for these HAPs/toxics is listed in table D2.1.3-3.

Normal operations result in the emission of radioactive materials at Pinellas. These emissions include approximately 100 curies of tritium annually. The health effects of these emissions are discussed in section 4.1.7.9. EPA has granted Pinellas minor source status because of these low annual emissions (PI DOE, 1992d). Tritium is the only radionuclide that may be affected by the activities that are the subject of this EA.

The air quality under ambient and No Action conditions at Pinellas is shown in table 4.1.7.2-1. The concentrations listed in the table are based on information received from DOE, Pinellas (PI DOE, 1991d). Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of the O_3 standard, baseline air quality concentrations from Pinellas do not exceed, and would not be expected to exceed, any applicable guideline or regulation.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources within Pinellas include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, paging systems, construction and materials-handling equipment, and vehicles). No sound-level measurements have been made around Pinellas. At the site boundary, away from most of these industrial facilities, noise from these sources would be barely distinguishable from background noise levels. Thus, the acoustic environment along the Pinellas boundary and in the nearby residential areas away from traffic noise was assumed to be that of a suburban or urban location with typical DNL in the 53 to 62 dBA range (EPA, 1974). The primary source of noise at the site boundary and in nearby residential areas is traffic. The contribution of plant traffic to traffic noise levels in the area is minor.

The State of Florida has not established specific numerical environmental noise standards applicable to Pinellas. Pinellas County has specified limits on environmental noise at the property line of an industrial source as described in appendix D (section D2.2.3). Although the maximum noise levels specified by the ordinance and the EPA guideline level for residential areas may be exceeded at the Pinellas site boundary, these noise levels are attributable to traffic noise and not to sources at the plant.

Environmental Consequences.

Air Quality. Closeout of Complex missions at Pinellas would reduce emissions of criteria, hazardous, and toxic air pollutants. The air quality in the vicinity of the plant may improve marginally with the elimination of the minor pollutant sources (table 4.1.7.2-1). Closeout of Complex missions at Pinellas would eliminate the nominal emissions of tritium.

Acoustic Conditions. Closeout of Pinellas Complex missions would result in reduced staff levels. The reduction in traffic volumes on nearby streets, primarily during the peak hours, would result in only a minor reduction in noise levels along these routes. Community noise levels are expected to experience only a minor reduction due to elimination of noise sources on the site.

4.1.7.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at Pinellas.

Surface Water. Pinellas lies on the divide between the Cross Bayou and Starkey Road drainage basins. The dividing line between the basins crosses the site in a northeast/southwest direction. All wastewater discharges from the plant, with the exception of stormwater, are sent to the Pinellas County Sewer System (PI DOE, 1991b). There are two stormwater retention and one stormwater detention ponds and no natural surface water bodies at Pinellas (figure 3.2.3-2) (PI GE, 1991).

TABLE 4.1.7.2–1.—*Pinellas Plant Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines* [Page 1 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)[f]	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[g]
Carbon Monoxide (CO)	8-hour	10,000[b]	8,016[c]	e	8,016
	1-hour	40,000[b]	13,742[c]	e	13,742
Lead (Pb)	Calendar Quarter	1.5[b]	i	e	i
Nitrogen Dioxide (NO_2)	Annual	100[b]	i	e	i
Ozone (O_3)	1-hour	235[b]	243[c]	e	243
Particulate Matter (PM_{10})	Annual	50[b]	i	e	i
	24-hour	150[b]	i	e	i
Sulfur Dioxide (SO_2)	Annual	60[a]	23[c]	e	23
	24-hour	260[a]	118[c]	15	133
	3-hour	1,300[b]	526[c]	e	526
Total Suspended Particulates	Annual	50	i	e	i
	24-hour	150	i	e	i
Hazardous Air Pollutants and Other Toxic Compounds[h]					
1,1,1-Trichloroethane	24-hour	9,168[a]	i	26.0	≥26.0
	8-hour	38,200[a]	i	40.0	≥40.0
1,4 Dioxane	24-hour	216[a]	i	16.0	≥16.0
	8-hour	900[a]	i	30.0	≥30.0
Acetic Acid	24-hour	60	i	12.2	≥12.2
	8-hour	250	i	21.4	≥21.4
Acetone	24-hour	8,544[a]	i	194.7	≥194.7
	8-hour	35,600[a]	i	340.8	≥340.8
Chlorodifluoroethane	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Chlorodifluoromethane	24-hour	16,992	i	12.0	≥12.0
	8-hour	70,800	i	21.0	≥21.0
D'Limonene	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Dichlorodifluoromethane	Annual	200[a]	i	2.4	≥2.4
	24-hour	23,760[a]	i	9.8	≥9.8
	8-hour	99,000[a]	i	16.8	≥16.8
Dimethyl Formamide	Annual	30[a]	i	0	0
	24-hour	72[a]	i	0.01	≥0.01
	8-hour	300[a]	i	0.01	≥0.01
Ethyl Alcohol	24-hour	9,024	i	e	i
	8-hour	37,600	i	e	i
Ethyl Benzene	Annual	1,000[a]	i	e	i
	24-hour	1,041.6[a]	i	e	i
	8-hour	4,340[c]	i	e	i
Fluoboric Acid	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i

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Footnotes at end of table.

TABLE 4.1.7.2–1.—*Pinellas Plant Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*—Continued [Page 2 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)[f]	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[g]
Hazardous Air Pollutants and Other Toxic Compounds[h] (continued)					
Fluorine End-Capped Homopolymers	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Fluoroaliphatic Polymeric Esters	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Fluorobenzene	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Fluorotelomer	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Glycol Ethers	24-hour	46.20[a]	i	0.02	≥0.02
	8-hour	180[a]	i	0.03	≥0.03
Hexane	24-hour	422.4[a]	i	0.6	≥0.6
	8-hour	1,760[a]	i	1.1	≥1.1
Hydrochloric Acid	Annual	7	i	1.1	≥1.1
	24-hour	18	i	5.0	≥5.0
	8-hour	75	i	11.0	≥11.0
Isopropyl Alcohol	24-hour	2,359.2	i	49.0	≥49.0
	8-hour	9,830	i	85.7	≥85.7
Lead Compound	Annual	0.09[a]	i	0.01	≥0.01
	24-hour	0.12	i	0.07	≥0.07
	8-hour	0.5	i	0.1	≥0.1
Methyl Alcohol	24-hour	628.8	i	40.4	≥40.4
	8-hour	2,620	i	70.7	≥70.7
Methyl Ethyl Ketone	Annual	80[a]	i	e	i
	24-hour	1,416[a]	i	e	i
	8-hour	5,900[a]	i	e	i
Methyl Isobutyl Ketone	Annual	492[a]	i	e	i
	8-hour	2,050[a]	i	e	i
Methylene Chloride	Annual	2.1[a]	i	2.0	≥2.0
	24-hour	417.6[a]	i	30.0	≥30.0
	8-hour	1,740[a]	i	60.0	≥60.0
Naptha/Mineral Spirits	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i

EA 3399-2

Footnotes at end of table.

TABLE 4.1.7.2–1.—*Pinellas Plant Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*—Continued [Page 3 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Maximum Background Concentration (μg/m³)[f]	No Action Concentration (μg/m³)	Baseline Concentration (μg/m³)[g]
Hazardous Air Pollutants and Other Toxic Compounds[h] (continued)					
Nickel Chloride	24-hour	0.24[a]	i	0.1	≥0.1
	8-hour	1[c]	i	0.3	≥0.3
Nitric Acid	24-hour	12.48	i	3.0	≥3.0
	8-hour	52	i	5.0	≥5.0
Phosophoric Acid	24-hour	2.4	i	0.9	≥0.9
	8-hour	10	i	2.5	≥2.5
Sulfuric Acid	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Tetrachloroethylene	24-hour	813.6[a]	i	0.3	≥0.3
	8-hour	3,390[a]	i	0.5	≥0.5
Toluene	Annual	300[a]	i	6.6	≥6.6
	24-hour	898[a]	i	26.3	≥26.3
	8-hour	3,770[a]	i	46.0	≥46.0
Trichloroethylene	24-hour	645.6[a]	i	8.0	≥8.0
	8-hour	2,690[a]	i	14.0	≥14.0
Trichlorotrifluoroethane	24-hour	36,816	i	642.3	≥642.3
	8-hour	153,400[a]	i	1,124.1	≥1,124.1
Xylene	Annual	300[a]	i	e	i
	24-hour	1,041.6[a]	i	e	i
	8-hour	4,340[a]	i	e	i

EA 3399-3

[a] State standard (FL DER, 1992).
[b] Federal standard (40 CFR 50).
[c] Ambient air quality monitoring data for year 1990 (PI DOE, 1991d).
[d] No state standard or guideline.
[e] Not estimated because the potential release is negligible.
[f] The maximum of the concentrations as measured from the area ambient monitoring stations.
[g] The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
[h] The compounds listed are the major pollutants of concern (PI DOE, 1992d).
[i] Data unavailable.

Pinellas is located above the 100-year tidal floodplain. The land elevation at the plant is approximatley 18 feet above MSL, which is higher than the 100-year floodplain mark of 11 feet above MSL (PI DOE, 1991b).

Pinellas is located approximately 4.4. miles west of Tampa Bay, and 6.3 miles east of the Gulf of Mexico. The nearest significant water body to Pinellas is Lake Seminole (1 mile to the west), which does not have open access to the Gulf or to Tampa Bay and would therefore not provide a conduit for storm surge to reach the plant site. Minimum plant floor elevation is approximately 18 feet MSL, or 4.4 feet above the highest recorded storm surge in Pinellas County which occurred during a hurricane in 1984. The probability of experiencing a storm surge that exceeds the Pinellas 18 feet MSL is very low. Even the storm surge from hurricane Andrew, estimated at approximately 15.5 feet, would not have flooded the plant site (PI DOE, 1992d). Given this information, it is not likely that Pinellas would be affected by the storm surge from even the most significant storm event.

Extraordinary wave action could potentially flood the plant site during a storm event (DOE, 1988). However, due to the distance and number of naturally occurring and man-made barriers that exist between Pinellas and the open waters of the Gulf of Mexico and Tampa Bay, there appears to be no credible scenario in which storm-generated wave activity could inundate the plant (PI DOE, 1992d).

Pinellas discharges approximately 66 MGY in liquid effluents to the Pinellas County sewer system. The Pinellas County wastewater treatment plant receives approximately 7.3 to 8.8 BGY (20 to 24 MGD of waste water and has a capacity of 10.4 BGY (28.5 MGD) (PI DOE, 1987). The discharge consists of sanitary sewage and pH-neutralized industrial process waters from the plant's 110 MGY-capacity Industrial Wastewater Neutralization Facility. Non-radioactive discharges to the Pinellas County sewer system are regulated under Pinellas County Sewer Use Ordinance #88-4 and the U.S. Department of Energy Pinellas Plant Industrial Wastewater Discharge Permit #018-IE, issued August 28, 1989. Pinellas is also subject to the National Categorical Pretreatment Standards of 40 CFR Part 433 developed by the EPA. Radioactive discharges are regulated by state and Federal standards. Where differing standards apply to a pollutant, the plant complies with the more stringent (PI, DOE, 1992a).

Non-radiological parameters are monitored at the point where the combined industrial wastewater and sanitary effluent first enter the Pinellas County sewer system, according to the following schedule: pH–continuously monitored; metals–weekly; cyanide, mercury, total suspended solids, and biological oxygen demand–monthly; and total toxic organics–biannually. Tritium is the only radiological parameter encountered in Pinellas discharges and it is monitored each day from the sanitary, industrial, and combined waste streams (PI DOE, 1992a).

In 1991, one noncompliance with pH permit limits and one noncompliance with zinc permit limits were noted. The zinc noncompliance was only slightly above limits and was determined to be an unusual excursion. The pH noncompliance resulted from acidic cleaning solutions discharged to sanitary drain systems that bypassed pH-neutralization at the Industrial Wastewater Neutralization Facility. Efforts to prevent reoccurrence of pH violations included notifying all plant personnel of the discharge permit requirements and prohibiting discharge of high or low pH cleaning solutions into sanitary sewage drains. Table 4.1.7.3–1 presents a summary of the parameters monitored and a comparison of the average concentrations discharged in 1991 with regulatory standards (PI DOE, 1992).

The East and South retention ponds receive all surface runoff from paved and unpaved areas of the plant. The East retention pond is included in the Northeast Site solid waste management unit, currently under investigation for corrective measures as part of the Hazardous and Solid Waste Amendments Permit issued by EPA Region IV (FL 6890090008) (PI DOE, 1991b). Sediments from

TABLE 4.1.7.3–1.—*Summary of Liquid Effluent Monitoring at Pinellas Plant*

Industrial Wastewater Neutralization Facility, 1991			
Parameter	**Unit of Measure**	**Criteria**	**Average Concentration**
Cadmium	mg/L	0.2[a]	<0.01
Chromium	mg/L	2.6[a]	<0.03
Copper	mg/L	1.0[a]	0.30
Cyanide	mg/L	1.0[a]	<0.02
Lead	mg/L	0.6[a]	<0.05
Mercury	mg/L	0.1[a]	<0.0002
Nickel	mg/L	1.0[a]	<0.05
Silver	mg/L	0.4[a]	<0.01
Total Suspended Solids	mg/L	250[a]	50.8
Biological Oxygen Demand	mg/L	250[a]	34.5
Zinc	mg/L	1.9[a]	0.17
Total Toxic Organics	mg/L	0.85[a]	0.036
pH	pH units	5.5–9.5[a]	6.6
Tritium	pCi/L	100,000,000[b]	8,240

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[a] Industrial Wastewater Discharge Permit #018-IE and Sewer User Ordinance 88.4.
[b] Florida Department of Health and Rehabilitative Services.

Source: PI DOE, 1992a.

the East retention pond contain no pollutants above regulatory action levels. Stormwater from the South retention pond would flow to the Cross Bayou Canal; however, no discharge from the pond has occurred since its construction. An NPDES industrial stormwater permit application for the South and East retention ponds has been submitted to EPA for processing (PI DOE, 1992d).

The West detention pond received treated industrial effluent from 1972 to 1982 and has been identified as a solid waste management unit to be investigated for possible corrective measures. Currently, the West pond is not receiving effluent or waste but does receive limited stormwater runoff during heavy rainfall events (PI DOE, 1991b). The West pond does not discharge to offsite surface waters (PI DOE, 1992a).

Surface Water Quality. Water quality in the two stormwater retention ponds and the West detention pond is monitored weekly for tritium and periodically for nonradiological constituents (PI DOE, 1991b). Results from 1991 indicate the highest tritium levels were 800 pCi/L, well below Federal drinking water standards of 20,000 pCi/L (PI DOE, 1992d). Monitoring results for nonradiological parameters in the East and South retention ponds are presented in table 4.1.7.3-2. Monitoring from 1992 indicates that copper, iron, and phosphorous exceeded Florida state water quality criteria. Because the South retention pond has not discharged since its construction, no impacts to offsite surface waters have resulted. Quarterly offsite surface water monitoring indicates tritium concentrations are well below DOE and EPA water quality criteria (PI DOE, 1992a).

Groundwater. Aquifers associated with Pinellas include a near-surface unit (5 to 35 feet below ground) and the deeper Floridan Aquifer (100 feet below ground), separated by a shale of low hydraulic conductivity. These aquifers are classified as Class IIa, current sources of drinking water and waters having other beneficial uses.

The water table of the near-surface aquifer is found a few feet below the ground surface. The water table

TABLE 4.1.7.3–2.—*Summary of Surface Water Quality Monitoring at Pinellas Plant*

Receiving Water: Site Retention Ponds—1992			
Parameter[a]	Unit of Measure	Water Quality Criteria	Average Existing Water Body Concentration
East Retention Pond			
Biochemical Oxygen Demand	mg/L	NA	2
Chemical Oxygen	mg/L	NA	14
Conductivity	µmhos	NA	193
Iron	mg/L	0.3[b]	0.13
Maganese	mg/L	0.1[b]	0.02
pH	pH units	6.5-8.5 [b]	7.72
Total Organic Carbon	mg/L	NA	2,200
Total Suspended Solids	mg/L	NA	6
Zinc	mg/L	1[b]	0.16
South Retention Pond			
Biochemical Oxygen Demand	mg/L	NA	2
Chemical Oxygen Demand	mg/L	NA	35
Conductivity	µmhos	NA	459
Copper	mg/L	0.015[b]	0.04
Iron	mg/L	0.3[b]	0.45
Manganese	mg/L	0.1[b]	0.02
Nitrate	mg/L	10[b]	0.02
Nitrite/Nitrate	mg/L	10[c]	0.02
pH	pH units	6.5-8.5 [b]	7.65
Phosphorous	mg/L	0.0001[b]	0.24
Total Organic Carbon	mg/L	NA	12
Total Suspended Solids	mg/L	NA	5
Zinc	mg/L	1[b]	0.07

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[a] Parameters measured at levels below the detection limit of the analysis method are not listed.
[b] Florida State Water Quality Criteria for Class II Water-Shellfish Propagation or Harvesting.
[c] Maximum Containment Level (MCL), EPA Primary Drinking Water Regulations (40 CFR 14). Listed for comparison purposes only.

Source: PI GE, 1992.

fluctuates 1 to 5 feet seasonally (PI DOE, 1992d). A groundwater divide crosses the site northeast to southwest. Groundwater flow in the surficial aquifer is from the divide toward discharge points along three surface water channels.

The Floridan Aquifer is an extensive water-bearing carbonate unit found throughout west-central Florida. It contains upper and lower units, which are separated by an evaporite bed. The lower unit generally contains saltwater, while the upper unit serves as the primary potable and agricultural water supply for the area. In Pinellas and Hillsborough counties, the thickness of the Upper Floridan Aquifer is approximately 1,200 feet.

In much of west-central Florida, the Upper Floridan Aquifer is separated from the Surficial Aquifer by the Hawthorn Formation. This unit, because of its flow-restricting properties, acts as a confining layer for the Upper Floridan Aquifer. As a result, the potentiometric surface associated with the Upper Floridan is generally only 5 to 10 feet below that of the groundwater table associated with the Surficial Aquifer.

Groundwater Quality. Groundwater quality in the uncontaminated portions of the Surficial Aquifer beneath the plant is generally good, except for a pH level which is less than limits set for than water quality criteria, and a naturally occurring iron content

that is higher than the criteria (table 4.1.7.3-3). The results of water quality analyses from wells in the monitoring network indicate that concentrations of major constituents are within the reported range for background water quality. Concentrations of trace metals in the groundwater are less than detection limits or are within criteria limits of the EPA. Concentrations of herbicides, insecticides, organic priority pollutants, and total organic carbon in groundwater are also less than detection limits.

Contamination of groundwater in the Surficial Aquifer has been identified within and adjacent to the Pinellas boundary (figure 4.1.7.3-1). The areas of greatest concern are 4 of the 15 solid waste management units within the plant boundary and the 4.5- acre site, which is adjacent to the plant boundary but has been attributed to previous Pinellas activities. The four solid waste management units, Northeast Site, Old Drum Storage Pad, Building 100, and Incinerator Ditch, have been recommended for corrective measures studies (PI DOE, 1992a). Remediation activities for the 4.5-acre site have successfully recovered and treated approximately 4.1 million gallons of VOC-contaminated groundwater (PI GE, 1991).

The water quality of the Floridan Aquifer directly beneath Pinellas has been measured and has not been adversely impacted by Pinellas operations (PI DOE, 1992d).

Groundwater Supply. The Floridan Aquifer is the primary source of water supply in the Pinellas County area. Well fields are located in Pasco and Hillsborough counties that supply the various communities with domestic and industrial water. Only limited agricultural use of water occurs in the vicinity of Pinellas. The plant has no production wells, and the water supply is obtained from the Pinellas County Water System (PI DOE, 1991a).

Pinellas uses approximately 0.14 MGD of potable water (table 3.2.3-3). Periodic restrictions on water use at the plant have occurred due to a dramatic rise in regional water demand (PI GE, 1991). Although

TABLE 4.1.7.3–3.—*Summary of Groundwater Quality Monitoring at Pinellas Plant*

Parameter	Unit of Measure	Water Quality Criteria	1990—Existing Conditions[f]	
			DOE 1[b]	DOE 2[c]
1,2-Dichloroethylene (total)	mg/L	e	<0.003	<0.003
Arsenic	mg/L	0.05[a]	0.001	0.001
Chloroform	mg/L	0.10[d]	<0.003	<0.001
Iron	mg/L	0.3[a]	4.6	3.9
Lead	mg/L	0.015[a]	<0.01	<0.01
Manganese	mg/L	0.05[a]	0.01	0.05
Methylene Chloride	mg/L	0.005[d]	<0.003	<0.003
Pesticides & Herbicides	mg/L	0.01-0.003[a]	<0.01	<0.01
pH	pH units	6.0-8.5[a]	6.6	6.8
Sodium	mg/L	160[a]	230	86
Total Organic Carbon	mg/L	e	130	56
Trichloroethylene	mg/L	0.005[d]	<0.003	<0.003

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[a] Florida state water quality criteria.
[b] Well located in the area of the proposed Mechanical Technology Building.
[c] Well located in the area of the proposed Office/Manufacturing Building.
[d] EPA Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).
[e] No specified limit.
[f] Less than symbol (<) indicates concentration below analysis detection limit.

Source: PI DOE, 1991a.

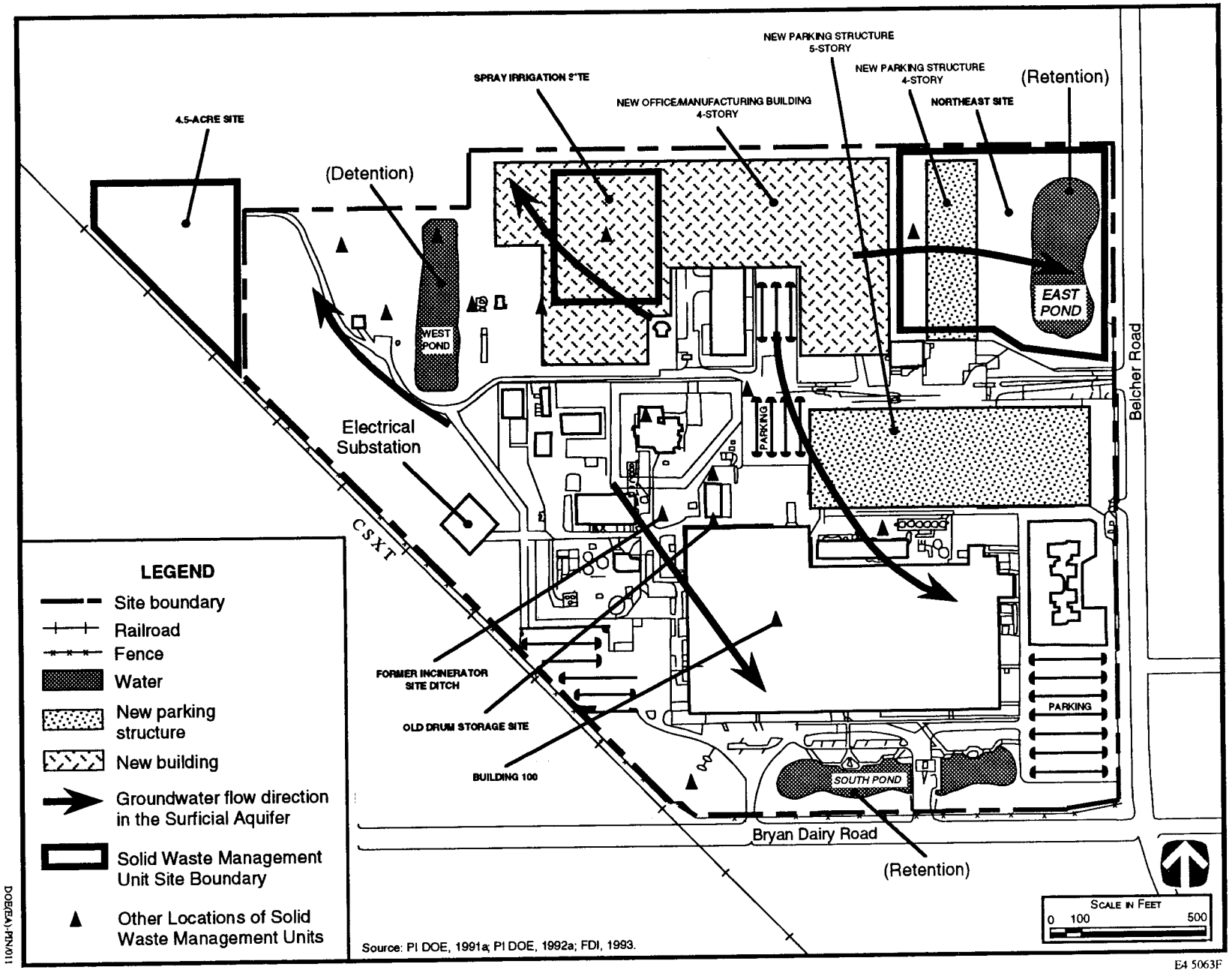

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FIGURE 4.1.7.3–1.—*Groundwater Contamination at the Pinellas Plant.*

there have been failures in some of the supply piping of the Pinellas County water supply system, faulty sections of the system are scheduled for replacement and backup supplies from the St. Petersburg water supply system are available to ensure that there is no interruption in service. All current water restrictions are due to drought conditions. There is no permit or contract agreement with Pinellas County for water supply.

Environmental Consequences. Complex mission closeout activities at Pinellas would involve no new construction and all current DP operations would cease.

Surface Water. Because existing facilities are not located in the 100-year floodplain and do not appear to be within an area affected by a credible longer term event, mission closeout would not affect floodplain areas.

Because there would be no surface water withdrawals, and no routine releases to offsite surface waters, no adverse impacts would be anticipated to flow rates in local surface water bodies.

Surface Water Quality. Because there would be no routine releases to offsite surface waters, there would be no adverse impacts to water quality.

Groundwater. By closing out Complex missions at Pinellas, a reduction in the demand for groundwater from local water suppliers would occur.

Groundwater Quality. Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances during mission closeout activities. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from transition activities associated with Complex mission closeout at Pinellas.

4.1.7.4 *Geology and Soils*

Affected Environment. Pinellas lies on the Floridan Plateau of the Florida Peninsula. The site lies on a low relief surface north of St. Petersburg.

There are no capable faults in Pinellas County. This region of Florida lies in Seismic Zone 0 (ICBO, 1991). Earthquakes are not common in Florida. The most severe earthquake within a 200-mile radius occurred near St. Augustine in 1879, 160 miles northeast of the plant, and had a magnitude of 4. There is no reason to expect damaging earthquakes at Pinellas (PI DOE, 1991b).

Sinkholes are not uncommon in Florida in areas where limestone layers are near the surface. Circular depressions have been observed at Pinellas from aerial photographs, but no historic active sinkhole development has taken place in the plant area. Because of the depth of the limestone layers below the water table, sinkhole collapse is unlikely at Pinellas (PI DOE, 1983).

Pinellas is underlain by Made land and soils of the Myakka and Wabasso soil series (PI USDA, 1972). Made land consists of mixed sand, clay, hard rock, shells, and shell fragments that have been transported, reworked, leveled by earth-moving equipment, and used as foundation material. The Myakka and Wabasso consist of nearly level, poorly drained, fine sandy soils formed, respectively, in thick beds of acid marine sands and beds of sandy and loamy sediments. Because of the low relief and relatively high water saturation of these soils, they are not subject to water or wind erosion.

No prime or unique farmland soils are located within the Pinellas site. All the soils within the site boundary are characterized as unsuitable for cultivation (PI USDA, 1972).

The Pinellas radiological monitoring program analyzes soil from two onsite and four offsite locations for plutonium. Results of the analyses for 1990 were below detectable levels (PI DOE, 1991b).

Environmental Consequences. The proposed closeout of Complex missions at Pinellas would not result in impacts on the geologic features of the area, nor would the geology have any impact on mission closeout activities at the plant.

Hazardous, radioactive, and potential mixed waste sources would be eliminated from the plant, thus decreasing future soil contamination potential.

4.1.7.5 *Biotic Resources*

Affected Environment. Habitat in the southern part of Pinellas generally consists of lawns, ponds, and ornamental vegetation surrounding buildings and parking lots. Because of the lack of natural vegetation to provide cover, few animals are likely to use these areas to breed. Much of the northern part of the site is a grassy field with clusters of scattered trees. Lands surrounding the site have experienced extensive urban development, although areas to the immediate northwest are bounded by remnant pine forests and other natural plant communities typical of Pinellas County. These plant communities and the wildlife typically found in them are described in an EA prepared for the site by DOE (PI DOE, 1983).

Two man-made ponds, the East Pond near the northeastern corner of the site and the West Pond near the northwestern corner of the site (figure 3.2.3-2), are designated as wetlands on NWI maps (PI FWS, 1982; PI DOE, 1983). These wetlands are classified on the maps as Palustrine Open Water. These ponds were once used to store wastewater generated by Pinellas (PI DOE, 1983) but now serve only as stormwater retention ponds. To function for stormwater retention, the ponds require periodic cleaning and maintenance involving the disruption of any vegetation that establishes within them. A third stormwater retention pond, the South Pond, was constructed since development of the NWI maps. The sides of this pond are lined with steel pilings; it contains no vegetative growth.

Although there is no natural surface water on the site, some aquatic flora and fauna, including frogs and insects, may have become established in the East and West Ponds, and could be providing a source of food for migrating birds. However, habitats within both ponds are less than choice for migrating birds.

A threatened and endangered species survey of Pinellas was conducted in March 1992 (PI DOE, 1992a). No threatened or endangered species were seen on or near the site during the survey.

Environmental Consequences. Closeout of Complex missions at Pinellas under the Proposed Action would not adversely affect biotic resources. Mission closeout would result in a reduction of existing operational impacts to natural habitats on and surrounding the site.

4.1.7.6 *Cultural Resources*

Affected Environment. The prehistoric chronology of the Pinellas area consists of five broad time periods: Paleoindian (12,000-6500 B.C.), Archaic (6500-1000 B.C.), Transitional (1000-500 B.C.), Manasota (500 B.C.-A.D. 800), and Mississippian (A.D. 800-1625) (PI Milanich, 1980; PI Austin, 1991). Prehistoric site types in the vicinity include temple and burial mounds, shell and dirt middens, artifact scatters, villages, and cemeteries (PI Austin, 1991). About 65 percent of the facility has been developed, and the remaining area has been disturbed by plowing and clearing activities. No cultural resource inventories have been conducted for Pinellas, and no sites have been recorded. As a result of the previous development and disturbance, the Florida SHPO has concurred with the finding that NRHP-eligible cultural resources are not likely to occur at the plant (FL SHPO, 1991).

The history of the region has been previously documented (PI Tebeau, 1971; PI Austin, 1991). Pinellas was constructed in 1955 on land that was originally pasture for dairy cattle (History

Associates, 1987). As a result of the previous development and disturbance at the plant, no historic resources have been identified and no surveys have been conducted. The Florida SHPO has concurred with the finding that NRHP-eligible cultural resources are not likely to occur at Pinellas (FL SHPO, 1991). The Pinellas facilities are constructed of cinder block and have been modified numerous times. The facilities are not considered to exhibit architectural integrity nor are they representative of a particular style. They are not considered contributing features to the broad historical theme of the Manhattan Project and initial nuclear production. The facilities are not likely to be considered eligible for the NRHP.

The Safety Harbor archaeological manifestation (late Mississippian period) is assumed to represent the Tocobaga Indian group who occupied the area at the time of Spanish contact. They were decimated in the early 1700's by European diseases, and the area was relatively unoccupied (PI Austin, 1991; PI Bullen, 1978). Northern Creek groups moved into the Tampa Bay area after the Creek War and were labeled Seminoles by the British (PI Tebeau, 1971). An Upper Creek or Red Stick settlement may have been located on the lower Pinellas peninsula, but an exact location has not been documented (PI Austin, 1991). Site types that may be of concern to Native American groups include villages, temple mounds, charnel house locations, burial sites, and cemeteries.

Environmental Consequences. The closeout of Complex missions at Pinellas does not include ground disturbance or building modifications and therefore would not affect cultural resources.

4.1.7.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at Pinellas is based on an ROI where 99 percent of the plant employees lived in 1991. The ROI includes Hillsborough (4 percent), Pasco (4 percent), and Pinellas (91 percent) counties in Florida. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Clearwater (23 percent), Largo (18 percent), Pinellas Park (10 percent), Seminole (11 percent), and St. Petersburg (30 percent) (see figure 3.2.3-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.7-1 through E3.7-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 159 percent, increasing from 378,426 in 1970 to 979,201 in 1990. Total employment increased from 364,562 to 929,724 between 1970 and 1990, an annual growth rate of 5 percent. The unemployment rates for 1970 and 1990 were 3.7 percent and 5.1 percent, respectively. For the same years, personal income increased from approximately $4.1 billion to $35.5 billion (an annual average of 11 percent), and per capita income increased from $3,749 to $18,051.

Between 1970 and 1990, employment at Pinellas increased from 1,274 to 1,667, representing less than 1 percent of the ROI employment in 1990 (PI DOE, 1991e). Changes in mission requirements have historically led to fluctuations in employment levels over this period. For example, employment rose to 1,946 by 1985. As of September 30, 1992, employment at Pinellas had decreased to 1,575. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to 1,070 by the year 2000 (DOE, 1993c). In 1992, the

total Pinellas payroll was estimated to be about $74 million (PI DOE, 1991e). Under the No Action baseline, the total payroll would be projected to be approximately $50 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 1,188,000 by 2000 and 1,300,000 by 2020. The unemployment rates for the years 2000 and 2020 are both projected to be 5.4 percent. For the same years, personal income is projected to increase from approximately $51.5 billion to $70.4 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $23,000 in 2000 to $26,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 81 percent to 1,966,844. During the same period, the Florida population increased 91 percent. The population in the three-county ROI is projected to increase from an estimated 2,255,000 in 2000 to 2,689,000 by 2020, an annual rate of 1 percent.

The largest county population increase (270 percent) occurred in Pasco County between 1970 and 1990, while during the same years, population in Pinellas County increased 63 percent. Population in Pasco County is estimated to increase 12 percent between 1990 and 2000 and 19 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Pinellas County population is projected to increase approximately 14 percent between 1990 and 2000 and an additional 19 percent between 2000 and 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Seminole had the greatest increase in city population (825 percent) in the ROI. For the same years, the Clearwater, Largo, and Pinellas Park populations increased 90 percent, 198 percent, and 95 percent, respectively, while St. Petersburg had the smallest population growth (10 percent).

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 126 percent from 432,142 to 975,046. Concurrent with population growth in the ROI, housing units are expected to increase approximately 15 percent by the year 2000 and an additional 19 percent by 2020, an annual increase of about 1 percent.

Between 1970 and 1990, the largest increase in housing units (328 percent) occurred in Pasco County, while the smallest increase (100 percent) occurred in Pinellas County. The number of housing units in Pasco County is expected to increase approximately 12 percent by 2000 and an additional 19 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Pinellas County is expected to increase about 14 percent by 2000 and an additional 19 percent by 2020, an annual increase of about 1 percent.

In 1990, the homeowner vacancy rates averaged about 4 percent in the ROI, with averages of approximately 4 percent for both Hillsborough and Pasco counties. The vacancy rate for rental units averaged 14 percent and ranged from about 14 percent in Hillsborough County to 15 percent in Pasco County.

Community Infrastructure and Services. The water supply systems operated by Pinellas, Hillsborough, and Pasco counties and the cities of St. Petersburg and Tampa maintain about 95 percent of the capacity of the nine systems identified in the ROI. All of these systems draw their raw water supplies from groundwater, except Tampa, which draws about 60 percent of its supplies from surface water.

The systems operated by Pinellas County (about 102 MGD capacity) and St. Petersburg (68 MGD capacity) had 1988 average daily demands of 75 percent and 63 percent of capacity, respectively. The water supply systems of Tampa (130 MGD capacity), Hillsborough County Northwest Service Area (about 9 MGD capacity), and Hillsborough County South-Central Service Area (about 24 MGD capacity) all operate in Hillsborough County. In

1988, the average daily demands on Tampa's system were of percent of capacity. Hillsborough County's South-Central and Northwest Service Area systems operated near or at capacity, with average daily demands of 91 percent and 100 percent of capacity, but both are supplemented by Tampa and other regional systems. Pasco County Utilities (35 MGD capacity) had 1991 average daily demands of 32 percent of capacity.

The average daily demands on the Pinellas County and St. Petersburg systems are projected to be of percent and 68 percent of capacity in 1995 and 92 percent and 73 percent of capacity in 2000, respectively. The average daily demands on Tampa's system are projected to be 64 percent of capacity in 1995 and 75 percent in 2000. Pasco County Utilities is projected to have average daily demands of about 35 percent of capacity in 1995 and 38 percent of capacity in 2000.

Pinellas, Hillsborough, and Pasco counties and the cities of St. Petersburg, Clearwater, Largo, and Tampa operate wastewater treatment systems that maintain about 96 percent of the capacity of the 12 systems identified in the ROI. Pinellas County (about 45 MGD capacity), St. Petersburg (about 68 MGD capacity), Clearwater (about 23 MGD capacity), and Largo (15 MGD capacity) all operate systems in Pinellas County. The Pinellas County system had 1990 average daily demands of 64 percent of capacity, while the St. Petersburg, Clearwater, and Largo systems had 1988 average daily demands of 74 percent, 65 percent, and 68 percent of capacity, respectively. Hillsborough County (about 25 MGD capacity) and Tampa (about 212 MGD capacity) had 1988 average daily demands of 67 percent and 29 percent of capacity, respectively. Pasco County's system (15 MGD capacity) experienced 1991 average daily demands of 80 percent of capacity.

All of the systems discussed for Pinellas and Hillsborough counties are projected to have average daily demands of less than 78 percent of capacity in 1995 and less than 80 percent of capacity in 2000. The average daily demands on Pasco County's system are projected to be about 83 percent of capacity in 1995 and 87 percent of capacity in 2000.

Three school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 32,626 students in the Pasco School District to 120,364 students in the Hillsborough County School District. The school districts operated between 79 percent and 94 percent of capacity. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 22:1, and expenditures averaged $4,261 per pupil. The statewide average pupil-to-teacher ratio was 23:1, and expenditures averaged $4,638 per pupil (FL DEd, 1990).

Forty-six hospitals serve the three-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 4,483 physicians served the ROI. The physician-to-population ratio for the ROI was 2.3:1,000, and ranged from 1.2:1,000 in Pasco County to 2.5:1,000 in Hillsborough County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Nine city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county ROI was in Hillsborough County, with 845 sworn officers or 1.0 sworn officers per 1,000 persons. Other large agencies are in Pinellas County, with 680 sworn officers or 0.8 sworn officers per 1,000 persons and in the city of St. Petersburg, with 483 sworn officers or 2.0 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.4 per 1,000 persons (FBI, 1991).

Seventeen fire departments and 2,064 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Hillsborough County (507 firefighters; 0.6 firefighters per 1,000 persons) and in Pinellas County (384 firefighters; 0.5

firefighters per 1,000 persons). The average number of firefighters in the ROI was 1.0 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to Pinellas is via Belcher Road (Pinellas County Road 501) to the east and Bryan Dairy Road (Pinellas County Road 296) to the south.

Estimated traffic along segments providing access to Pinellas is projected to contribute to differing service level conditions in accordance with population growth. All roadways that access the site would typically experience traffic congestion, with volumes exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be greatly restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in considerable congestion. In addition, estimated truck traffic into Pinellas for delivery of supplies and removal of wastes would typically average 30 trips per day. However, the additional traffic volumes associated with continued operation of Pinellas are relatively minor and would not substantially affect local transportation conditions.

Three major road improvements are scheduled for completion (1994–1997) that will provide improved access to Pinellas. Bryan Dairy Road (Pinellas County Road 296) will be extended west to Seminole Road (US 19A) near 102nd Avenue. A new bridge will be constructed for this road over Lake Seminole. McMullen Booth Road will be widened from two to six lanes between Curlew Road (Florida State Route 586) and Sunset Point Road. A four-lane bridge will be constructed over Old Tampa Bay just west of Saint Petersburg-Clearwater International Airport. This will connect 49th Street in South Pinellas County with McMullen Booth Road in North Pinellas County.

Other modes of transportation in the ROI include public transportation systems, railways, and waterways. Public transportation in Pinellas County is provided by the Pinellas Sun Coast Transit Authority. Railroad service in the ROI is provided by CSX Transportation. A single-track CSX Transportation line parallels the western border of Pinellas but does not access the site. Waterborne transport in the ROI is from the Gulf of Mexico through Tampa Bay. Two port facilities are located at St. Petersburg Harbor and Tampa Harbor (COE, 1991).

Tampa International and St. Petersburg-Clearwater International airports receive jet air passenger and cargo service from both national and local carriers. Numerous smaller private airports are located in the study area (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning and the proposed Fiscal Year 1994 budget figures, DOE has revised the estimate of post consolidation work force figures which reflect a loss of 800 jobs instead of 1,050 jobs (DOE, 1993 c and d). The analysis presented in table 4.1.7.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 1,050 lost jobs. The estimate of 800 lost jobs is 24 percent lower than the 1,050 job loss used in the following analysis, and this lower job loss estimate would result in slightly fewer negative economic consequences. The Proposed Action would result in minor decreases in economic activity and employment in the ROI. Based on the employment requirements for the transferred functions from Pinellas, employment would decrease in the ROI by an estimated 3,038 jobs (1,050 direct and 1,988 indirect). This reduction in jobs would not increase the unemployment rate in the year 2000 beyond a projected baseline level of 5.4 percent. Earnings in the ROI would be reduced by about $103.1 million, with a related decrease in total personal income of $148.2 million.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.7.7-1. This project-related change would represent a slight population decrease

TABLE 4.1.7.7–1.—*Pinellas Plant Proposed Action Economic and Population Characteristics*

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	1,188,649	NA
Baseline Unemployment Rate	5.4%	NA
Baseline Personal Income (Thousands $)	$51,496,890	NA
Baseline Per Capita Income ($/Person)	$22,837	NA
Baseline Employment	1,124,772	NA
Direct Jobs Lost	1,050	0.09
Indirect Jobs Lost	1,988	0.18
Out-Migrating Workforce	545	0.05
Total Out-Migration	1,383	0.06
Population Decrease		
Hillsborough County	62	0.01
Pasco County	50	0.02
Pinellas County	1,271	0.13
Clearwater	318	0.28
Largo	246	0.33
Pinellas Park	145	0.29
Seminole	145	1.37
St. Petersburg	415	0.15
ROI (County Total)	1,383	0.06

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; FL DOL, 1991; DOE, 1993c.

of less than 1 percent from the projected ROI baseline of 2,255,000. The city of Seminole would be the most affected, with an estimated 1-percent loss in its projected population.

The less than 1-percent change in population after closeout of Complex missions would create an estimated 685 additional vacant housing units, which is less than a 1-percent increase. The city of Seminole would be the most affected, but with a less than 2-percent increase in the number of vacant housing units.

The less than 1-percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be affected, and local traffic conditions would improve slightly.

4.1.7.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the Pinellas waste management baseline is provided in section 3.2.3.3 and appendix A, section A.3. Because there are no TRU wastes associated with any of the Complex missions at Pinellas that would be closed out due to the Proposed Action, no further discussion of TRU waste generation or management is presented.

Generation of LLW, hazardous/toxic waste, and nonhazardous wastes at Pinellas is expected to decrease with time, as production operations are expected to be reduced. Additionally, Pinellas' Pollution Prevention Program would systematically

reduce waste generation through specific waste projects and the use of process waste assessments.

Solid LLW generated in small quantities at Pinellas is temporarily stored onsite and shipped to the SRS burial site for final disposal.

Waste operations at Pinellas consist of the storage and treatment of hazardous wastes subject to the requirements of RCRA and the management of wastes subject to the requirements of TSCA. All facilities are in compliance with the applicable requirements of both TSCA and RCRA, as appropriate. All waste stream residue generated at Pinellas that is not reclaimed or recycled onsite is manifested and shipped under contract with DOT-registered transporters to RCRA-permitted offsite treatment and disposal facilities. There are no RCRA-permitted commercial facilities available to treat Pinellas' explosive wastes; therefore, open burn thermal treatment activities occur onsite for reactive and Class C explosive materials. Pinellas is currently evaluating alternative treatment options for explosive wastes currently treated onsite.

Nonhazardous wastes are segregated and recycled whenever possible. Trash is taken to the local sanitary landfill. Pretreated industrial process wastewater and sanitary wastewater are discharged to the Pinellas County wastewater treatment facility in compliance with industrial wastewater permit discharge limits.

Pinellas has implemented a waste minimization and pollution prevention program using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Ongoing hazardous waste pollution prevention and waste minimization activities at Pinellas include offsite solvent reclamation, use of aqueous degreasers instead of chlorinated solvents, and onsite treatment of machine cutting fluid.

Environmental Consequences. Closeout of the Complex missions at Pinellas would ultimately reduce annual onsite hazardous annual waste management by 2,400 lb for DP operations. Over 50 percent of the reduction would be due to decreased generation, treatment, and disposal of wastewater sludge.

Closeout of Complex missions at Pinellas would initiate closure of existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Florida Department of Environmental Regulations. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to RCRA-permitted treatment and disposal facilities. Equipment, structures, and soils (if contaminated) would also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements.

Existing inventories of LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Due to the closeout of Complex missions, Pinellas would no longer discharge pretreated industrial process wastewater effluents and sanitary wastewaters to the Pinellas County Sewer System.

Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, plastics, scrap, and metal containers, would no longer be generated. Trash that would have been disposed of in the local sanitary landfill by a commercial contractor would cease, extending the operating life of the local landfill.

4.1.7.9 *Human Health: Facility Operations and Accidents*

Affected Environment. Releases of chemical pollutants as a result of Pinellas operations are discussed in the Air and Water Resources sections (4.1.7.2 and 4.1.7.3, respectively). Exposures to members of the public associated with radiological

releases are well below applicable permit, regulatory, and DOE operational requirements (PI DOE, 1991c).

A review of the recent annual environmental and accident reports for Pinellas indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serve as potable water. High or low pH process water is neutralized before discharge. Furthermore, all releases of the pollutants are below Pinellas County Sewer System permit limits and water quality is not adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For Pinellas, all possible hazardous air pollutants were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, ammonia, methylene chloride, nickel chloride, TCA, toluene, TCE, methyl ethyl ketone, nitric acid, and isopropyl alcohol. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The existing Hazard Indexes for Pinellas (see table F-19a) were 0.272 onsite (worker effects) and 0.02 at the site boundary (effect on the public) on an annual basis.

Two of the chemicals identified, methylene chloride and TCE, are considered to be carcinogens and the cancer risk for each was calculated. The combined risk to individuals for the carcinogens was calculated as 4.1×10^{-5} onsite and 1.5×10^{-6} at the site boundary (public) (see table F-19b).

Releases of radioactive materials from Pinellas result in a total maximum individual annual dose of 0.098 mrem effective dose equivalent, which is well below the NESHAP 10 mrem effective dose equivalent standard (PI DOE, 1991b). The resulting risk of potential fatal cancers associated with 1 year of operations would be 4.4×10^{-8}.

Risks less than 10^{-6} are considered acceptable by EPA and the State of Florida because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general public. When risks are greater than 10^{-6} for regulated priority pollutants/hazardous chemicals, appropriate measures are required to reduce these risks to less than 10^{-6}.

In summary, these analyses show that excess cancer risks to workers and members of the public can be expected from the normal releases of hazardous chemicals/chemical pollutants at Pinellas as a result of continued operations (No Action). Mitigative actions, such as substituting less toxic solvents or modifying production processes, are being implemented as appropriate to minimize the impacts.

Environmental Consequences. Closeout of Pinellas Complex missions would result in no additions of hazardous material to, but rather the transfer of operations from, Pinellas to other DOE sites. Consequently, mission closeout would result in a decrease in adverse effects at Pinellas. The impacts at the DOE facilities that would receive the relocated functions from Pinellas are discussed in their respective sections. Closeout of Complex missions at Pinellas would reduce or eliminate the mitigated cancer risks, which are expected to be below 10^{-6}.

4.1.8 Closeout Complex Nonnuclear Missions at Rocky Flats Plant

A detailed discussion of RFP's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.4. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at RFP and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on the closeout of Complex nonnuclear missions of RFP, is also provided in the chapter 4 introduction and section 4.1.

4.1.8.1 *Land Resources*

Affected Environment. RFP is located approximately 16 miles northwest of downtown Denver, Colorado (figure 3.2.4-1). Generalized land uses within RFP and in the immediate vicinity are shown in figure 4.1.8.1-1. Residential distribution of RFP employees is discussed in section 4.1.8.7. RFP contains two main types of land use: industrial and undeveloped. Production facilities, which occupy only 384 acres (about 6 percent of the site), are centrally located on the site in a fenced security area (RF EG&G, 1991a). The primary function of the remaining 6,166 acres is that of a security buffer zone. Most of this area is open space; however, there are several other uses including 20 acres of production support facilities, 111 acres (55 acres developed, 56 acres future) of sanitary waste disposal, and 523 acres of aggregate and clay mining. Twenty-nine acres are presently being mined, 194 acres are expected to be mined over the next 20 years, and the remainder is on a 50-year lease. In addition to RFP facilities, the National Renewable Energy Laboratory has facilities located in the extreme northwest corner of the site. There is no prime farmland within the RFP boundary. RFP does not contain any public recreation facilities.

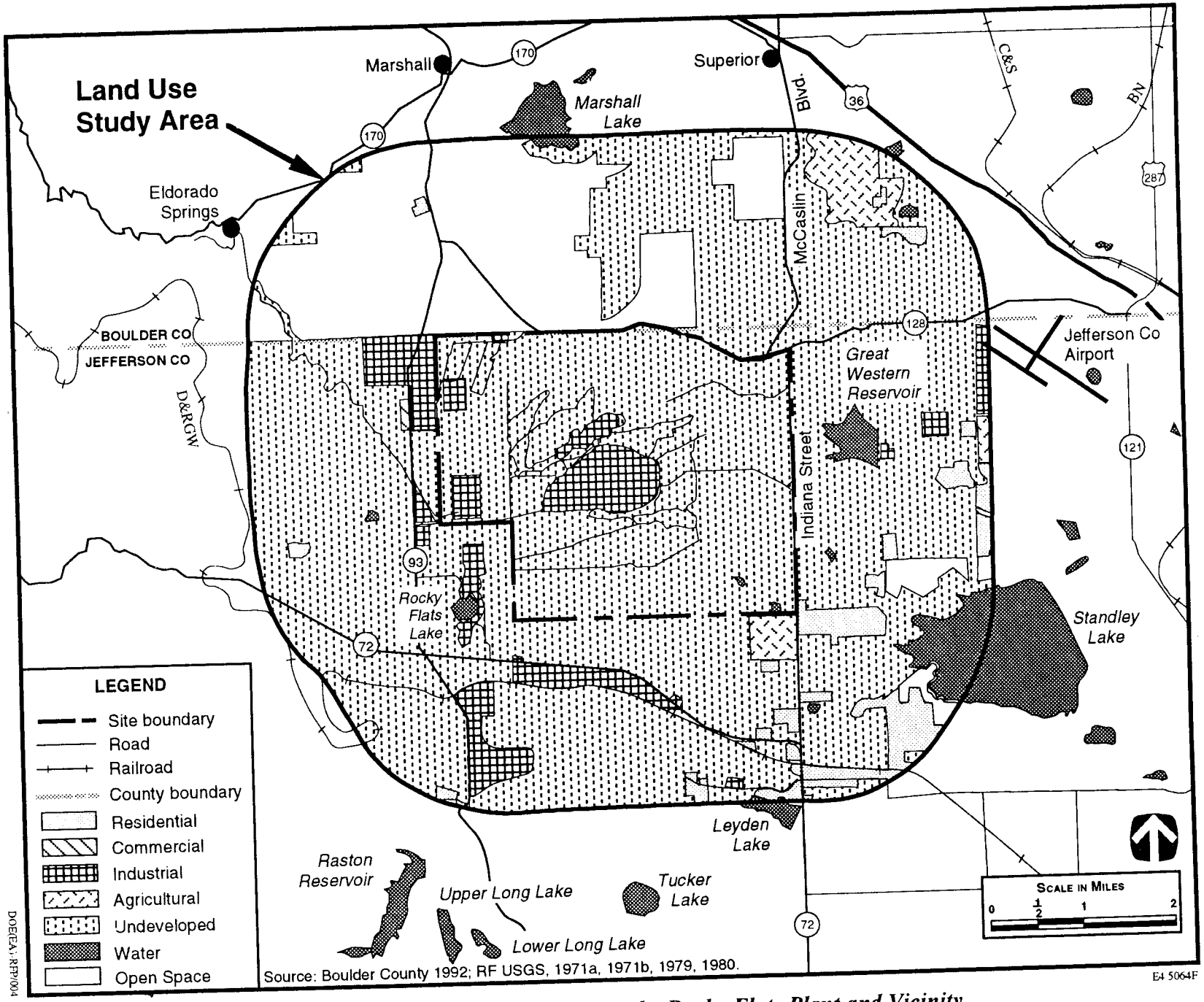
Construction and operation of the DOE facilities has heavily disturbed the character of the landscape. The most dominant features on the site include two large stacks and a water tank. The facilities are brightly lit at night and highly visible from many areas within a 3- to 5-mile radius of the site. The area within the central developed area is consistent with a Class 5 VRM designation. The remainder of RFP ranges from a Class 3 to Class 4.

Environmental Consequences. With implementation of the Proposed Action, RFP facilities would change from a DP mission to an environmental cleanup (see section 4.4). Land use within the RFP site would not change during the closeout of Complex nonnuclear missions; therefore, no onsite land use impacts are expected. Future use of RFP surplus facilities would be determined as part of transition activities.

Closeout of Complex nonnuclear missions at RFP would not adversely impact the comprehensive planning and zoning of Boulder and Jefferson counties. A review of socioeconomic data in section 4.1.8.7 indicates no adverse impacts to regional recreational resources due to changes in employment at the plant. No construction or demolition activities are planned as part of closeout; therefore, no affect on visual resources or VRM classifications is expected.

4.1.8.2 *Air Quality and Acoustics*

Affected Environment. The climate at RFP and in the surrounding region is characterized as a dry climate, middle-latitude steppe (Trewartha, 1954), with mild, sunny, semiarid conditions and few temperature extremes. The annual average temperature at RFP is 50.3 °F; temperatures vary from an average daily minimum of 15.9 °F in January to an average daily maximum of 88.0 °F in July.



DOE/EA-RFP/004

FIGURE 4.1.8.1–1.—*Generalized Land Use at the Rocky Flats Plant and Vicinity.*

The average annual precipitation at the RFP is approximately 15 inches (NOAA, 1991c).

Ambient Air Quality. RFP is located within the Metropolitan Denver Intrastate AQCR. This AQCR is designated nonattainment with respect to the NAAQS for PM_{10}, O_3, and CO, and listed as attainment for SO_2 and NO_2 (40 CFR 81.306). The PM_{10} standard is exceeded primarily due to fugitive dust. The O_3 and CO standards are exceeded primarily due to vehicular traffic, which is typical of an urban area. The NAAQS and Colorado state ambient air quality standards are listed in table D2.1.1-1.

The Colorado Department of Health has standards for seven hazardous/toxic air pollutants. Five of these (asbestos, beryllium, mercury, benzene, and vinyl chloride) are regulated by NESHAP. The other two (pb and hydrogen sulfide) are not regulated under NESHAP. The Colorado Department of Health has not promulgated HAPs regulations for new sources. The HAPs/toxics described in this section are those currently used at RFP or those anticipated to be used under the RFP consolidation alternative.

RFP operates an ambient air quality monitoring station located near the east entrance of the plant (RF Rockwell, 1989). The data from this monitoring station are presented in table D2.1.4-1. To achieve a conservative estimate, the maximum background concentrations as measured from this station were used in the analysis. Note that the Colorado ozone standard was exceeded.

The principal sources of criteria pollutants at RFP are the steam plant boilers. Minor combustion sources include various small boilers and diesel generators. Other sources of criteria pollutants include coating operations and particulate matter from various manufacturing operations. The emission inventories for RFP are included in table D2.1.4-2.

HAPs/toxics from various laboratories and manufacturing facilities include CCl_4, TCA, trichlorotrifluoroethane, ammonia, and trace quantities of other chemicals. Table D2.1.4-3 lists the RFP emissions inventory of HAPs/toxics.

Normal operations result in the emission of radioactive materials at RFP. These emissions would not be affected by the activities that are the subject of this EA.

The air quality under ambient and No Action conditions at RFP is shown in table 4.1.8.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of predicted concentrations of ozone, baseline concentrations from RFP do not exceed, and would not be expected to exceed, any applicable guidelines or regulations. (See section 4.1.8.9 for a discussion of the human health effects of CCl_4.)

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources within RFP include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). No sound-level measurements have been made around RFP. At the site boundary, away from most of the industrial facilities, noise from these sources would be barely

TABLE 4.1.8.2–1.—*RFP Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines*

Pollutant	Averaging Time	Most Stringent Regulation or Guideline ($\mu g/m^3$)	Maximum Background Concentration ($\mu g/m^3$)	No Action Concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)
Carbon Monoxide (CO)	8-hour	10,000[b]	4,437	7.1	4,444
	1-hour	40,000[b]	11,108	13.8	11,122
Hydrogen Sulfide (H_2S)	1-hour	142	d	18.8	≥ 18.8
Lead (Pb)	Calendar Quarter	1.5[b]	0.1	e	0.1
	30-day	1.5[c]	d	e	d
Nitrogen Dioxide (NO_2)	Annual	100[b]	20.7	0.3	21
Ozone (O_3)	1-hour	160[c]	561.5	e	561.5
Particulate Matter (PM_{10})	Annual	50[b]	21.2	0.7[g]	21.9
	24-hour	150[b]	43.4	40.4[g]	83.8
Sulfur Dioxide (SO_2)	Annual	80[b]	13.1	0.2	13.3
	24-hour	365[b]	86.4	7.8	94.2
	3-hour	700[c]	120.4	13.5	133.9
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,1,1-Trichloroethane	30-day	h	d	0.4[f]	≥0.4
Acetone	Annual	h	d	0.003	≥0.003
Ammonia	Annual	h	d	0.2	≥0.2
Carbon Tetrachloride	Annual	h	d	0.8	≥0.8
Cyclohexane	Annual	h	d	0.002	≥0.002
Dioctyl Phthalate	Annual	h	d	0.004	≥0.004
Ethyl Alcohol	Annual	h	d	0.003	≥0.003
Ethylene Glycol	Annual	h	d	0.005	≥0.005
Hydrogen Chloride	Annual	h	d	0.04	≥0.04
Hydrogen Fluoride	Annual	h	d	0.1	≥0.1
Isopropyl Alcohol	Annual	h	d	0.003	≥0.003
Lead	Annual	h	d	0.004	≥0.004
Methylene Chloride	Annual	h	d	0.07	≥0.07
Nitric Acid	Annual	h	d	0.05	≥0.05
Trichlorotrifluoro-ethane	30-day	h	d	0.4[f]	≥0.4

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a Compounds listed are the major pollutants of concern (RF DOE, 1992a).
b Federal standard (40 CFR 50).
c State standard (CO DOH, 1989).
d Data unavailable.
e Not estimated because the potential release is negligible.
f Annual average concentration.
g It is assumed that all PM_{10} concentrations are TSP concentrations.
h No state standards.

distinguishable from background noise levels. Thus, the acoustic environment along the RFP boundary and in the nearby residential areas away from traffic noise is assumed to be that of a rural location with typical DNL in the 35 to 50 dBA range (EPA, 1974). The primary source of noise at the site boundary and at nearby residences is traffic. Except for the prohibition of nuisance noise, neither the State of Colorado nor its local governments have established environmental noise standards applicable to RFP.

Noise levels at some residences along roads near RFP may exceed the EPA guidelines level for residential areas. The contribution to noise levels at nearby residences from sources at RFP is minor and not expected to contribute to any exceedance of the guideline levels.

Environmental Consequences.

Air Quality. Closeout of Complex nonnuclear missions at RFP would reduce emissions of criteria, hazardous, and toxic air pollutants. The air quality in the vicinity of RFP would likely improve with the elimination of pollutant sources.

Closeout of Complex nonnuclear missions at RFP would not reduce or eliminate emissions of radioactive materials. These emissions would not be affected by the activities that are the subject of this EA.

Acoustic Conditions. Closeout would reduce staff levels and traffic volumes on nearby roads. A minor reduction in traffic noise levels would also result. However, some of this reduction is expected to be offset by traffic resulting from increases due to other transition activities at RFP.

4.1.8.3 *Water Resources*

Affected Environment. This section describes the surface water and groundwater resources at RFP.

Surface Water. The primary streams in the plant area are Walnut Creek, North Walnut Creek, South Walnut Creek, and Woman Creek. The major hydrological features at RFP are shown in figure 4.1.8.3-1. The streams at RFP are considered part of the Big Dry Creek drainage basin, although Big Dry Creek is not directly affected by RFP activities. Rock Creek flows through the northwestern portion of the site and is physically separate from the operational plant complex; as such, Rock Creek is unaffected by site activities. Rock Creek has been maintained in an undisturbed condition since 1952 (RF EG&G, 1991e).

RFP lies on the divide between Walnut Creek and Woman Creek drainage basins. North Walnut Creek and South Walnut Creek drain the central and northern areas of RFP, and Woman Creek drains the southern areas. The confluence of South and North Walnut Creeks forms Walnut Creek. Walnut Creek flows downstream from RFP and empties into the Broomfield Diversion Ditch. The Broomfield Diversion Ditch routes water around the Great Western Reservoir, which is a public water supply, then into Big Dry Creek, and eventually into the South Platte River.

Woman Creek flows east across the southern portion of RFP into Standley Lake, which provides irrigation storage and municipal water for surrounding communities (RF EG&G, 1990a). The Woman Creek drainage basin traverses and drains the southern portion of the site. The South Interceptor Ditch collects runoff from the southern portions of the plant before it reaches Woman Creek, and diverts the flow to the off-channel unlined detention Pond C-2. Woman Creek flows into Standley Lake, which provides irrigation, storage, and municipal water for surrounding communities. Woman Creek may also be diverted into Mower Reservoir which also flows into Standley Lake. Then Standley Lake flows into Big Dry Creek, which flows into the South Platte River.

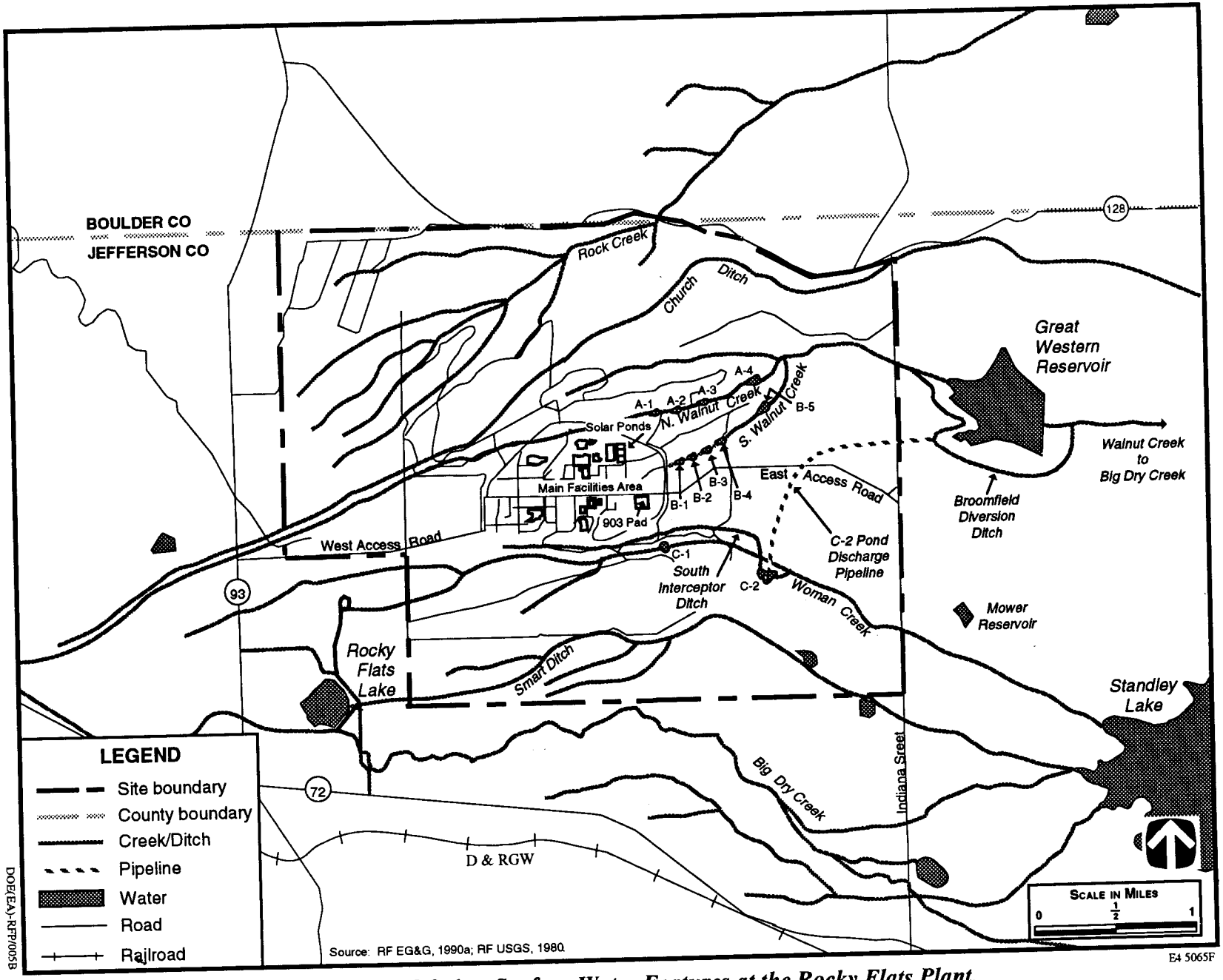

FIGURE 4.1.8.3–1.—*Surface Water Features at the Rocky Flats Plant.*

All natural surface water flow on RFP occurs in ephemeral channels that flow only as a result of precipitation, discharge of site effluents, surface seeps, or release of water from storage areas west of the site to supplement water supplies in the Great Western Reservoir or Standley Lake (RF DOE, 1987). On North Walnut Creek, South Walnut Creek, and Woman Creek, a series of unlined ponds serve to impound waters from the site. Along North Walnut Creek, the ponds are numbered A-1 through A-4; on South Walnut Creek, the ponds are numbered B-1 through B-5; and on Woman Creek, the ponds are numbered C-1 and C-2.

Wastewater from industrial processes is treated at a treatment plant that is isolated from other sources and does not discharge. Existing sanitary wastewater generation is estimated at approximately 55.2 MGY (table 3.2.4-2). Sanitary wastewater is treated and discharged to Pond B-3. Stormwater runoff from the plant is conveyed in storm sewers that discharge to creeks on the undeveloped portion of the site (RF WWE, 1992). Discharges from Ponds A-3, A-4, B-3, B-5, and C-2 are monitored under the NPDES permit program.

Terminal Ponds (A-4, B-5, and C-2) are designed to capture the flow from a 100-year storm if maintained at less than 10 percent of capacity. However, RFP has been unable to maintain the 10 percent capacity limit due to the treatment of large quantities of water and delays in receiving approval for certain discharges (RF ASI, 1991).

The primary source of flood potential at RFP is from flash flooding in seasonal streams. Of these, Woman Creek and North and South Walnut Creek drain the part of the site occupied by plant facilities (DOE, 1988). A recent study evaluating flooding potential at RFP indicated that even in the most extreme circumstances it is unlikely that flows on Woman Creek could pose a hazard to facilities. The stream is at least 80 feet below the elevation of structures in proximity to the stream (DOE, 1988 page 3-1). Because evidence suggested that Walnut Creek may be subject to excessive flows during periods of high rainfall and runoff, a probabilistic flood analysis was performed. The 500-year floodplain of Walnut Creek corresponds to an elevation of approximately 5,925 feet. The majority of RFP facilities are located between elevations of 5,950 and 6,050 feet MSL. Therefore, these facilities lie outside the 500-year floodplain.

RFP does not withdraw any water from streams on or near the site. All water for the plant is obtained from surface waters from the city of Denver via the South Boulder Diversion Canal from the South Boulder Creek and Ralston Reservoir. The water supply contract with the city and county of Denver through the Denver Water Board is for an unguaranteed supply of up to 1.5 MGD (RF DOE, 1991c). The current average water consumption is approximately 0.3 MGD (table 3.2.4-3). Raw water is stored in a 1.5 million gallon storage pond west of the plant (RF DOE, 1987).

Surface Water Quality. Revised surface water classifications and standards for RFP streams were adopted by the Colorado Water Quality Control Commission in January 1990 (RF DOE, 1991c). These standards were enacted in response to concerns raised after the 1989 FBI/EPA investigation of environmental violations and a chromic acid spill. The new water quality stream standards are not yet reflected in the RFP NPDES permit (RF EG&G, 1991e).

The water from Woman Creek, North Walnut Creek, and South Walnut Creek flows into ponds that restrict offsite discharges and allow water testing and, if necessary, treatment to meet water quality standards (RF EG&G, 1991e). A treatment facility is located at Pond A-4. Water from Pond B-5 is transferred to Pond A-4. Treatment consists of filtration and carbon absorption to reduce potential radionuclides and organic chemical contaminants. With concurrence from the Colorado Department of Health, water is released from Pond A-4 to Walnut Creek, and from Pond C-2 to the Broomfield Diversion Ditch, or in an emergency, to Ponds A-4 or B-5.

Discharges from Ponds A-4 and B-5 enter Walnut Creek and are diverted around the Great Western Reservoir by the Broomfield Diversion Ditch. Water is discharged untreated from Pond C-2 through an 8,000-foot pipeline into the Broomfield Diversion Ditch and around the Great Western Reservoir (RF EG&G, 1990a). The release of untreated discharge from Pond C-2 has been approved by EPA because sampling indicates that the discharge meets all Woman Creek standards, except for gross beta. The gross beta standards for Walnut Creek, the eventual destination of the piped discharge, are higher, and no standard is violated (RF EG&G, 1991e).

An unlined surface water control pond exists immediately downstream and downgradient of the landfill and current waste disposal operations at the eastern end of the landfill. The landfill is considered a hazardous waste management landfill due to past disposal of some materials that may now qualify as regulated hazardous wastes (RF EG&G, 1991e). The landfill pond routinely exceeds the RFP standard for strontium and has exceeded standards for copper, iron, lithium, manganese, mercury, nickel, plutonium, and zinc (RF ASI, 1991). The landfill pond does not discharge to natural surface waters.

RFP did not comply with NPDES permit limits for biochemical oxygen demand in May, June, and September 1990 and for fecal coliform in August 1990. All noncompliances were communicated to DOE as soon as the data became available. DOE notified EPA by telephone and followed up with written details. No Notices of Violation were issued by EPA in 1990 for these noncompliances (RF EG&G, 1991e). Also, the 1989 Environmental Audit states that the leach fields are inadequate and sewage emerges on the surface and has flowed to nearby streams (RF DOE, 1989).

Water quality monitoring results for Walnut Creek and Woman Creek are presented in table 4.1.8.3-1. These results indicate that concentrations were less than the water quality criteria listed, except in the case of beryllium, which exceeds Federal drinking water regulations.

Groundwater. Two hydraulically connected groundwater systems are present at RFP. The upper unit exists as an unconfined aquifer and the lower unit as a confined aquifer.

The unconfined aquifer at RFP is primarily unconsolidated alluvial material. Depth to the water table becomes shallower from 50 to 70 feet toward the east as the alluvial material thins. Seeps are common along stream drainages. Groundwater flow direction is generally toward the east (RF EG&G, 1991f).

Recharge to the unconfined aquifer occurs from infiltration of precipitation and as seepage from ditches, creeks, and ponds. In addition, retention ponds along South Walnut and Woman Creeks probably recharge this unit.

In the confined aquifer, groundwater is in the sandstone lenses below most of the plant. Flow within the sandstones is assumed to be from west to east (RF Hydro-Search, 1985). In some places, the sandstones are in contact with the alluvium so that the unit is part of the unconfined system at those places. Recharge to the sandstones occurs where they are in direct contact with the alluvium and valley fill of the upper aquifer or by leakage through claystones in contact with alluvium. The sandstone units discharge along the South Platte River, about 18 miles east of RFP.

Groundwater Quality. Groundwater monitoring has been conducted at RFP since 1960. Currently, 371 wells characterize the hydrogeology and groundwater quality at RFP. Groundwater quality in uncontaminated portions in surficial materials (alluvium, colluvium, valley fill, and weathered bedrock) is relatively good and can be classified as calcium bicarbonate water. The unweathered bedrock groundwater system can be distinguished from the surficial system by relatively higher sodium and sulfate content (DOE, 1989). Groundwater quality of the aquifer beneath RFP in the proposed area is summarized in table 4.1.8.3-2.

TABLE 4.1.8.3–1.—*Summary of Surface Water Quality Monitoring at Rocky Flats Plant*

Parameter	Unit of Measure	Water Quality Criteria	Existing Water Body Concentration[f]	
			Average	Maximum
Receiving Water: Walnut Creek—1989/90				
Americium–241	pCi/L	0.05[a]	0.0015	0.003
Beryllium[e]	mg/L	0.004[b]	0.005	0.005
Copper	mg/L	1[c]	0.019	0.025
Gross Alpha	pCi/L	11[a]	4.1	5.3
Gross Beta	pCi/L	19[a]	6.4	9.2
Lead	mg/L	0.015[b]	0.005	0.005
Plutonium–239	pCi/L	1.2[d]	0.005	0.01
Tritium	pCi/L	500[a]	30	50
Uranium–233, 234	pCi/L	10[a]	1.89	3.4
Uranium–235	pCi/L	10[a]	0.15	0.3
Uranium–238	pCi/L	10[a]	2.02	2.86
Total Dissolved Solids	mg/L	500[c]	270	270
Receiving Water: Woman Creek—1989/90				
Americium–241	pCi/L	0.05[a]	0.0	0.0
Beryllium[e]	mg/L	0.004[b]	0.0046	0.005
Copper	mg/L	1[c]	0.0266	0.0363
Gross Alpha	pCi/L	7[a]	<1	<1
Gross Beta	pCi/L	5[a]	4	4
Lead[e]	mg/L	0.015[b]	0.007	0.025
Plutonium–239	pCi/L	1.2[d]	0.0	0.0
Tritium	pCi/L	500[a]	<20	<20
Uranium–233, 234	pCi/L	5[a]	1.1	1.1
Uranium–235	pCi/L	5[a]	0.0	0.0
Uranium–238	pCi/L	5[a]	0.6	0.6
Total Dissolved Solids	mg/L	500[c]	287	300

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[a] Colorado state water quality standards, specific for Walnut and Woman Creeks.
[b] Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
[c] Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).
[d] U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
[e] Concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards—they do not constitute enforceable limits.
[f] Less than symbol (<) indicates concentration below analysis detection limit.

Source: RF EG&G, 1990a. (Radiological data from table 9-1; nonradiological data from table 9-18.)

TABLE 4.1.8.3–2.—*Summary of Groundwater Quality Monitoring at Rocky Flats Plant*

Parameter	Unit of Measure	Water Quality Criteria	1991—Existing Conditions[c]		
			Well No. 4986	Well No. 110889	Well No. 110989
1,1,1-Trichloroethane	mg/L	0.2[a]	NA	0.0050	0.0050
1,1,2-Trichloroethane	mg/L	0.005[a]	NA	0.0050	0.0050
1,2-Dichloroethane	mg/L	0.005[a]	NA	0.0050	0.0050
Beryllium	mg/L	0.004[a]	0.002-0.005	0.001	NA
Cadmium	mg/L	0.005[a]	0.002-0.005	0.005	NA
Copper	mg/L	1.0[d]	0.0056-0.02	0.0172	NA
Gross Alpha	pCi/L	15[a]	-0.05-7.4	-0.5-2.1	0.3-1.06
Gross Beta	pCi/L	50[a]	-0.19-8.3	0.5-2.9	1.7-3.3
Lead	mg/L	0.015[a]	0.0006-0.0007	0.0021	NA
Radium–229	pCi/L	e	0.067	NA	NA
Strontium–89, 90	pCi/L	e	0.08-0.26	0.2-0.38	0.46-0.56
Total Dissolved Solids	mg/L	500[d]	10-430	170	160-190
Trichloroethylene	mg/L	0.005[a]	NA	0.0050	0.0050
Tritium	pCi/L	20,000[a]	-15-231	8-788	-116-271
Uranium–233, 234	pCi/L	20[b]	0.075-2.0	0-4.6	0.11-0.38
Uranium–235	pCi/L	24[b]	0-1.6	0-0.12	-0.01-0.03
Uranium–238	pCi/L	24[b]	NA	0.03-0.48	0.07-0.25
Vinyl Chloride	mg/L	0.002[a]	NA	0.0100	0.0100

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[a] Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
[b] U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
[c] Wells are located in the area of the proposed Mechanical Technology Building, Office Manufacturing Building, and surface parking sites.
[d] Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).
[e] No specified limit.

NA Not Available

Source: RF EG&G, 1991e.

The unconfined aquifer contains both radiological and nonradiological contaminants. To date, no contaminants have been found in the confined aquifer.

There are five known contaminant plumes at RFP (figure 4.1.8.3-2). The first plume is associated with the solar evaporation ponds, which were used to store radioactive/hazardous waste. The main contamination from this plume lies beneath Buildings 207A and 207B. Groundwater quality data from 1991 indicate that the solar ponds contributed nitrate/nitrite, sodium, total dissolved solids, sulfate, radionuclides, and VOCs to the groundwater in surficial material and weathered bedrock immediately north, east, and southeast of the ponds. The radionuclides include tritium, radium, strontium-89 and -90, and uranium-233, -234, -235, and -238.

The second plume, the 903 Pad, Mound, and Trench plume, is located in the southeastern central portion of RFP. The 903 Pad and Mound areas were historically used for storage and burial, respectively, of radioactively contaminated wastes. The plume does not lie beneath buildings that house DOE DP nonnuclear activities.

The third plume is associated with the present landfill and is located at the western end of North Walnut Creek. The plume does not lie beneath buildings that house DOE DP nonnuclear activities. However,

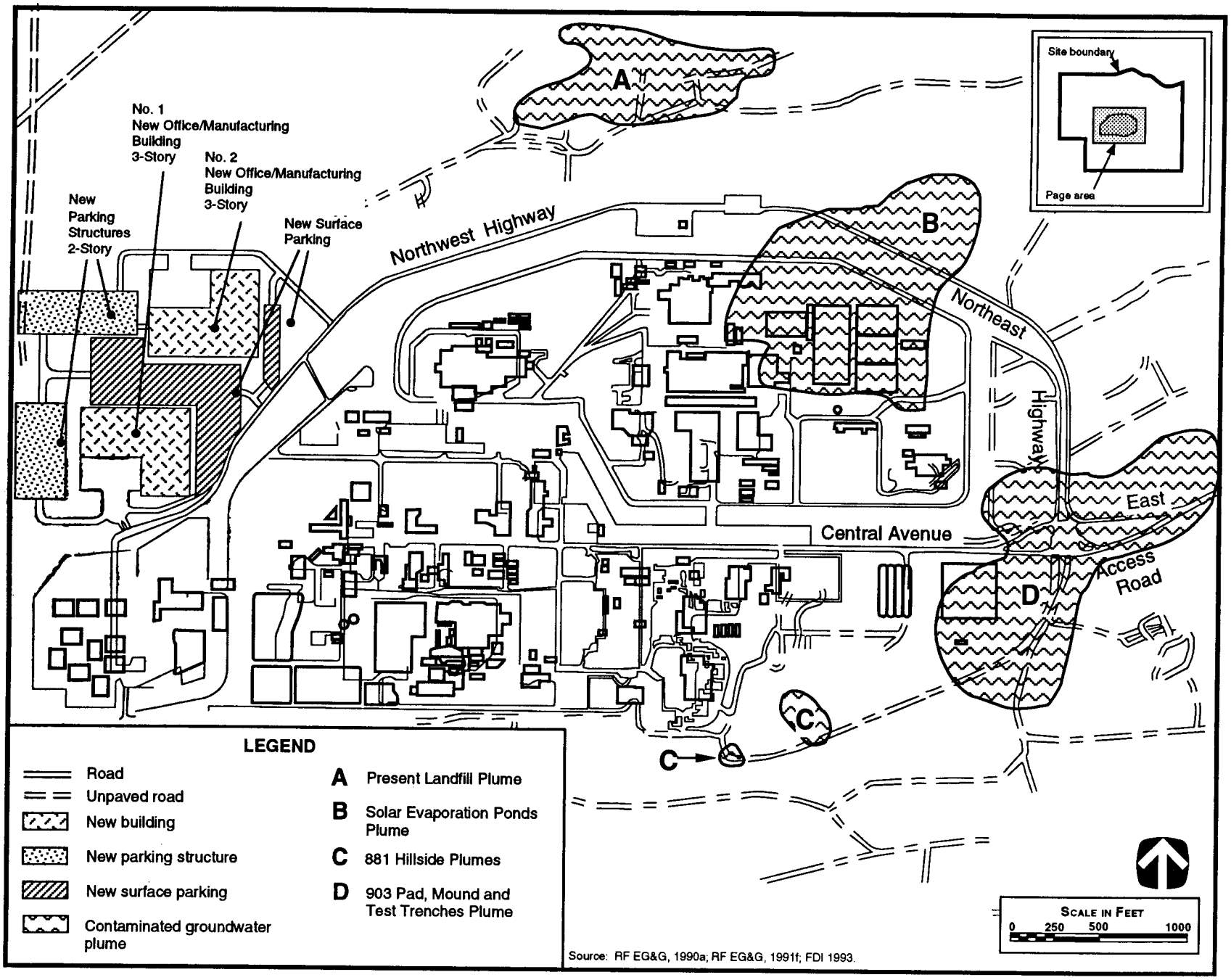

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FIGURE 4.1.8.3–2.—*Groundwater Contamination at the Rocky Flats Plant.*

the contaminants in this area have reached the North Walnut Creek drainage. The plume contains inorganic analytes, dissolved metals, dissolved radionuclides, VOCs, and nitrate/nitrite above standard levels.

The fourth plume is the 881 Hillside plume, located in the south-central portion of the RFP in the shallow groundwater system. This plume does not lie beneath any buildings housing DOE DP nonnuclear activities.

The fifth plume is associated with the West Spray Area with primary contamination occurring in the western portion of the RFP buffer zone. This plume is not shown on figure 4.1.8.3–2 and does not lie beneath buildings that house DOE DP nonnuclear activities. Remediation of all plumes is being addressed as part of the RFP environmental restoration program.

Groundwater Use. Currently, no groundwater is used by the facility. However, the plant is attempting to have one water supply well permitted for research use.

Groundwater Rights and Permits. In general, the rights to groundwater resources in Colorado are unrelated to ownership of the land under which those groundwater resources are located. However, for the Denver Basin Aquifers, which include the lower aquifers at the RFP, the right to groundwater resources derives from land ownership as long as the water is not tributary to any surface water supplies.

Environmental Consequences. Closeout of Complex nonnuclear missions at RFP would not involve any new construction; instead, all current nonnuclear operations would cease.

Surface Water. Because existing facilities are not located in the 500-year floodplain, closeout would not affect the floodplain area.

The closeout would result in an incremental decrease in the total wastewater volume handled by the plant. With reduced wastewater discharges, the RFP Terminal Ponds may be able to operate at design capacity to capture the flow from a 100-year storm. No impact to flow and water quality of Walnut and Woman Creeks would result.

Surface Water Quality. Because surface water discharges would be reduced there would be no adverse impact to water quality from closeout activities.

Groundwater. Because RFP does not withdraw groundwater, there would be no impact on the availability of this resource.

Groundwater Quality. A minor beneficial impact on groundwater resources would occur due to less potential for degradation of water quality from Complex nonnuclear mission activities. However, all other nuclear functions would continue as presently planned.

Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances during closeout activities. Given normal safeguards and procedures, no adverse impact to groundwater quality is expected to result from transition activities associated with the closeout of RFP Complex nonnuclear functions.

4.1.8.4 *Geology and Soils*

Affected Environment. RFP lies on the west flank of the Denver Basin. The plant is located on the gently eastward-sloping plain east of the foothills of the Front Range of the Rocky Mountains. The site is on rock layers that slope east at a low angle to the east. A short distance to the west, the stratigraphic sequence turns sharply upward, forming a series of rock outcrops along the mountain front (RF EG&G, 1991b).

RFP is in an area of low seismicity and lies in Seismic Zone 1 (ICBO, 1991). No capable faults are present in the immediate vicinity of the plant. The main faulting in the area is along the Front Range. Occasional earthquakes with maximum intensities of V to VI occur in Colorado, with the larger ones restricted to the west end of the state. Seismic activity poses little or no threat.

Small landslides and other mass movements are present where slopes exist; however, slopes are not steep and mass movements are limited in scale.

RFP is underlain by soils of the Denver-Kutch and Flatirons-Veldcamp soil associations. Erosion potential of the Denver-Kutch soils is low to moderate and the shrink-swell potential is moderate to high. The Flatirons-Veldcamp soils do not pose an erosion hazard, and their shrink-swell potential is low to moderate. Some soils in the Denver-Kutch association located on RFP could be considered prime farmland if irrigated (RF USDA, 1980). However, they are not irrigated and, therefore, are not designated as prime farmland.

Air-distributed plutonium-239 has settled over the land surface at RFP due to past operation activities, contaminating the surface layer of soils to depths of up to about 12 inches. Soil sampling is conducted to detect and monitor contamination with radioactive material on and from RFP, and permanent soil-sampling sites have been set up around the perimeter of the plant. Because radiation levels above those naturally occurring have been found to the east and southeast of the main RFP complex, DOE has carried out and currently supports remediation actions to remove or decrease soil contamination (RF DOE, 1992b).

Environmental Consequences. The proposed closeout of Complex nonnuclear missions at RFP would result in no impact on geologic features of the area, nor would the geology have any impact on closeout activities at the plant.

Hazardous, radioactive, and mixed waste sources would be eliminated from portions of the plant, thus decreasing future soil contamination potential. The proposed closeout of Complex nonnuclear functions at RFP would result in no impact on the soils of the area.

4.1.8.5 *Biotic Resources*

Affected Environment. Other than the central developed area of approximately 400 acres, most of RFP is managed as an undeveloped security buffer zone (section 4.1.8.1) that is excluded from human activity. This area supports natural vegetation that is representative of tall grass prairie, short grass plains, lower montane, and foothill ravine regions (RF DOE, 1980 and 1991a). The undeveloped buffer areas are closed to the grazing that is prevalent on grasslands in the vicinity of the RFP site. Many areas that formerly supported annual weed communities (due to grazing prior to DOE acquisition) now support perennial grassland. Wildlife in the undeveloped buffer areas is typical of similar grassland habitats in the surrounding region (RF DOE, 1991a).

Wetlands within the RFP site have been mapped and verified by the Corps of Engineers. Wetlands include an open lake, ponds, intermittent stream channels, ditches, and hillside seeps (RF EG&G, 1990b; RF FWS, 1975). These wetlands are classified in the lacustrine, riverine, and palustrine systems by the FWS.

Four intermittent streams that provide habitat for aquatic biota occur within the boundaries of RFP: Rock Creek, Woman Creek, and North and South Walnut Creeks (figure 4.1.8.3-1) (RF DOE, 1980; RF Rockwell, 1986a). Woman Creek supports an aquatic biota typical of small, high-prairie streams receiving minimal agricultural runoff and domestic and industrial wastes.

A comprehensive survey for threatened and endangered species has been recently completed for

RFP (RF EG&G, 1991c). Suitable habitat for the Ute's ladies-tresses orchid (*Spiranthes diluvialis*) (a Federally-listed threatened species) occurs on RFP; however, no specimens were found during a recent survey (RF ESCO, 1992). The bald eagle (*Haliaeetus leucocephalus*) (a Federally- and state-listed endangered species) is known to winter on large water bodies in the vicinity of RFP, and the peregrine falcon (*Falco peregrinus*) (a Federally- and state-listed endangered species) has been sighted on RFP. The ferruginous hawk (*Buteo regalis*) and the Preble's meadow jumping mouse (*Zapus hudsonius preble*) (both Federal candidate category-2 species) have also been observed on RFP and may breed there. Portions of a prairie dog colony extend across RFP's northern boundary and could provide suitable habitat for the black-footed ferret (*Mustele nigripes*) (a Federally- and state-listed endangered species). However, the occurrence of the black-footed ferret is not likely (RF EG&G, 1991c).

Environmental Consequences. Closeout of Complex nonnuclear missions at RFP under the Proposed Action would not adversely affect biotic resources. Closeout of these missions would result in a reduction of existing operational impacts to natural habitats on and around the site.

4.1.8.6 *Cultural Resources*

Affected Environment. The prehistoric chronology of the Rocky Flats area consists of four broad time periods: Paleoindian (10,000-5500 B.C.), Archaic (5500 B.C.-A.D. 1), Ceramic (A.D. 1-1550), and Protohistoric (A.D. 1550-1800) (RF Cassells, 1983; RF D&M, 1991). Prehistoric site types that occur in the area include teepee ring sites, camps, quarries, hunting stations, plant processing sites, and buffalo kill and butchering sites. Three surveys have been conducted at RFP covering all of the undisturbed portions of the facility (RF Burney, 1989; RF Cassells, 1983; RF D&M, 1991). No prehistoric sites were identified; however, two sites with rock alignments and four isolated cairns were recorded and are most likely prehistoric (RF Burney, 1989; RF EG&G, 1991a). The two sites have not been evaluated to determine their NRHP eligibility; therefore, these sites are considered potentially NRHP-eligible pending additional work. The four isolated cairns are not considered NRHP-eligible (RF Burney, 1989; RF D&M, 1991).

The history of the region has been previously documented. Most of the historic resources in the area are archaeological sites or standing structures associated with ranching or transportation routes. Historic site types in the vicinity include trails, railroad grades, homesteads, cattle camps, line shacks, ranch complexes, irrigation ditches, stock ponds, and windmills. All undisturbed portions of RFP have been intensively surveyed; 35 historic sites and 4 isolated rock features have been recorded. The historic sites include a railroad grade, stock ponds and tanks, irrigation ditches, corrals, a fence, a dump, a spring house, and homesteads. None of the historic sites or features have been recommended as eligible for the NRHP (RF Burney, 1989; RF D&M, 1991).

In 1951, the Santa Fe Office of the AEC selected the Denver area for a new fabrication facility, and operations at Rocky Flats were initiated in 1953 (RF D&M, 1991). Most of the RFP facilities were constructed in the early 1950's and have since been modified and refurbished. The existing facilities are not likely to be considered NRHP-eligible because they lack architectural integrity, are not representative of a particular style, and are not contributing features to the broad theme of the Manhattan Project and initial nuclear production.

Several Native American groups, including Plains Apache, Comanche, Ute, Arapaho, and Cheyenne, historically occupied or traversed the foothills area around RFP. Important sites, such as burials or vision quest locations, may be of concern to Native American groups. Several unidentified rock features and alignments have been recorded on RFP and may also be of concern to Native American groups.

Environmental Consequences. The closeout of Complex nonnuclear missions at RFP does not

include ground disturbance or building modifications and, therefore, would not affect cultural resources.

4.1.8.7 *Socioeconomics and Community Services*

Affected Environment. The discussion of socioeconomics and community services at RFP is based on an ROI where 93 percent of the RFP employees lived in 1991. The ROI includes Adams (18 percent), Arapahoe (5 percent), Boulder (24 percent), Denver (8 percent), and Jefferson (38 percent) counties in Colorado. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Arvada (16 percent), Boulder (6 percent), Broomfield (8 percent), Golden (5 percent), and Westminster (8 percent) (see figure 3.2.4-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.8-1 through E3.8-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 97 percent, increasing from 511,935 in 1970 to 1,009,650 in 1990. Total employment increased from 492,961 to 964,447 between 1970 and 1990, an annual growth rate of 3 percent. The unemployment rates for 1970 and 1990 were 3.7 percent and 4.5 percent, respectively. For the same years, personal income increased from approximately $5.6 billion to $35.8 billion (an annual average of 10 percent), and per capita income increased from $4,503 to $20,006.

Between 1970 and 1990, employment at RFP increased from 3,805 to 6,780, representing less than 1 percent of the ROI employment in 1990 (RF EG&G, 1991d). Changes in mission requirements have historically led to fluctuations in employment levels over this period. For example, employment increased to 6,000 by 1985. As of September 30, 1992, employment at RFP had increased to 7,299. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to increase to approximately 6,500 persons by the year 2000 (DOE, 1993c). In 1992, the total RFP payroll was estimated to be about $294 million (RF DOE, 1992a). Under the No Action baseline, the total payroll would be projected to be approximately $262 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 1,205,000 by 2000 and 1,283,000 by 2020. The unemployment rates for 2000 and 2020 are both projected to be 5.6 percent. For the same years, personal income is projected to increase from approximately $51.8 billion to $67.7 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $25,000 in 2000 to $28,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 45 percent to 1,787,928. During the same period, the Colorado population increased 49 percent. The population in the 5-county ROI is projected to increase from an estimated 2,100,000 in 2000 to 2,390,000 by 2020, an annual rate of 1 percent.

The largest county population increase (137 percent) occurred in Arapahoe County between 1970 and 1990, while the population in Denver County declined 9 percent. During the same period, population in Jefferson County increased 88 percent. Population in Arapahoe County is estimated to increase 16 percent between 1990 and 2000 and 14

percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Denver County population is projected to increase approximately 22 percent between 1990 and 2000 and 14 percent between 2000 and 2020, an annual growth rate of 1 percent. The population in Jefferson County is expected to increase approximately 14 percent by 2000 and an additional 14 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Westminster had the greatest increase in city population (284 percent) in the ROI. For the same years, the populations in Arvada, Boulder, Broomfield, and Golden increased 86 percent, 25 percent, 239 percent, and 34 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 92 percent from 410,529 to 788,480. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 18 percent by the year 2000 and an additional 14 percent by 2020, an annual increase of about 1 percent.

Between 1970 and 1990, the largest increase in housing units (245 percent) occurred in Arapahoe County, while the smallest increase (24 percent) occurred in Denver County. The number of housing units in Arapahoe County is expected to increase approximately 19 percent by 2000 and an additional 14 percent by 2020, an annual increase of 1 percent. The number of housing units in Denver County is expected to increase about 5 percent by 2000 and an additional 14 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 3 percent in the ROI and ranged from approximately 2 percent in Boulder County to 4 percent in Denver County. The vacancy rates for rental units averaged 11 percent and ranged from about 5 percent in Boulder County to 14 percent in Adams County.

Community Infrastructure and Services. Thornton, Westminster, Northglenn, Brighton, South Adams County Water and Sewer District, Aurora, Englewood, Boulder, Longmont, Broomfield, Lafayette, Denver, Arvada, and Golden all operate water supply systems in the ROI. All of these systems draw their raw water supplies from surface water, except Brighton and the South Adams County Water and Sewer District, which utilize groundwater supplies.

In Adams County, the systems operated by Thornton (50 MGD capacity), Northglenn (15 MGD capacity), Brighton (12 MGD capacity), and South Adams County Water and Sewer District (15.5 MGD capacity) had 1989 average daily demands of less than 29 percent of capacity. Westminster's system (36 MGD capacity), also in Adams County, had 1989 average daily demands of 64 percent of capacity. The Aurora (130 MGD capacity) and Englewood (34 MGD capacity) systems in Arapahoe County experienced 1989 average daily demands of 31 percent and 24 percent of capacity, respectively. Water supply systems in the cities of Boulder (55 MGD capacity), Longmont (50 MGD capacity), Broomfield (8 MGD capacity), and Lafayette (8 MGD capacity) in Boulder County all had 1989 average daily demands of less than 38 percent of capacity. The Denver Water Board system (715 MGD capacity) had 1989 average daily demands of 30 percent of capacity. The systems operated by Arvada (52 MGD capacity) and Golden (15 MGD capacity) in Jefferson County had 1989 average daily demands of 30 percent and 23 percent of capacity, respectively.

Westminster's system is projected to have average daily demands of 67 percent of capacity in 1995 and 70 percent of capacity in the year 2000. All other systems are projected to have average daily demands of less than 41 percent of capacity in 1995 and less than 46 percent of capacity in 2000.

Westminster, Northglenn, Brighton, South Adams County Water and Sewer District, Aurora, Englewood, Boulder, Broomfield, Lafayette, Longmont, and Denver operate wastewater treatment systems in the ROI. Westminster (5.5

MGD capacity), Northglenn (6.5 MGD capacity), Brighton (about 2.6 MGD capacity), and South Adams County Water and Sewer District (4 MGD capacity) in Adams County experienced 1989 average daily demands of 76 percent, 48 percent, 67 percent, and 65 percent of capacity, respectively. Englewood's system (35 MGD capacity) in Arapahoe County experienced 1989 average daily demands of 66 percent of capacity. Aurora (2.5 MGD capacity), also in Arapahoe County, operates its system near capacity (92 percent in 1989) but utilizes Denver's system to treat approximately 90 percent of its wastewater. The cities of Boulder (16 MGD capacity), Longmont (about 11.6 MGD capacity), Broomfield (5.4 MGD capacity), and Lafayette (1.8 MGD capacity) all operate systems in Boulder County. Longmont, Broomfield, and Lafayette had 1989 average daily demands of 61 percent, 47 percent, and 67 percent of capacity, respectively, while Boulder's system experienced average daily demands of 100 percent of capacity. The Denver Metro Wastewater Reclamation District (185 MGD capacity), the largest system in the region, serves both Denver County and Arvada and Lakewood in Jefferson County and had 1989 average daily demands of 76 percent of capacity.

The system operated by Westminster is projected to have average daily demands of 85 percent of capacity in 1995 and 95 percent of capacity in 2000. Boulder's system, currently operating at capacity, is projected to have average daily demands of 103 percent and 106 percent of capacity in 1995 and 2000, respectively. All other systems are projected to have average daily demands of less than 80 percent of capacity in 1995 and less than 84 percent of capacity in 2000.

Eighteen school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 181 students in the Deer Trail School District to 75,164 students in the Jefferson County School District. School districts with enrollments over 1,000 were operating between 46 percent and 135 percent of capacity. Those school districts operating over 100 percent of capacity were Strasburg (135 percent) and Westminster (104 percent). Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 19:1, and expenditures averaged $5,253 per pupil. The statewide average pupil-to-teacher ratio was 18:1, and expenditures averaged $5,374 per pupil (CO DEd, 1990).

Thirty-one hospitals serve the five-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 5,199 physicians served the ROI. The physician-to-population ratio for the ROI was 2.9:1,000 and ranged from 1.3:1,000 in Jefferson County to 6.6:1,000 in Denver County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Fourteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agencies in the five-county ROI were in Denver, with 1,362 sworn officers or 2.9 sworn officers per 1,000 persons; and in Jefferson County, with 360 sworn officers or 0.8 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.8 per 1,000 persons (FBI, 1991).

Thirty-three fire departments and 3,694 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Denver County (877 firefighters; 1.9 firefighters per 1,000 persons) and in Boulder County (754 firefighters; 3.3 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.1 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to RFP is provided by Colorado State Route 93 to the west and Jefferson County Road 17 (Indiana Street) to the east.

Estimated traffic along segments providing access to RFP is projected to contribute to differing service level conditions in accordance with population growth. Colorado State Routes 93 and 128, as well as Indiana Street, would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in some congestion. In addition, estimated truck traffic into RFP for delivery of supplies and removal of wastes would typically average 24 trips per day. However, the additional traffic volumes associated with continued operation of RFP are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to RFP (CO DHwy, 1991a).

Major railroads in the ROI include the Denver and Rio Grande Western Railroad; the Burlington Northern Railroad; the Atchison, Topeka, and Santa Fe Railroad; and the Union Pacific Railroad. A single-track spur from the Denver and Rio Grande Western Railroad mainline accesses RFP from the west (RF DOE, 1980). No navigable waterways within the ROI are capable of accommodating waterborne transportation of material shipments to RFP.

Stapleton International Airport provides passenger and cargo service in the ROI on national and international carriers (DOT, 1991). A new Denver Airport is scheduled for completion in October 1993, at which time Stapleton International Airport is scheduled to close (Adams County, 1990).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning and the proposed Fiscal Year 1994 budget figures, DOE has revised the estimate of post consolidation work force figures which reflect a loss of 715 jobs instead of 750 jobs (DOE, 1993c and d). The analysis presented in table 4.1.8-7 and discussed here uses the methodology presented in appendix E and the original estimate of 750 lost jobs. The estimate of 715 lost jobs is 5 percent lower than the 750 job loss used in the following analysis, and this lower job loss would result in slightly fewer negative economic consequences. The Proposed Action would result in minor decreases in economic activity and employment in the ROI. Based on the employment requirements for the transferred functions from RFP, employment would decrease in the ROI by an estimated 2,917 jobs (750 direct and 1,167 indirect). This reduction would not increase the unemployment rate in the year 2000 beyond the projected baseline level of 5.6 percent. Earnings in the ROI would be reduced by about $68.5 million, with a related decrease in the total personal income of $82.2 million.

The ROI would be further affected by employment losses after the closure of the Technical Training Center at Lowry Air Force Base located in Denver. The 1001st Space Systems Squadron, Defense Finance and Accounting Service, and the Air Force Reserve Personnel Center would remain open, but all technical training would by redistributed to other locations (RF DBCRC, 1991). It is estimated that this closure will result in the loss of approximately 6,500 persons, of whom between 3,500 and 4,000 are students at the Technical Training Center.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.8.7-1. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 2,100,000. The cities of Broomfield and Golden would be the most affected; however, their populations would not decrease more then 1 percent.

The less than 1-percent change in population after closeout of Complex nonnuclear missions would create an estimated 435 additional vacant housing

TABLE 4.1.8.7–1.—*Rocky Flats Plant Proposed Action Economic and Population Characteristics*

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	1,205,374	NA
Baseline Unemployment Rate	5.6%	NA
Baseline Personal Income (Thousands $)	$51,753,781	NA
Baseline Per Capita Income ($/Person)	$24,644	NA
Baseline Employment	1,137,688	NA
Direct Jobs Lost	750	0.07
Indirect Jobs Lost	1,167	0.10
Out-Migrating Workforce	390	0.03
Total Out-Migration	989	0.05
Population Decrease		
Adams County	190	0.06
Arapahoe County	54	0.01
Boulder County	253	0.10
Boulder	65	0.07
Broomfield	50	0.18
Denver County	90	0.02
Jefferson County	401	0.08
Arvada	166	0.17
Golden	56	0.38
Westminster	88	0.10
ROI (County Total)	988	0.05

E4 4018

Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; CO DOL, 1991; DOE, 1993c.

units, which is less than a 1-percent increase. The city of Golden would be the most affected, but with a less than 1-percent increase in the number of vacant housing units.

The less than 1-percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be affected, and local traffic conditions would improve slightly.

4.1.8.8 *Waste Management/ Pollution Prevention*

Affected Environment. Discussion of the RFP waste management baseline is provided in section 3.2.4.3 and appendix A, section A.4. Because there are no TRU wastes associated with any of the Complex nonnuclear missions at RFP that would be closed out due to the Proposed Action, no further discussion of TRU waste generation or management is presented.

Generation of LLW, mixed, hazardous/toxic waste, and nonhazardous wastes at RFP is expected to decrease with time, as production operations are expected to be reduced.

LLW is packaged and stored onsite pending approval for offsite disposal at NTS. RFP's RCRA permit

specifies storage locations and volume limits for LLW storage onsite. A new 25,000-ft^2 centralized waste storage facility, which would consolidate LLW, low-level mixed, and hazardous wastes, is scheduled to be completed in April 1994, allowing RFP to extend permitted capacity well beyond 1994.

Waste operations at RFP consist of the storage and treatment of hazardous wastes subject to the requirements of RCRA and the management of wastes subject to the requirements of TSCA. All facilities are in compliance with the applicable requirements of both TSCA and RCRA, as appropriate. All waste stream residue generated at RFP that is not reclaimed or recycled onsite is manifested and shipped under contract with DOT-registered transporters to RCRA- or TSCA-permitted offsite treatment and disposal facilities.

Nonhazardous wastes are segregated and recycled whenever possible. Trash is disposed of at RFP in a landfill approved by Jefferson County with concurrence from the State of Colorado. Wastewater effluents from RFP processing activities are treated and used for process make-up water and do not discharge offsite.

RFP has implemented a waste minimization and pollution prevention program using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Ongoing hazardous waste pollution prevention and waste minimization activities at RFP include replacement of carbon tetrachloride and trichloroethane used in cleaning with aqueous detergents or nonchlorinated solvents, and recycling of chlorofluorocarbons used in refrigeration units throughout the plant.

Environmental Consequences. Closeout of Complex nonnuclear missions at RFP would ultimately reduce onsite, hazardous annual waste management by approximately 378,600 lb for DP operations. Over 65 percent of the reduction would be due to decreased generation and incineration of bulk oil; 32 percent to decreased generation and landfilling of industrial wastewater pretreatment sludge; and less than 2 percent to decreased generation and incineration of bulk acid liquid. Nonhazardous waste would also be reduced as a result of the closeout.

Closeout of Complex nonnuclear missions at RFP would initiate closure of some existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Colorado Department of Health. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to RCRA- or TSCA-permitted treatment and disposal facilities. Equipment, structures, and soils (if contaminated) would also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements.

Existing inventories of LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Due to the closeout of Complex nonnuclear missions, RFP would reduce discharges of treated sanitary wastewater to Walnut Creek.

Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, plastics, scrap, and metal containers, would be reduced as a result of this action. Trash that would have been disposed of in the onsite sanitary landfill would diminish, extending the operating life of the landfill.

4.1.8.9 *Human Health: Facility Operations and Accidents*

Affected Environment. As discussed in the Air and Water Resources sections for RFP (4.1.8.2 and 4.1.8.3, respectively), the chemical pollutant levels from RFP operations to which the public is exposed meet applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public from radiological releases from RFP

are well below applicable permit, regulatory, and DOE operational requirements (RF EG&G, 1991e).

A review of the recent RFP annual environmental and accident reports indicates that there have been no releases that resulted in adverse impacts to workers, members of the public, or the environment. This review was performed to provide a baseline for estimating impacts from recent site operations. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than expected in the future.

Water from processes containing hazardous chemicals is treated in a closed loop system. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For RFP, HAPs were examined and from this assessment, the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: ammonia, CCl_4, methylene chloride, and TCA. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The existing Hazard Indexes for RFP (see table F-14a) were 14.1 onsite (worker effects) and 0.322 at the site boundary (effect on the public) on an annual basis.

The exceedance of the Hazard Index onsite is due primarily to CCl_4 emissions (Hazard Quotient of 14.0), the majority of which is due to nuclear facilities operations; elimination of this chemical would bring the Hazard Index to a level below 1.0, where no adverse health effects would be expected. In the future, CCl_4 use would be reduced. Replacement non-carcinogenic solvents like TCA would be used as a substitute for CCl_4. Furthermore, RFP operations that use CCl_4 are not activities that are proposed to be transferred as part of the action of this EA. The activities currently involving beryllium at RFP have been the subject of epidemiologic studies which show correlation with chronic beryllium diseases. However, improved safety procedures and modifications in the crystal structure of beryllium result in lower toxicity than that of beryllium used between 1940 and 1950 (Rossman, 1991).

Two of the chemicals identified, CCl_4 and methylene chloride, are considered to be carcinogens and the cancer risk to individuals was calculated. The risk for the carcinogen was calculated as 5.3×10^{-4} onsite (worker) and 1.2×10^{-5} at the site boundary (public) (see table F-14b). The cancer risk for the methylene chloride will be mitigated by substitution of a less toxic noncarcinogenic solvent.

Releases of radioactive materials from RFP resulted in a total maximum individual annual dose of 0.23 mrem effective dose equivalent (RF EG&G, 1990a). The resulting risk of potential fatal cancers associated with 1 year of operations would be 1.0×10^{-7}. Cancer risks of 10^{-6} or less are considered acceptable because this incidence of cancers cannot be distinguished from the normal risk to an individual member of the public. When risks are greater than 10^{-6}, appropriate measures are required to reduce the risks to less than 10^{-6}.

In summary, these analyses show that excess cancer risks to workers and members of the public can be expected from normal releases of hazardous chemicals/chemical pollutants associated with nuclear activities at RFP as a result of continued operations. Administrative and engineering mitigative actions are being implemented to minimize the impact. The risk attributed to nonnuclear functions can be reduced by replacing the currently used solvents with less toxic ones.

Environmental Consequences. Closeout of Complex nonnuclear missions would result in no additions of hazardous materials to RFP. Consequently, closeout would result in a decrease in adverse affects. The impacts at the DOE facilities that would receive the relocated Complex nonnuclear missions from RFP are discussed in their respective sections.

4.2 OTHER CONSOLIDATION ALTERNATIVES

This section discusses the environmental consequences of the Mound, Pinellas, and RFP alternatives to the Proposed Action (KCP consolidation). Because many of the elements of the alternatives are also common to the Proposed Action and No Action, the discussion of impacts for each is presented and discussed in a comparative manner to the Proposed Action (section 4.1) and, as appropriate, No Action (section 4.1.1 to 4.1.8).

4.2.1 Mound Plant

Impacts of this alternative are similar to the Proposed Action because the neutron generator, cap assemblies, and thermal battery functions from Pinellas would be relocated to SNL (sections 4.1.5). However, the impacts of this alternative would be less than the impacts of the Proposed Action at SNL because the milliwatt heat source surveillance function would remain at Mound and not be relocated to SNL. The impacts of this alternative would also be less than the Proposed Action at LANL (section 4.1.3), which would receive only the neutron tube target loading function from Pinellas and the beryllium technology and pit support functions from RFP, but not the explosives or calorimeter functions from Mound. There would be no impacts at SRS under this alternative because the tritium-handling functions currently at Mound would remain at Mound and not be relocated to SRS. The explosives, tritium-handling, and electrical/mechanical functions currently performed at Mound would remain in place but at the same reduced workload as the Proposed Action.

4.2.1.1 *Land Resources*

Consolidation of electrical/mechanical functions at Mound would require modification of existing building space located at the Main Hill Area, SM/PP Hill Area, and Valley Area of the plant (figure 3.4.1-2). New construction would occur at the SM/PP Hill Area (heavily developed) and New Property Area (undeveloped). New construction at the SM/PP Hill Area and the New Property Area would disturb about 62 acres for new buildings, temporary construction laydown, and a parking area (table 3.4.1-1).

During construction, the offsite land requirements for residential land uses from project-related in-migration (section 4.1.6.7) would be approximately 37 acres, distributed throughout the local jurisdictions of Butler, Montgomery, and Warren counties. The project-related offsite land requirements for residential land uses associated with operations would be approximately 267 acres. Land available for residential development in the tri-county area would easily meet these needs.

There are extensive public and private recreational facilities in the region that could easily absorb the increased demand resulting from the population increase. Impacts to recreational resources would be negligible.

Facilities of the Mound alternative would be located adjacent to existing industrial development and would be screened from viewpoints with high sensitivity levels by terrain and vegetation. The buildings would be similar in appearance to the existing structures and in keeping with the existing Class 5 VRM designation.

4.2.1.2 *Air Quality and Acoustics*

Air Quality. During construction, minor air quality impacts would occur, including the generation of particulate matter such as dust and dirt. These impacts would be controlled through standard construction practices such as watering of construction sites. During operations, air emissions could increase at Mound for the criteria pollutants and for HAPs/toxics (FDI, 1993). The emissions inventory for the Mound alternative is presented in table D3.1.2-1. The predicted air quality impacts at Mound from the Mound consolidation alternative are presented in table 4.2.1.2-1. These are all within applicable standards and guidelines (See appendix D for a description of the input parameters, assumptions, and methodology used to estimate impacts of this alternative on air quality at Mound).

Normal operations result in the emission of radioactive materials at Mound (MD DOE, 1991a). The Mound alternative would not result in an increase in the emission of radioactive materials.

Acoustic Conditions. Changes in noise levels during construction and operations have been estimated for the major traffic routes around Mound. The estimates are based on existing traffic volumes and projected changes in volumes as a result of proposed changes in employment at Mound. These changes in traffic volumes are predicted to result in an increase of 5 dB in peak-hour sound levels along Mound Road during operations. Changes in sound levels along other routes are estimated to be small. The increased noise levels along the major access routes would be expected to cause no increase in annoyance level to communities or individuals, except along Mound Road during operations when some increased reaction to traffic noise may be expected.

Noise emissions from onsite construction activities have not been analyzed but may be expected to result in a short-term increase in noise from heavy equipment operation and other construction noise sources. Construction activities include erection of major new buildings and parking areas on the southern part of the site and renovation of existing buildings. Noise emissions from onsite operation activities should be similar to those from existing sources. The facilities would be designed to minimize noise levels at the site boundary and to ensure compliance with the city of Miamisburg's Noise Ordinance (appendix D, section D.2.2.2).

Construction workers and personnel working at any of the reconfigured facilities at Mound would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at Mound.

Although no increase in annoyance is expected offsite from construction and operations onsite, measures would be necessary to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. Noise levels would be measured in worker areas and an effective hearing protection program conducted. Traffic noise may be mitigated by providing access to the new facilities from Benner Road.

4.2.1.3 *Water Resources*

This section describes potential surface and groundwater impact due to the Mound consolidation alternative.

Surface Water. Building modifications and new building construction would take place in areas above the 500-year floodplain. Therefore, the requirements of Executive Order 11788 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Because the water supply for Mound is from three onsite wells, the only potential impacts from site activities on the Great Miami River result from the

TABLE 4.2.1.2–1.—*Contribution to Air Quality from the Mound Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines* [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[g]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Carbon Monoxide (CO)	8-hour	10,000[b]	4,467	2.5	4,469.5
	1-hour	40,000[b]	13,973	8.5	13,981.5
Lead (Pb)	Calendar Quarter	1.5[b]	d	f	d
Nitrogen Dioxide (NO_2)	Annual	100[b]	≥0.4	0.2	0.6
Ozone (O_3)	1-hour	235[b]	d	f	d
Particulate Matter (PM_{10})	Annual	50[b]	29.6	0.01	29.6
	24-hour	150[b]	98.5	0.01	98.6
Sulfur Dioxide (SO_2)	Annual	80[c]	15.7	0.0003	15.7
	24-hour	365[c]	70.7	0.004	70.7
	3-hour	1,300[b]	120.4	0.02	120.4
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,4-Dioxane	1-hour	2,143[c]	d	1.4	≥1.4
1,1,1-Trichloroethane	1-hour	45,476[c]	≥42.5	0.5	≥43
Acetic Acid	1-hour	595[c]	d	0.9	≥0.9
Acetone	1-hour	42,380[c]	≥56.6	16.1	≥72.7
Chlorodifluoroethane	1-hour	e	d	0.9	≥0.9
Chlorodifluoromethane	1-hour	84,286[c]	d	0.5	≥0.5
D'Limonene	1-hour	e	d	2.4	≥2.4
Dichlorodifluoromethane	1-hour	117,857[c]	d	0.5	≥0.5
Dimethyl Foramide	1-hour	714[c]	d	0.5	≥0.5
Ethyl Benzene	1-hour	10,333[c]	d	0.9	≥0.9
Fluorotelomer	1-hour	e	d	5.7	≥5.7
Fluorine End-capped Homopolymers	1-hour	e	d	8.0	≥8.0
Fluoboric Acid	1-hour	e	d	0.9	≥0.9
Fluoroaliphatic Polymer Esters	1-hour	e	d	0.5	≥0.5
Fluorobenzene	1-hour	e	d	0.6	≥0.6
Fluoroteloner	1-hour	e	d	0.5	≥0.5
Glycol Ethers	1-hour	571[c]	d	50.1	≥50.1
Hexane	1-hour	4,190[c]	d	1.4	≥1.4
Hydrogen Chloride	1-hour	179[c]	≥16.5	6.1	≥22.6
Isopropyl Alcohol	1-hour	23,405[c]	≥20.9	34.5	≥55.4
Methyl Alcohol	1-hour	6238[c]	d	0.5	≥0.5
Methyl Ethyl Ketone	1-hour	14,048[c]	d	1.4	≥1.4
Methyl Isobutyl Ketone	1-hour	4,881[c]	d	2.8	≥2.8
Methylene Chloride	1-hour	4,143[c]	d	0.5	≥0.5

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Footnotes at end of table.

TABLE 4.2.1.2–1.—*Contribution to Air Quality from the Mound Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines* —Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[g]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Hazardous Air Pollutants and Other Toxic Compounds[a]					
Naptha/Mineral Spirits	1-hour	e	d	8.5	≥8.5
Nitric Acid	1-hour	124[c]	d	17.9	≥0.9
Phosphoric Acid	1-hour	24[c]	d	1.4	≥1.4
Sulfuric Acid	1-hour	24[c]	d	11.3	≥11.3
Tetrachloroethylene	1-hour	8,071[c]	d	0.9	≥0.9
Toluene	1-hour	8,976[c]	d	8.0	≥8.0
Trichloroethylene	1-hour	6,405[c]	d	9.0	≥9.0
Trichlorotrifluoroethane	1-hour	182,619[c]	≥17.5	0.5	≥18.0
Xylene	1-hour	10,333[c]	d	5.2	≥5.2

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a Compounds listed are the major pollutants of concern (FDI, 1993).
b Federal standard (40 CFR 50).
c State standard (Ohio EPA, 1991).
d Data unavailable.
e No state standard.
f Emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).
g Baseline Concentrations are from table 4.1.6.2-1.

planned water treatment processing facility and the existing wastewater treatment plant.

The additional sanitary wastewater generated by the transferred processes would be approximately 132 MGY (table 3.4.1-3). This additional wastewater would represent an approximate 280 percent increase over the current wastewater generation rate of approximately 47 MGY (table 3.2.2-2). The additional process/sanitary wastewater would require additional treatment capacity.

The total wastewater throughput of the relocated facilities would be approximately 132 MGY (0.6 ft³/s). This represents less than 1 percent of the average 1990 flow of the Great Miami River of 3,369 ft³/s. Influent to, and effluent from, the treatment facility would be required to meet all Federal and state discharge limits.

Surface Water Quality. During construction, erosion and transport of disturbed soils could create adverse impacts to the site drainage facilities and surface water quality. New construction in the Valley Area and the SM/PP Hill area could result in the disposition of eroded materials into the site's stormwater control system, thereby reducing its effectiveness. The New Property Area drains in the direction of the Great Miami River via the Miami-Erie Canal. The erosion and transport of disturbed materials could degrade receiving water quality; therefore, the use of control measures, such as berms and silt fences, would be implemented to minimize any adverse impacts during construction.

The proposed new parking areas would increase the impervious surface area and increase the flow of nonpoint source drainage toward the Miami-Erie Canal. Areas of surficial contamination exist in proximity to the proposed parking areas (MD DOE, 1987b). During periods of high runoff, the transport of contaminants in the direction of the Miami-Erie Canal could occur. The level of potential impact would be controlled or eliminated through the

collection of runoff. Mitigation of impacts could involve the treatment of stormwater runoff before release to offsite surface waters, or the remediation of the areas of surficial contamination.

Groundwater. Water requirements for renovation of existing buildings and construction of new buildings would be approximately 8,000 GPD or 6.6 MGY for the 4-year construction period (table 3.4.1-2). During operations, approximately 0.91 MGD or 330 MGY of additional water would be required for domestic and industrial uses (table 3.4.1-4). The renovation and operations water use estimates are within the 1.2 BGY capacity of the production wells and represent a less than 4 percent and approximately a 180 percent increase, respectively, in the approximately 0.5 MGD (table 3.2.2-3) currently withdrawn by Mound from its wells.

Groundwater Quality. Because no discharge of waste materials to groundwater is planned, no adverse impact to groundwater quality is expected.

4.2.1.4 *Geology and Soils*

Mass movement, subsidence, seismic activity, and volcanism are unlikely to occur at a level that would impact construction or operations activities. There are no landslides, sinkholes, or other nontectonic movements at Mound. No impact would result to local geologic features from this action.

Transferring the electrical/mechanical functions to Mound would require a total of 62 acres for a new building, parking lot, and construction laydown area (table 3.4.1-1). Disturbance during construction could temporarily lead to an increase in soil erosion from wind and water. Water erosion is likely to occur only sporadically during storm periods. Wind erosion is likely to occur intermittently depending on wind velocities. The maximum total soil loss rate associated with construction is not expected to exceed the maximum acceptable soil loss of 5 tons per acre per year. Wind erosion control measures would include sprinkling, use of mulch, and other dust control methods on a daily basis. Water erosion control measures would include proper drainage and grading. Exposing only small areas for limited periods would reduce the effects of erosion and ensure that soil losses are within acceptable levels.

Soil disturbance during operations would be reduced from that of the construction period as areas temporarily given over to laydown and haul-road use are restored. Environmental consequences to soils during operations would include permanent alteration of soil cover as a result of emplacement of structures, parking lots, and other features. Control measures during construction would include regrading and reseeding. Paving, grading of slopes, establishment of ground cover, windbreaks, construction of engineered berms, and drainage ways would also reduce both wind and water erosion impacts.

4.2.1.5 *Biotic Resources*

The construction, modification, and operation of facilities for nonnuclear consolidation at Mound would require the loss of some natural vegetation and terrestrial wildlife habitat. Most of this loss would include forested and old field habitats within the largely undeveloped New Property Area. Remaining natural habitats within the western part of Mound would be fragmented by construction and exposed to increased human presence for the operating life of the consolidated facilities. A limited area of natural habitat would also be lost from the more heavily developed SM/PP Hill Area. Areas cleared of existing vegetation would be permanently occupied by structures, pavement, or new vegetation. About 30 acres of the total 62 acres to be disturbed would be used for construction laydown and parking (table 3.4.1-1). Where possible, these areas would be revegetated with native species following construction. Additionally, new wastewater treatment and hazardous waste storage capacity would be required.

These impacts would represent a large reduction in the quantity and quality of terrestrial habitat within Mound but only a minor regional impact to terrestrial habitat. Old field and forested habitats are a common feature in the landscape surrounding Miamisburg. Potential mitigation measures include habitat disturbance minimization and revegetation with native species.

Wetlands may potentially be disturbed by construction of new facilities associated with the Mound consolidation alternative. A wetland delineation and discussions with the Corps of Engineers would be necessary to determine the extent of potential disturbance. If disturbance to wetlands could not be avoided during construction, mitigation would involve constructing or purchasing compensatory replacement wetlands within Mound or in the surrounding area at a ratio designated by the Corps of Engineers.

Increased water demands of the consolidated facilities would be met by onsite wells. Wastewater discharges would be required to meet all Federal and state discharge limits, thereby avoiding impacts to aquatic biota in the Great Miami River. Stormwater management structures associated with the new facilities would be constructed to prevent significant quantities of runoff from reaching the Miami-Erie Canal or other aquatic habitats near Mound.

DOE has contacted the FWS and Ohio Division of Natural Areas and Preservation to determine whether the proposed consolidation would potentially affect threatened or endangered species. In keeping with current environmental practice on Mound, all trees with peeling bark within the proposed construction footprint would be inspected for the presence of the Indiana Bat (*Myotis sodolis*) before any disturbance is initiated.

4.2.1.6 *Cultural Resources*

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at Mound may have impacts if important Native American resources are present and no impacts if such resources do not occur. No NRHP-eligible prehistoric or historic resources are expected to occur. Construction activities may physically disturb Native American resources. Operations may create audio or visual intrusions to sacred locations. If selected as the consolidation site, consultation would be initiated for this project to identify important Native American resources.

The environmental consequences of locating functions at SNL and LANL as part of this alternative are discussed in sections 4.1.5.6 and 4.1.3.6, respectively.

4.2.1.7 *Socioeconomics*

The following section discusses the potential environmental impacts of the Mound alternative. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are summarized in table 4.2.1.7-1.

As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 3,120 to 2,700 new jobs (DOE, 1993d). The analysis presented in table 4.2.1.7 and discussed here uses the methodology presented in appendix E and the original estimate of 3,120 new jobs. The estimate of 2,700 new jobs is 13 percent lower than the 3,120 new jobs used in the following analysis, and this

TABLE 4.2.1.7–1.—*Mound Plant Alternative Economic and Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	501,291	NA	521,680	NA
Baseline Unemployment Rate	5.5%	NA	5.6%	NA
Baseline Personal Income (Thousands $)	$19,255,693	NA	$22,344,200	NA
Baseline Per Capita Income ($/Person)	$19,373	NA	$22,146	NA
Baseline Employment	473,813	NA	492,213	NA
Direct Jobs	775	0.16	3,120	0.63
Indirect Jobs	2,820	0.60	5,178	1.05
In-Migrating Workforce	256	0.05	1,634	0.33
Total In-Migration	570	0.06	4,143	0.41
Population Increase				
Butler County	60	0.02	435	0.15
Middletown	38	0.08	273	0.58
Montgomery County	421	0.07	3,062	0.51
Centerville	65	0.30	472	2.16
Dayton	113	0.06	824	0.44
Germantown	30	0.59	215	4.22
Miamisburg	99	0.54	717	3.87
West Carrolton	42	0.28	302	2.02
Warren County	89	0.08	646	0.56
Carlisle	37	0.76	271	5.46
ROI (County Total)	570	0.06	4,143	0.41

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; OH BES, 1991; FDI, 1993.

lower estimate would result in fewer economic benefits than the 3,120 new jobs.

The construction, modification, and installation of facilities and equipment for the consolidation of electrical/mechanical and special products functions at Mound would require 775 employees during peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 3,120 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions will be filled through donor transfers, new hires, and internal reassignments. In addition to those jobs created directly by the project, other employment, indirectly created, would lead to further in-migration to the ROI.

The city of Miamisburg could experience a growth in income tax receipts up to $2,200,000 in the year 2000 as a result of additional direct employment, and there could be a small additional gain as a result of new indirect jobs. This estimated growth in income tax receipts would represent a 29-percent increase in total income tax revenue, a 22-percent increase in General Fund revenue, and a 10-percent increase in total revenues.

Locating electrical/mechanical and special products functions at Mound would increase population in the ROI by approximately 570 during 1995, the peak construction year, and by an estimated 4,143 during 2000, the peak operations period. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from

donor sites and other places outside of the regional labor force. In 2000, this project-related population would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 1,009,000. None of the cities or counties would experience population growth beyond 1 percent over the baseline during peak construction. However, several small cities would experience population changes that range from 2 percent (West Carrollton) to 5 percent (Carlisle) over the baseline during peak operations. Other cities in the range include Germantown (4 percent), Miamisburg (4 percent), and Centerville (2 percent).

The less than 1-percent change in population during construction required for consolidating the electrical/mechanical and special products functions would create the need for approximately 200 housing units, which is less than a 1-percent addition to this large urban area. For operations in the year 2000, the less than 1-percent change in population would not create the need for additional housing units beyond a 1-percent increase. In past years, housing units in the ROI have been built at an annual rate of 2 percent. In the smaller cities, housing units have been built at annual average rates ranging between 2 and 6 percent. Therefore, additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and peak operations would not affect any water or wastewater systems in the ROI because the existing capacities more than exceed the projected demand.

In the 1989-1990 school year, school districts in Butler, Montgomery, and Warren counties were operating, on average, between 83 percent and 87 percent of capacity. Under the No Action future baseline, these capacities will not be exceeded in either 1995 or 2000. Currently, one school district in each county exceeds capacity, but these capacities would not be affected beyond what would naturally occur under the No Action baseline growth because the Mound alternative would not add more than 1 percent to enrollments during construction or operations.

Existing health care facilities are more than adequate to accommodate the population increases, although approximately 10 new doctors (less than 1-percent increase over the projected baseline) would be needed during operations to maintain the current level of service.

Current staffing levels for police and fire services in the ROI counties and cities would be maintained relative to population increases during peak construction. To maintain current standards during operations, approximately 8 additional police officers and 12 firefighters would be needed in the ROI. Cities projected to have the greatest needs are Dayton (three officers; less than 1 percent over the projected baseline), Miamisburg (one officer and two firefighters; each at 4 percent over the projected baseline), and Centerville (two firefighters; 2 percent over the projected baseline).

Relative to baseline traffic projections, consolidation activities would have minimal impacts on the local transportation network serving Mound. Average truck traffic associated with construction activities would increase by seven trips daily relative to historic levels (FDI, 1993). Annual vehicle accidents would increase by approximately 19 and associated fatalities would increase by less than 1.

Conditions on most route segments in the local transportation network during typical operations are projected to remain consistent with projections. However, projected conditions along the segment of Mound Road between Main Street and Benner Road would deteriorate from baseline free flow conditions, with no delays from disruptions, to a stable flow with minor deterioration of service conditions associated with disruptions due to consolidation activities. Average commercial truck traffic would increase to 228 trips daily (FDI, 1993). An estimated 156 additional vehicle accidents and

1 associated fatality are projected to occur annually within the ROI due to consolidation activities.

Under the Mound alternative, 90 additional employees during peak construction and 385 additional employees during peak operations would be required at SNL. At LANL, 10 additional employees during peak construction and 50 during operations would be required (DOE 1993b; FDI, 1993). The effect of this alternative on SNL and LANL would be less than with the Proposed Action. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 390 additional operations employees at SNL and 46 additional operations employees at LANL would not affect this conclusion. Effects on RFP and Pinellas would be the same as with the Proposed Action. These changes in employment numbers would create no adverse effects on the related ROIs. Some negative effects would occur at KCP as discussed in section 4.2.4.7.

4.2.1.8 *Waste Management/ Pollution Prevention*

Solid waste generated during construction of new buildings would include discarded packaging and construction materials (e.g., plasterboard, brick, wood, and scrap steel). All construction waste would be disposed of offsite. Sanitation sewage would be handled by an outside contractor. Because this contractor would also be responsible for disposing of this sewage, existing site wastewater treatment facilities would not be affected.

Hazardous waste generated during construction would consist of such materials as waste adhesives, oils, cleaning fluids, solvents, and coatings. All hazardous waste would be appropriately packaged, manifested, and shipped under contract with DOT-registered transporters to RCRA-permitted offsite disposal facilities or recyclers.

The consolidation of current nonnuclear manufacturing activities at Mound would generate additional hazardous and nonhazardous wastes. The additional hazardous wastes generated would consist of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; corrosives; combustibles; TCLP materials; off-specification materials; sludge; oils/solvents; PCBs (expected to be phased out); and caustic and acid solutions. A summary of the wastes, effluents, and emissions, and discussions related to their management, can be found in appendix C, section C.1.

Mound would have to manage a hazardous waste volume increase of more than three times existing volumes. The additional liquid hazardous waste volume of approximately 47,600 GPY and 12,300 ft^3/yr of solid hazardous waste would require additional waste management considerations.

The additional sanitary/industrial wastewater effluent discharge of approximately 132 MGY due to the consolidation at Mound could not be handled by the existing wastewater treatment system, which has a capacity of 47.4 MGY. A major upgrade/ modification to the existing treatment plant would be necessary.

The estimated 359,000 ft^3/yr of additional solid nonhazardous wastes would shorten the life expectancy of the offsite sanitary landfill. The landfill would have to be expanded or another landfill utilized. Amounts of paper and scrap metals available for recycling would increase.

Relocating only the tritium-handling functions at Pinellas to LANL would mean the addition of approximately 4,715 lb/yr of hazardous waste at LANL. The additional hazardous wastes include crushed containers, alkaline and acid liquids, and cyanide solution. These wastes could be stored onsite at LANL in existing RCRA-permitted storage facilities. Because LANL has a contract with offsite vendors to ship hazardous waste offsite for treatment and disposal, there would be no need to add more storage facilities.

Each of the functions transferring to Mound or LANL due to consolidation of nonnuclear manufacturing at Mound have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities. This environmental benefit would be transferred with the functions. Once the transfer of the functions occurs, Mound and LANL would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

4.2.1.9 *Human Health: Facility Operations and Accidents*

Discussions of impacts to members of the public and the environment, worker exposures, and accidents for the No Action (Affected Environment) and the Proposed Action are presented in section 4.1 and sections 4.1.1 to 4.1.8. Information specific to the Mound alternative (i.e., different from the Proposed Action) is discussed below; actions that are the same as those for the proposed consolidation at KCP were discussed earlier and are not repeated here.

As discussed in the Air and Water Resources sections for Mound (4.2.1.2 and 4.2.1.3, respectively), even after consolidation at Mound, exposures to members of the public associated with the release of chemical pollutants as a result of Mound operations, even after consolidation at Mound, meet all applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public associated with radiological releases from current Mound operations are also well below applicable permit, regulatory, and DOE operational requirements (MD DOE, 1991a). Consolidating functions at Mound would not result in any increases of radiological releases.

A review of the recent Mound annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future. Because the functions that would be consolidated at Mound are the same as or similar to those currently being performed, and would be conducted in facilities designed for these activities, the current accident profile would not change as a result of consolidating these functions at Mound.

This alternative involves relocation of the electrical/mechanical and special products functions to Mound as an alternative to consolidation at KCP. Differences in site characteristics between Mound and KCP would cause small differences of pollutant concentrations at Mound from those calculated for the KCP site. However, the conclusion remains that releases associated with relocating these functions would be below applicable permit, regulatory, and DOE operational requirements. The concentrations of potentially hazardous chemicals associated with the functions to be relocated would result in a cancer risk of 2.45×10^{-6} onsite and at the site boundary, a risk to the public of 3.65×10^{-8}. These risks are mainly attributable to TCE, for which solvents posing much reduced risks will be substituted (see table F-15b).

4.2.2 Pinellas Plant

Impacts of the Pinellas alternative are similar to the Proposed Action because the tritium-handling functions from Mound would be relocated to SRS (section 4.1.2). However, the impacts of this alternative would be less than the impacts of the Proposed Action at LANL (section 4.1.3), which would only receive the detonator and calorimeter

functions from Mound and the beryllium technology and pit support functions from RFP but not the neutron tube target loading function from Pinellas. The impacts of this alternative would also be less than those for the Proposed Action at SNL (section 4.1.5), which would receive only the milliwatt heat source surveillance function from Mound and not the neutron generator, cap assemblies, and thermal batteries functions from Pinellas. The neutron generator, cap assemblies, thermal batteries, electrical/mechanical, and neutron tube target loading functions currently performed at Pinellas would remain in place but at the same reduced workload as the Proposed Action.

4.2.2.1 *Land Resources*

Consolidation of electrical/mechanical functions at Pinellas would require the demolition of the existing parking lot at Building 1200, the parking lot north of Building 100, and a gas storage tank; and relocation of a contractor modular building complex. New facilities would include a five-story parking structure, a large three-story office/manufacturing building, and a one-story mechanical technology building (see figure 3.4.2-2). Land disturbance for the above facilities, construction parking, and a 35-acre construction support area would total approximately 63 acres (table 3.4.2-1). Pinellas does not have sufficient onsite land area to meet this requirement. Specific mitigation measures would be identified in the final design phase if this alternative were implemented.

During construction, the land requirements for residential land use from project-related in-migration (section 4.1.7.7) would be approximately 50 acres distributed throughout the local jurisdictions of Pinellas County. The project-related land requirements associated with operations would be approximately 258 acres. The offsite residential land use demand would easily be accommodated within the county.

Extensive public and private recreational facilities in the region could easily absorb the resulting increased demand. Impacts to recreational resources would be negligible.

Project-related impacts to visual resources would occur from the construction of a new three-story, 36-foot-high, approximately 500-foot-long office/manufacturing building and a new five-story, 60-foot-high, 425-foot-long parking structure. The plant site, which is already heavily developed, is designated VRM Class 5. The viewpoints from the adjacent roads would have clear views of the new high-rise structures.

The viewpoints from the Lake Allen area, an expanding residential area with waterfront-oriented homes and a park with water frontage, are slightly more sensitive. The viewpoints from Lake Allen already contain limited views of industrial structures, which rise above the vegetation screening in the foreground. The new buildings would also be partially visible above the vegetation screen. The visual change could be termed moderate as these views already consist of a highly altered industrial landscape. As a result, the VRM Class would not change.

4.2.2.2 *Air Quality and Acoustics*

Air Quality. During construction, minor air quality impacts would occur, including the generation of particulate matter such as dust and dirt. These impacts would be controlled through standard practices such as watering of construction sites. During operations, air emissions could increase at Pinellas for the criteria pollutants (totaling approximately 40 tons per year) and for HAPs/toxics (totaling approximately 20 tons per year) (FDI, 1993). The emissions inventory for the Pinellas alternative is presented in table D3.1.2-2. Table 4.2.2.2-1 presents the contribution to air quality at Pinellas from the Pinellas consolidation alternative

TABLE 4.2.2.2–1.—*Contribution to Air Quality from the Pinellas Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines* [Page 1 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[f]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Carbon Monoxide (CO)	8-hour	10,000[b]	8,016	5.1	8,021.1
	1-hour	40,000[b]	13,742	11.3	13,753.3
Lead (Pb)	Calendar Quarter	1.5[c]	e	g	e
Nitrogen Dioxide (NO_2)	Annual	100[b]	e	0.4	≥ 0.4
Ozone (O_3)	1-hour	235[b]	243.4	g	243.4
Particulate Matter (PM_{10})	Annual	50[b]	e	0.02	≥0.02
	24-hour	150[b]	e	0.3	≥0.3
Sulfur Dioxide (SO_2)	Annual	60[c]	23	0.0009	23
	24-hour	260[c]	133	0.01	133
	3-hour	1,300[b]	526	0.04	526
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,1,1-Trichloroethane	24-hour	9,168[c]	≥26	0.4	≥26.4
	8-hour	38,200[c]	≥40	1.1	≥41.1
1,4-Dioxane	24-hour	216[c]	≥16	1.2	≥17.2
	8-hour	900[c]	≥30	3.2	≥3.2
Acetic Acid	24-hour	60[c]	≥12.2	0.8	≥13.0
	8-hour	250[c]	≥21.4	2.1	≥23.5
Acetone	24-hour	8,544[c]	≥194.7	12.4	≥207.1
	8-hour	35,600[c]	≥340.8	34.2	≥375.0
Chlorodifluoroethane	Annual	d	e	0.1	≥0.1
	24-hour	d	e	0.8	≥0.8
	8-hour	d	e	2.1	≥2.1
Chlorodifluoromethane	24-hour	16,992[c]	≥12	0.4	≥12.4
	8-hour	70,800[c]	≥21	1.1	≥22.1
D'Limonene	Annual	d	e	0.3	≥0.3
	24-hour	d	e	3.1	≥3.1
	8-hour	d	e	8.6	8.6
Dichlorodifluoromethane	Annual	200[c]	≥2.4	0.04	≥2.4
	24-hour	23,760[c]	≥9.8	0.4	≥10.2
	8-hour	99,000[c]	≥16.8	1.1	≥17.9
Dimethyl Formamide	Annual	30[c]	≥0	0.04	≥0.04
	24-hour	72[c]	≥0.01	0.4	≥0.4
	8-hour	300[c]	≥0.01	1.1	≥1.1
Ethyl Alcohol	24-hour	9,024[c]	≥1.2	0.4	≥1.6
	8-hour	37,600[c]	≥2.1	1.1	≥3.2
Ethyl Benzene	Annual	1,000[c]	e	0.1	≥0.1
	24-hour	1,041.6[c]	e	0.8	≥0.8
	8-hour	4,340[c]	e	2.1	≥2.1

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Footnotes at end of table.

TABLE 4.2.2.2–1.—*Contribution to Air Quality from the Pinellas Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines* —Continued [Page 2 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[f]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Fluoboric Acid	Annual	d	e	0.1	≥0.1
	24-hour	d	e	0.8	≥0.8
	8-hour	d	e	2.1	≥2.1
Fluorine End-Capped Homopolymers	Annual	d	e	0.6	≥0.6
	24-hour	d	e	6.6	≥6.6
	8-hour	d	e	18.2	≥18.2
Fluoroaliphatic Polymeric Esters	Annual	d	e	0.04	≥0.04
	24-hour	d	e	0.4	≥0.4
	8-hour	d	e	1.1	≥1.1
Fluorobenzene	Annual	d	e	0.4	≥0.4
	24-hour	d	e	4.7	≥4.7
	8-hour	d	e	12.8	≥12.8
Fluorotelomer	Annual	d	e	0.04	≥0.04
	24-hour	d	e	0.4	≥0.4
	8-hour	d	e	1.1	≥1.1
Glycol Ethers	24-hour	42.2[c]	0.02	43.9	≥43.9
	8-hour	180[c]	0.03	120.7	≥120.7
Hexane	24-hour	422.4[c]	≥.06	1.2	≥1.8
	8-hour	1,760[c]	≥1.1	3.2	≥4.3
Hydrochloric Acid	Annual	7[c]	≥1.1	0.5	≥1.6
	24-hour	18[c]	≥5.0	5.1	≥10.0
	8-hour	75[c]	≥11.0	13.9	≥24.9
Isopropyl Alcohol	24-hour	2,359.2[c]	≥49.0	26.8	≥15.8
	8-hour	9,830[c]	≥85.7	73.7	≥159.4
Lead Compound	Annual	0.09[c]	≥0.01	g	≥0.01
	24-hour	0.12[c]	≥0.07	g	≥0.1
	8-hour	0.5[c]	≥0.10	g	≥0.1
Methyl Alcohol	24-hour	628.8[c]	≥40.4	0.4	≥40.8
	8-hour	2,620[c]	≥70.7	1.1	≥71.8
Methyl Ethyl Ketone	Annual	80[c]	≥0.3	0.1	≥0.4
	24-hour	1,416[c]	≥1.07	1.2	≥2.2
	8-hour	5,900[c]	≥1.9	3.2	≥5.1
Methyl Isobutyl Ketone	24-hour	492[c]	e	2.3	≥2.3
	8-hour	2,050[c]	e	6.4	≥6.4
Methylene Chloride	Annual	2.1[c]	≥2.0	0.04	≥2.0
	24-hour	417.6[c]	≥30.0	0.4	≥30.4
	8-hour	1,740[c]	≥60.0	1.1	≥61.1
Naptha/Mineral Spirits	Annual	d	≥0.8	0.7	≥1.5
	24-hour	d	≥3.2	7.0	≥10.2
	8-hour	d	≥5.7	19.3	≥15.0

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Footnotes at end of table.

TABLE 4.2.2.2–1.—*Contribution to Air Quality from the Pinellas Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines*—Continued [Page 3 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[f]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Nickel Chloride	24-hour	0.24[c]	≥0.1	g	≥0.1
	8-hour	1[c]	≥0.3	g	≥0.3
Nitric Acid	24-hour	12.48[c]	≥3.0	14.8	≥17.8
	8-hour	52[c]	≥5.0	40.6	≥45.6
Phosphoric Acid	24-hour	2.4[c]	≥0.9	1.2	≥2.1
	8-hour	10[c]	≥2.5	3.2	≥5.7
Sulfuric Acid	Annual	d	e	0.9	≥0.9
	24-hour	d	e	9.3	≥9.3
	8-hour	d	e	25.6	≥25.6
Tetrachloroethylene	24-hour	813.6[c]	≥0.3	0.8	≥1.1
	8-hour	3,390[c]	≥0.5	2.1	≥2.6
Toluene	Annual	2,000[c]	≥6.6	0.6	≥7.2
	24-hour	904.8[c]	≥6.3	6.6	≥32.9
	8-hour	3,770[c]	≥6.0	18.2	≥64.2
Trichloroethylene	24-hour	645.6[c]	≥8	7.4	≥15.4
	8-hour	2,690[c]	≥14	20.3	≥34.3
Trichlorotrifluoroethane	24-hour	36,816[c]	e	0.4	≥0.4
	8-hour	153,400[c]	≥642.7	1.1	≥642.7
Xylene	Annual	300[c]	≥1,124.1	0.4	≥1,124.1
	24-hour	1,041.6[c]	e	4.3	≥4.3
	8-hour	4,340[c]	e	11.8	≥11.8

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[a] Compounds listed are the major pollutants of concern (FDI, 1993).
[b] Federal standard (40 CFR 50).
[c] State standard (FL DER, 1992).
[d] No standard or guideline.
[e] Data unavailable.
[f] Baseline Concentrations are from table 4.1.7.2-1.
[g] Emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).

and total concentrations with comparison to applicable regulations and guidelines. The 1-hour standard for ozone and the 24-hour standard for glycol ethers would be exceeded at the site boundary. All other pollutants are within applicable regulation or guidelines. The exceedance for ozone is associated with baseline conditions at the site (section 4.1.7.2). Potential mitigation measures for glycol ethers includes substitution with other compounds. (See appendix D for a description of the input parameters, assumptions, and methodology used to estimate impacts of this alternative on air quality at Pinellas.)

Normal operations result in the emission of radioactive materials at Pinellas (PI DOE, 1991b). The Pinellas alternative to the Proposed Action would not result in an increase in the emission of radioactive materials.

Acoustic Conditions. Changes in noise levels during construction and operations have been estimated for the major traffic routes around Pinellas. The estimates are based on existing traffic volumes and projected changes in traffic volumes as a result of changes in employment at Pinellas. These changes in traffic volumes are predicted to result in an increase of less than 1 dB in peak-hour sound levels along Belcher Road and no increase in peak-hour sound levels along Bryan Dairy Road. Changes in sound levels along other routes are estimated to be small. The increased noise levels along the major

access routes would not be expected to cause an increase in annoyance level to communities or individuals.

Noise emissions from onsite construction activities have not been analyzed but may be expected to result in a short-term increase in noise from heavy equipment operation and other construction noise sources at residential areas to the north. Construction activities include erecting a major new building and parking garage on the northern part of the site. Noise emissions from onsite operation activities should be similar to those from existing sources. The facilities would be designed to minimize noise levels at the site boundary and to assure compliance with the Pinellas County Noise Ordinance (see section D.2.2.3).

Construction workers and personnel working at any of the reconfigured facilities at Pinellas would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at Pinellas.

Although no increase in annoyance is expected offsite from construction and operations onsite, measures would be necessary to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments with appropriate hearing protection devices meeting OSHA standards. Noise levels would be measured in worker areas and an effective hearing protection program conducted.

4.2.2.3 *Water Resources*

This section describes potential surface and groundwater impacts due to the Pinellas consolidation alternative.

Surface Water. Building modification and new building construction would take place in areas above the 100-year floodplain and in areas that do not appear to be affected by a credible longer-term event. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Because all water is supplied from the county system and all wastewater is returned to the county wastewater collection system, there would be no impact on local surface water levels.

The addition of new buildings for office/manufacturing, mechanical technology, and onsite storage of hazardous waste would increase the amount of impervious area at Pinellas (FDI, 1993). This would increase the volume of stormwater runoff to the South and East retention ponds and potentially to the Cross Bayou Canal, into which they discharge. The increase in runoff would be controlled by the retention ponds so that offsite impacts would be minimized.

Surface Water Quality. The proposed location for the mechanical technology and office/manufacturing buildings lies within the Northeast Site solid waste management unit and Spray Irrigation Site, respectively, which contain contaminated groundwater in the near-surface aquifer (PI DOE, 1991a). The discharge of contaminated groundwater or soils to surface water during construction would be avoided.

The additional sanitary wastewater generated by the transferred processes is approximately 153 MGY (see table 3.4.2-3). The additional wastewater would represent an approximately 230 percent increase over the current rate of approximately 66 MGY (table 3.2.3-2). The additional discharge from transferred functions represents approximately 140 percent of the 110 million gallon annual capacity onsite pretreatment facility. This is also 2 percent of the 7.3 BGY current treatment rate of the county system and approximately 1 percent of the 10.4 BGY capacity (PI DOE, 1987). The effluent to the Pinellas County system would be required to meet all Federal, state, and local discharge requirements. There would be no impacts to surface water quality.

Groundwater. Currently, no groundwater is withdrawn beneath Pinellas. The Pinellas County Water System supplies the plant with water from the Floridan Aquifer.

The Pinellas alternative would require approximately 27,000 GPD of additional water during construction and approximately 0.98 MGD for operations (table 3.4.2-2 and 3.4.2-4, respectively). The construction use would be an approximate 19 percent increase in the approximately 0.14 MGD (table 3.2.3-3) current usage, with the operational use an approximately 700 percent increase. With current water demands and restrictions, the increase in operational use could pose an adverse impact on water supply (PI GE, 1991). Conservation measures at the plant, such as domestic water use restrictions and industrial process water recycling, could reduce the amount of water required.

Groundwater Quality. Groundwater in the surficial aquifer beneath the proposed locations is contaminated with VOCs. The groundwater quality near these locations is summarized in table 4.1.7.3-2. No intentional discharge of waste materials to groundwater would occur, and no adverse impacts would result to groundwater quality. Likewise, cleanup of the aquifer would not be impacted by activities of the Proposed Action.

4.2.2.4 *Geology and Soils*

Mass movement, subsidence, seismic activity, and volcanism are unlikely to occur at levels that would impact construction or operations activities. There are no landslides, active sinkholes, or other nontectonic movements at Pinellas. No impact would result to regional or local geologic features from this action.

Transferring the electrical/mechanical functions to Pinellas would require new building space. The total disturbance of approximately 63 acres (table 3.4.2-1) during construction could temporarily lead to an increase in soil erosion from wind and water. Water erosion is likely to occur only sporadically during storm periods. Wind erosion is likely to occur intermittently depending on wind velocities. The maximum total soil loss rate associated with construction is not expected to exceed the maximum acceptable soil loss of 5 tons per acre per year. Wind erosion control measures would include sprinkling, use of mulch, and other dust control methods. Water erosion control measures would include proper drainage, grading, and reseeding. Exposing only small areas for limited periods would reduce erosional effects and ensure that soil losses are within acceptable levels.

Soil disturbance during operations would be reduced from that of construction as areas temporarily given over to laydown and haul-road use are restored. Environmental consequences to soils during the periods of operations would include permanent alteration of soil cover as the result of emplacement of structures, parking lots, and other features.

4.2.2.5 *Biotic Resources*

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at Pinellas would disturb most of the remaining terrestrial habitat on the site. However, where possible, disturbed land would be revegetated using native species. Loss of a mowed field with scattered clusters of trees in the north-central part of the site would be necessary to accommodate new buildings. A new parking structure proposed for the east-central part of the site would only displace paved areas and landscaped vegetation. Additionally, new hazardous waste storage capacity would be required. Areas cleared of existing vegetation would be permanently occupied by structures, pavements, or new vegetation.

These impacts would not represent a large reduction in the quantity or quality of terrestrial habitat surrounding Pinellas. Although implementation of this alternative would result in the loss of most

terrestrial habitat at Pinellas, all of this habitat is currently in a highly disturbed condition and none of it is unusual to the surrounding area. Potential mitigation measures include habitat disturbance minimization and revegetation with native species.

Although it is unlikely, due to the lack of natural surface water on the site, wetlands may potentially be disturbed by construction activities associated with the Pinellas consolidation alternative. A wetland delineation and discussions with the Corps of Engineers and Florida Department of Environmental Regulation would be necessary to determine whether any jurisdictional wetlands occur in the areas to be disturbed. Known wetlands within the stormwater retention ponds would not be disturbed (PI FWS, 1982; PI DOE, 1983).

Development of the consolidated facilities would increase the volume of runoff to the stormwater retention ponds. The increased volume of water within the ponds would potentially result in the alteration of the wetlands. Potential mitigation includes additional stormwater management and soil erosion control measures.

The increased water demands during operations of the consolidated facilities would be met by, and wastewater returned to, the local municipal systems, thereby avoiding impacts to aquatic habitats in the vicinity of the site. Increased stormwater runoff to the detention ponds could potentially affect any aquatic biota established within them, but likely impacts would be negligible.

A threatened and endangered species survey of Pinellas was conducted in March 1992, and no threatened or endangered species were observed on or near the site (PI DOE, 1992a). Consequently, the proposed construction would not impact any threatened or endangered species.

4.2.2.6 *Cultural Resources*

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at Pinellas may have impacts if important Native American resources are present and no impacts if such resources do not occur. No NRHP-eligible prehistoric or historic resources are expected to occur. If selected as the consolidation site, consultation would be initiated for this project; however, impacts to Native American resources are not anticipated as a result of the proposed construction. There are no indications that physical activities will disturb Native American resources or intrude on sacred locations.

The environmental consequences of locating functions at SNL, SRS, and LANL as part of this alternative are discussed in sections 4.1.5.6, 4.1.2.6, and 4.1.3.6, respectively.

4.2.2.7 *Socioeconomics*

The following section discusses the potential environmental impacts of the Pinellas alternative. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action alternativess or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are summarized in table 4.2.2.7-1.

As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 3,995 to 3,500 new jobs (DOE, 1993d). The analysis presented in table 4.2.2.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 3,995 new jobs. The estimate of 3,500 new jobs is 12 percent lower than the 3,995 new jobs used in the following analysis, and this

TABLE 4.2.2.7–1.—*Pinellas Plant Alternative Economic and Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	1,078,854	NA	1,188,649	NA
Baseline Unemployment Rate	5.2%	NA	5.4%	NA
Baseline Personal Income (Thousands $)	$42,758,562	NA	$51,496,890	NA
Baseline Per Capita Income ($/Person)	$20,303	NA	$22,837	NA
Baseline Employment	1,022,608	NA	1,124,772	NA
Direct Jobs	1,149	0.11	3,995	0.36
Indirect Jobs	3,321	0.32	7,564	0.67
In-Migrating Workforce	376	0.04	2,074	0.18
Total In-Migration	838	0.04	5,261	0.23
Population Increase				
Hillsborough County	38	0.00	237	0.02
Pasco County	30	0.01	189	0.06
Pinellas County	770	0.08	4,835	0.50
Clearwater	193	0.18	1,210	1.07
Largo	149	0.21	936	1.25
Pinellas Park	88	0.19	552	1.11
Seminole	88	0.89	552	5.22
St. Petersburg	251	0.10	1,578	0.58
ROI (County Total)	838	0.04	5,261	0.23

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991a; FL DOL 1991; FDI, 1993.

lower estimate would result in fewer economic benefits than the 3,995 new jobs.

The construction, modification, and installation of facilities and equipment for the consolidation of electrical/mechanical and special products functions at Pinellas would require 1,149 employees at peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 3,995 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions will be filled through donor transfers, new hires, and internal reassignments. In addition to those jobs created directly by the project, other employment, indirectly created, would lead to further in-migration to the ROI.

Locating electrical/mechanical and special products functions at Pinellas would increase population in the ROI by approximately 838 during 1995, the peak construction year, and by an estimated 5,261 during 2000, the peak operations period. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force. In 2000, this project-related population would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 2,259,000. Except for Seminole, Largo, Pinellas Park, and Clearwater, none of the ROI cities or counties would experience population growth of more than 1 percent. Seminole would grow by almost 1 percent during peak construction and by about 5 percent by the year 2000. Largo, Pinellas Park, and Clearwater would each grow by about 1 percent by the start of peak operations in 2000.

The less than 1-percent change in population during construction required for consolidating the electrical/

mechanical and special products functions would create the need for approximately 319 housing units, which is less than a 1-percent addition to this large urban area. For operations in the year 2000, the less than 1-percent change in population would not create the need for additional housing units beyond a 1-percent increase except in Seminole where the greatest increase (4 percent) would occur. In past years, housing units in the ROI have been built at an annual rate of 4 percent and at an annual rate of 6 percent in Seminole. Therefore, additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

As identified in the Affected Environment section, some water and wastewater systems would be nearing capacity by the year 2000, given the No Action future baseline. The Pinellas alternative would add no more than a 1-percent increase over the baseline projection to any of the affected systems.

In the 1989-1990 school year, school districts in Hillsborough and Pinellas counties were operating, on average, at 94 percent and 87 percent of capacity, respectively. However, these capacities are projected to be exceeded by the years 1995 and 2000 under the No Action future baseline. The largest increases are expected to occur in the school districts in Pinellas County, where enrollments are projected to exceed current capacities by 34 percent in 1995 and 43 percent in 2000. Smaller increases are expected to occur in the school districts in Hillsborough County, where enrollments are projected to exceed current capacities by 9 percent in 1995 and 17 percent in 2000. However, school capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the Pinellas alternative would not add more than 1 percent to enrollments during construction or operations.

Existing health care resources are more than adequate to accommodate the projected population increases. Current staffing levels for police and fire services in the ROI are also adequate to support the projected population increases, while maintaining current service standards, because none of the counties or cities, except Seminole, would grow by more than 1 percent over the No Action baseline. Seminole would need to add two police officers and seven firefighters by the year 2000 in order to maintain its present service standards.

Relative to baseline traffic projections, consolidation activities would have minimal impacts on the local transportation network serving Pinellas. Conditions on all route segments in the local transportation network are projected to remain consistent with baseline projections. Average daily truck traffic associated with construction activities would increase by 13 trips daily relative to historic levels (FDI, 1993). Annual vehicle accidents would increase by approximately 13, and associated fatalities would increase by less than 1.

Conditions on most route segments in the local transportation network during typical operations are projected to remain consistent with baseline projections. However, projected conditions along the segments of Belcher Road between Ulmerton Road and Park Boulevard and Bryan Dairy Road between Starkey Road and 66th Street would deteriorate from baseline congested flow conditions, with serious deterioration of service from disruptions, to heavy congestion and severe deterioration of service from disruptions due to consolidation activities. Average commercial truck traffic is estimated to increase to 85 trips daily relative to historic levels (FDI, 1993). An estimated 78 additional vehicle accidents and 1 associated fatality are projected to occur annually within the ROI due to consolidation activities.

In summary, peak activities at Pinellas would have a minor effect on transportation services at the plant and on roads near the plant. These services would be further burdened during the initial peak operations phase. The Pinellas alternative would not adversely affect other community resources beyond what would naturally occur in the No Action baseline.

Under the Pinellas alternative, 40 additional employees during peak construction and 105 additional employees during peak operations would be required at LANL (DOE, 1993b; FDI, 1993). The effect of this alternative on LANL would be less than with the Proposed Action. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 118 additional operations employees at LANL would not affect this conclusion. SNL would require no additional employees. Effects on SRS, Mound, and RFP would be the same as with the Proposed Action. These changes in employment numbers would create no adverse effects on the related ROIs. Some adverse effects would occur at KCP as described in section 4.2.4.7.

4.2.2.8 *Waste Management/ Pollution Prevention*

Solid waste generated during construction of new buildings would include discarded packaging and construction materials (e.g., plasterboard, brick, wood, and scrap steel). All construction waste would be disposed of offsite. Sanitation sewage would be handled by an outside contractor; therefore, existing site wastewater treatment facilities would not be affected.

Hazardous waste generated during construction would consist of materials such as waste adhesives, oils, cleaning fluids, solvents, and coatings. All hazardous waste would be appropriately packaged, manifested, and shipped under contract with DOT-registered transporters to RCRA-permitted offsite disposal facilities or recyclers.

The consolidation of current nonnuclear manufacturing activities at Pinellas would generate additional hazardous and nonhazardous wastes at Pinellas. The additional hazardous wastes generated would consist of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; corrosives; combustibles; TCLP materials; off-specification materials; sludge; oils/solvents; PCBs (expected to be phased out); and caustics and acid solutions. A summary of the wastes, effluents, and emissions, and discussions related to their management, can be found in appendix C, section C.2.

The increase in waste volumes at Pinellas due to consolidation at Pinellas could have an adverse environmental impact. New onsite facilities would have to be added to handle the additional hazardous wastes. Pinellas would have to manage a volume increase of more than 2 times for hazardous liquid waste and 111 times for hazardous solid wastes over existing volumes. The additional liquid hazardous waste volume of approximately 51,500 gallons per year and 12,300 ft^3/yr of solid hazardous waste would require additional waste management considerations.

The additional sanitary/industrial wastewater effluent discharge of approximately 153 MGY due to the consolidation at Pinellas could not be handled by the existing waste treatment system, which currently has a capacity of 110 MGY. A major upgrade/modification to the existing treatment plant would be necessary.

The estimated 473,000 ft^3/yr of additional solid nonhazardous wastes would shorten the life expectancy of the offsite sanitary landfill. The landfill would have to be expanded or another landfill utilized.

Relocating only the tritium-handling functions at Mound to SRS would mean the addition of 50,900 lb/yr of hazardous waste at SRS; more than 99 percent of this waste is industrial wastewater pretreatment sludge. This waste could be stored onsite at SRS in three existing RCRA-permitted storage facilities. Because SRS has a contract with an offsite vendor to ship some hazardous waste offsite for treatment and disposal, there would be no need to add storage facilities. The industrial wastewater pretreatment sludge would be shipped offsite for landfill disposal, and other hazardous

wastes, such as acid liquid, would be shipped offsite and incinerated.

Each of the functions transferring to Pinellas or SRS due to consolidation of nonnuclear manufacturing at Pinellas have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities. This environmental benefit would be transferred with the function. Once the transfer of the functions occurs, Pinellas and SRS would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

4.2.2.9 *Human Health: Facility Operations and Accidents*

Discussions of impacts to members of the public and the environment, worker exposures, and accidents for the No Action alternatives (Affected Environment) and the Proposed Action are presented in section 4.1 and sections 4.1.1 to 4.1.8. Information specific to Pinellas (i.e., different from the Proposed Action) is discussed below; actions that are the same as those for the proposed consolidation at KCP were discussed earlier and not repeated here.

Releases of chemical pollutants as a result of Pinellas operations are discussed in the Air and Water Resources sections for Pinellas (4.2.2.2 and 4.2.2.3, respectively). Cumulative releases of 1,4-dioxane, methylene chloride, and TCE result in onsite (worker) and site boundary (public) individual cancer risks of 4.2×10^{-5} and 3.1×10^{-6}, respectively. These risks are mainly attributed to methylene chloride and TCE. Solvents posing reduced risks will be substituted. Exposures to members of the public associated with radiological releases from current Pinellas operations are well below applicable permit, regulatory, and DOE operational requirements (PI DOE, 1991b). Consolidating functions at Pinellas would not result in any increases of radiological releases.

A review of the recent Pinellas annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future. Because the functions that would be consolidated at Pinellas are the same as or similar to those currently being performed at Pinellas, and would be conducted in Pinellas facilities, the current accident profile at Pinellas would not change as a result of consolidating these functions at Pinellas.

This alternative involves relocation of the electrical/mechanical and special products functions at Pinellas as an alternative to consolidation at KCP. Differences in site characteristics between Pinellas and KCP cause small differences of pollutant concentrations at Pinellas from those calculated for the KCP site. Both the existing and cumulative cancer risks exceed 10^{-6} (see table F-19b), which is the level considered acceptable, because this incidence of cancers cannot be distinguished from the normal risks to an individual member of the public. Chemical concentrations that result in cancer risks from operations that are greater than 10^{-6} would be mitigated by implementing appropriate measures to reduce the risk to less than 10^{-6}.

4.2.3 Rocky Flats Plant

Impacts of the RFP alternative are similar to the Proposed Action because the tritium-handling functions from Mound and Pinellas would be relocated to SRS (section 4.1.2) and LANL (section

4.1.3), respectively, and the neutron generator, cap assemblies, and thermal batteries functions from Pinellas and the milliwatt heat source surveillance function from Mound would be relocated to SNL (section 4.1.5). However, the impacts of this alternative would be less than the impacts of the Proposed Action at LANL (section 4.1.3), which would only receive the detonator and calorimeter functions from Mound and the neutron tube target loading function from Pinellas, but not the beryllium technology and pit support functions from RFP. The electrical/mechanical, special products, and beryllium technology and pit support functions currently performed at RFP would remain in place but at the same reduced workload as the Proposed Action.

4.2.3.1 *Land Resources*

Consolidation of electrical/mechanical functions at RFP would be relocated into existing, vacant space in Buildings 444, 447, 460, 881, and 883. New construction would include a one-story mechanical technology building, a three-story office/manufacturing building, a two-story parking structure, and new surface parking and access roads (figure 3.4.3-2). The new construction would occur west of the existing fenced security area and would result in approximately 72 acres of disturbed land (table 3.4.3-1). The new uses would be compatible with adjacent RFP uses, existing land use plans, and zoning.

During construction, the offsite land requirements for residential use would be approximately 26 acres, primarily distributed throughout Jefferson and Boulder counties. The project-related land requirements for residential land uses associated with operations would be approximately 238 acres. This acreage represents a small percentage of the land available for development within the two counties and the region.

Regional recreational opportunities are widespread and plentiful in the RFP ROI. This alternative would not adversely affect regional recreation during construction or operations.

The proposed new facilities would be located immediately adjacent to the west end of the fenced security area, which is heavily developed. The buildings would be similar in appearance to the existing structures and would be approximately 1.5 miles from State Highway 93, the closest public viewpoint. There would be no apparent change to the average offsite viewer. The impact to visual resources would be negligible and would not affect VRM classifications.

4.2.3.2 *Air Quality and Acoustics*

Air Quality. During construction, minor construction-related air quality impacts would occur, including the generation of particulate matter such as dust and dirt. These impacts would be controlled through standard construction practices, such as watering of construction sites. During operations, air emissions could increase at RFP for the criteria pollutants and for HAPs/toxics (FDI, 1993). The emissions inventory for the RFP alternative is presented in table D3.1.2-3. The predicted impacts at RFP from the RFP consolidation alternative are presented in table 4.2.3.2-1. Air emissions are all within applicable standards and guidelines except for ozone. The exceedance for ozone is associated with baseline conditions in the Denver metropolitan area (section 4.1.8.2). (See appendix D for a description of the input parameters, assumptions, and methodology used to estimate impacts of this alternative on air quality at RFP.)

Normal operations result in the emission of radioactive materials at RFP. The RFP alternative to the Proposed Action would not result in an increase in the emission of radioactive materials.

Acoustic Conditions. Changes in noise levels during construction and operations have been estimated for the major traffic routes around RFP. The estimates are based on existing traffic volumes and projected

TABLE 4.2.3.2–1.—*Contribution to Air Quality from RFP Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines* [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)[f]	Proposed Action Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)
Carbon Monoxide (CO)	8-hour	10,000[b]	4,444	11.1	4,455.1
	1-hour	40,000[b]	11,122	15.8	11,137.8
Hydrogen Sulfide (H_2S)	1-hour	142[c]	≥18.8	e	≥18.8
Lead (Pb)	Calendar Quarter	1.5[b]	0.1	e	0.1
	30-day	1.5[c]	g	e	g
Nitrogen Dioxide (NO_2)	Annual	100[b]	21	0.2	21.2
Ozone (O_3)	1-hour	160[c]	561.5	e	561.5
Particulate Matter (PM_{10})	Annual	50[b]	21.9	0.01	21.9
	24-hour	150[b]	83.8	0.8	84.6
Sulfur Dioxide (SO_2)	Annual	80[b]	13.3	0.0005	13.3
	24-hour	365[b]	94.2	0.03	94.2
	3-hour	1,300[b]	133.9	0.05	134.0
Hazardous Air Pollutants and Other Toxic Compounds[a]					
1,1,1-Trichloroethane	Annual	d	≥0.4	0.001	≥0.4
1,4-Dioxane	Annual	d	g	0.003	≥0.003
Acetic Acid	Annual	d	g	0.002	≥0.002
Acetone	Annual	d	≥0.003	0.04	≥0.04
Ammonia	Annual	d	≥0.2	e	≥0.2
Carbon Tetrachloride	Annual	d	≥0.8	e	≥0.8
Chlorodifluoroethane	Annual	d	g	0.002	≥0.002
Chlorodifluoromethane	Annual	d	g	0.001	≥0.001
Cyclohexane	Annual	d	≥0.002	0.009	≥0.011
D'Limonene	Annual	d	g	0.001	≥0.001
Dichlorodifluoromethane	Annual	d	g	0.001	≥0.001
Dimethyl Foramide	Annual	d	g	0.001	≥0.001
Dioctyl Pthalate	Annual	d	≥0.004	e	≥0.004
Ethyl Alcohol	Annual	d	≥0.003	0.001	≥0.004
Ethyl Benzene	Annual	d	g	0.002	≥0.002
Ethylene Glycol	Annual	d	≥0.005	e	≥0.005
Fluoboric Acid	Annual	d	g	0.002	≥0.002
Fluorine End-capped Homopolymers	Annual	d	g	0.02	≥0.02
Fluoroaliphatic Polymeric Esters	Annual	d	g	0.001	≥0.001
Fluorobenzene	Annual	d	g	0.01	≥0.01
Fluorotelomer	Annual	d	g	0.001	≥0.001
Glycol Ethers	Annual	d	g	0.1	≥0.1

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Footnotes at end of table.

TABLE 4.2.3.2–1.—*Contribution to Air Quality from RFP Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines*—Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (μg/m³)	Baseline Concentration (μg/m³)[f]	Proposed Action Concentration (μg/m³)	Total Concentration (μg/m³)
Hexane	Annual	d	g	0.003	≥0.003
Hydrogen Chloride	Annual	d	≥0.04	0.012	≥0.05
Hydrogen Fluoride	Annual	d	≥0.1	e	≥0.1
Isopropyl Alcohol	Annual	d	≥0.003	0.08	≥0.08
Methyl Alcohol	Annual	d	g	0.001	≥0.001
Methyl Ethyl Ketone	Annual	d	g	0.003	≥0.003
Methyl Isobutyl Ketone	Annual	d	g	0.007	≥0.007
Methylene Chloride	Annual	d	≥0.07	0.001	≥0.07
Naptha/Mineral Spirits	Annual	d	g	0.02	≥0.02
Nitric Acid	Annual	d	≥0.05	0.04	≥0.09
Phosphoric Acid	Annual	d	g	0.003	≥0.003
Sulfuric Acid	Annual	d	g	0.03	≥0.03
Tetrachloroethylene	Annual	d	g	0.002	≥0.002
Toluene	Annual	d	g	0.02	≥0.02
Trichloroethylene	Annual	d	g	0.02	≥0.02
Trichlorotrifluoroethane	Annual	d	≥0.4	0.001	≥0.4
Xylene	Annual	d	g	0.01	≥0.01

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[a] Compounds listed are the major pollutants of concern (FDI, 1993).
[b] Federal standard (40 CFR 50).
[c] State standard (CO DOH, 1989).
[d] No state standard.
[e] Emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).
[f] Baseline Concentrations are from table 4.1.8.2-1.
[g] Data unavailable.

changes in traffic volumes as a result of anticipated changes in employment at RFP. These changes in traffic volumes are predicted to result in an increase of less than 2 dB in peak-hour sound levels along State Highways 72 and 128, and Indiana Street. Changes in sound levels along other routes are estimated to be small. The increased noise levels along the major access routes would not be expected to increase the annoyance level to communities or individuals.

Noise emissions from onsite construction activities have not been analyzed but are not expected to result in any increase in offsite noise levels because of the distance to the site boundary. Construction activities include erecting a new building and renovation of existing buildings. Noise emissions from onsite operation activities should be similar to those from existing sources. The facilities would be designed to minimize noise levels at the site boundary. Noise emissions from construction equipment and machines, and from operational facilities, equipment, and machines, are not expected to cause ambient noise levels to exceed the EPA guidelines set to protect the public from the effect of broadband environmental noise and to protect the public against hearing loss.

Construction workers and personnel working at any of the reconfigured facilities at RFP will be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at RFP.

Although no increase in annoyance is expected offsite from construction and operations onsite, measures would be necessary to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments with hearing protection devices meeting OSHA standards. Noise levels would be measured in worker areas and an effective hearing protection program conducted.

4.2.3.3 *Water Resources*

This section describes potential surface and groundwater impacts due to the RFP consolidation alternative.

Surface Water. As described in section 4.1.8.3, the 500-year floodplain of Walnut Creek corresponds to an elevation of approximately 5,925 feet (DOE, 1988 page 5-1). The elevation of the area of new construction was determined to range between 6,050 feet and 6,080 feet, well above the 500-year floodplain elevation. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Temporary water requirements during construction would result in the need for an additional 22,000 GPD, while the requirement due to consolidation operations would be approximately 0.97 MGD (tables 3.4.3-2 and 3.4.3-4, respectively). The water needed for construction represents approximately a 7-percent increase over the current water usage of approximately 0.32 MGD (table 3.2.4-3), with the water needed for operations an approximate 300-percent increase. Much of the water for RFP is obtained from the Denver Water Board; therefore, no impacts from site surface water withdrawals would occur.

RFP has a water supply contract with the Denver Water Board for 1.5 MGD, but this contract is not guaranteed. An additional daily requirement may require an amended agreement. The Denver Water Board's surface water sources are Gross Reservoir via the South Boulder Division Canal from the South Boulder Creek and Ralston Reservoir.

The existing RFP sewage treatment plant, which discharges to Pond B-3, is the only discharger to surface waters; it has a capacity of 150 MGY (table 3.2.4-2). The additional sanitary wastewater generated by the transferred processes is approximately 148 MGY (see table 3.4.3-3). This additional wastewater would represent an approximate 270-percent increase over the current sanitary wastewater generation rate of approximately 55.2 millions gallons annually (table 3.2.4-2). Additional wastewater treatment capacity would be required to accommodate this increase.

Surface Water Quality. Impacts to surface water quality may occur during the construction/modification phase due to land disturbance. Disturbed soils may be transported via surface runoff or wind to receiving waters. Appropriate erosion control measures would be used to minimize soil loss to surface waters.

As already described, additional wastewater treatment capacity would be required; the influent and effluent would be required to meet all Federal, state, and local discharge requirements.

The proposed new parking and building areas would increase the potential of nonpoint source pollutants being transported to Walnut and Woman Creeks. The treatment facilities and the capacity of the existing runoff-control holding ponds may have to be expanded due to the potential for increased runoff. Because water in the holding ponds is monitored before release to water bodies, no adverse impacts to downstream surface water bodies should occur as a result of increased runoff.

Groundwater. The Boulder Conservation Council supplies RFP with water from the Denver Basin aquifer for domestic and industrial use. Because no

water is withdrawn from beneath RFP, there would be no adverse impacts to the available quantity of groundwater.

Groundwater Quality. The groundwater quality closest to the proposed building sites is summarized in table 4.1.8.3-2. All data are within water quantity criteria and should not have an adverse impact on the RFP alternative. There are no plans to discharge waste materials directly to groundwater. Given normal safeguards and precautions, no adverse impacts would result to groundwater quality.

4.2.3.4 *Geology and Soils*

Mass movement, subsidence, seismic activity, and volcanism are unlikely to occur at a level that would impact construction or operation activities. There are no landslides, sinkholes, or other nontectonic movements at RFP. No impact would result to regional or local geologic features from this action.

Under the RFP alternative, construction could temporarily disturb about 72 acres of land and lead to an increase in soil erosion from wind and water (table 3.4.3-1). Water erosion is likely to occur only sporadically during storm periods. Wind erosion is likely to occur intermittently depending on wind velocities. The maximum total soil loss rate associated with this construction is not expected to exceed the maximum acceptable soil loss of 5 tons per acre per year. Wind erosion control measures can include sprinkling, use of mulch, and other dust control methods. Water erosion control measures would include proper drainage and grading. Exposing only small areas for limited periods would reduce erosional effects and ensure that losses remain within acceptable levels.

Soil disturbance during operations would be reduced from that of the construction period as areas temporarily given over to laydown and haul-road use are restored. Environmental consequences to soils during operations would include permanent alteration of soil cover as the result of emplacement of structures, parking lots and other features. There would be no adverse impact to soils.

4.2.3.5 *Biotic Resources*

The construction, modification, and operation of facilities and equipment for nonnuclear consolidation at RFP would require the loss of natural vegetation and terrestrial wildlife habitat. Losses of approximately 72 acres of mostly short-grass prairie vegetation to the immediate west of the central developed area would be necessary to accommodate new buildings and parking, as well as construction laydown and construction parking. The latter would represent a temporary disturbance of about 28 acres and would be revegetated, where possible, using native species. Additionally, new wastewater treatment, hazardous waste storage, and landfill capacity would be required. Areas cleared of existing vegetation would be permanently occupied by structures, pavement, or new vegetation.

These actions would not represent a major reduction in the quantity or quality of terrestrial habitat surrounding RFP. Although approximately 72 acres of habitat would be lost, this represents 1.2 percent of the over 6,000-acre (section 4.1.8.1) security buffer zone. Potential mitigation measures include habitat disturbance minimization and revegetation with native species.

Although NWI maps do not show any wetlands within the areas subject to disturbance (RF FWS, 1975), a wetland delineation and discussions with the Corps of Engineers would be required to verify the absence. If any delineated wetlands are disturbed or destroyed during construction, compensatory replacement wetlands would be purchased or constructed elsewhere within RFP or its vicinity at a ratio designated by the Corps of Engineers.

Water for RFP is obtained from the Denver Water Board and thereby would not affect aquatic resources at RFP. Potential impacts to aquatic habitats could occur since discharge rates to onsite water bodies

would significantly increase (section 4.2.3.3). All effluent discharged would be required to comply with conditions established in the NPDES permit. Therefore, adverse impacts to aquatic resources are not expected.

DOE has contacted the FWS and Colorado Natural Resources Department to determine whether the proposed construction would potentially impact threatened or endangered species. An inspection for the black-footed ferret (*Mustele nigripes*) (Federally- and state-listed endangered) would be performed if any development would affect areas within or close to where prairie dog colonies occur. Suitable habitat exists on RFP for the Ute's ladies tresses (*Spiranths diluvialis*) (Federally-listed threatened); however, no specimens were found during a recent survey (RF ESCO, 1992).

4.2.3.6 *Cultural Resources*

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at RFP may have impacts if important Native American resources are present and no impacts if such resources do not occur. No NRHP-eligible prehistoric or historic resources are expected to occur. Construction activities may physically disturb Native American resources and operations may decrease accessibility to traditional use areas or create audio or visual intrusions upon sacred locations. If selected as the consolidation site, consultation would be initiated for this project to identify important Native American resources.

The environmental consequences of locating functions at SNL, SRS, and LANL as part of this alternative are discussed in sections 4.1.5.6, 4.1.2.6, and 4.1.3.6, respectively.

4.2.3.7 *Socioeconomics*

The following section discusses the potential environmental impacts of the RFP alternative. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action alternative or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are shown in table 4.2.3.7-1.

As a result of ongoing planning, DOE has revised the estimates of new jobs during peak operations from 3,710 to 3,300 new jobs (DOE, 1993d). The analysis presented in table 4.2.3.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 3,710 new jobs. The estimate of 3,300 new jobs is 10 percent lower than the 3,710 new jobs used in the following analysis, and this lower estimate would result in fewer economic benefits than the 3,710 new jobs.

The construction, modification, and installation of facilities and equipment for the consolidation of electrical/mechanical functions at RFP would require 958 employees at peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 3,740 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions will be filled through donor transfers, new hires, and internal reassignments. In addition to those jobs created directly by the project, other employment, indirectly created, would lead to further in-migration to the ROI.

Locating electrical/mechanical functions at RFP would increase population in the ROI by approximately 699 during 1995, the peak construction year, and by an estimated 5,594 during 2000, the peak

TABLE 4.2.3.7–1.—*Rocky Flats Plant Alternative Economic And Population Characteristics*

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	1,103,180	NA	1,205,374	NA
Baseline Unemployment Rate	5.0%	NA	5.6%	NA
Baseline Personal Income (Thousands $)	$43,025,241	NA	$51,753,781	NA
Baseline Per Capita Income ($/Person)	$22,204	NA	$24,644	NA
Baseline Employment	1,047,492	NA	1,137,688	NA
Direct Jobs	958	0.09	3,740	0.33
Indirect Jobs	2,569	0.25	5,818	0.51
In-Migrating Workforce	314	0.03	2,205	0.19
Total In-Migration	699	0.04	5,594	0.27
Population Increase				
Adams County	134	0.05	1,074	0.33
Arapahoe County	38	0.01	308	0.07
Boulder County	179	0.08	1,432	0.57
Boulder	46	0.05	369	0.40
Broomfield	36	0.14	285	1.04
Denver County	64	0.01	509	0.09
Jefferson County	283	0.06	2,266	0.45
Arvada	117	0.13	940	0.95
Golden	40	0.28	319	2.13
Westminster	62	0.08	498	0.59
ROI (County Total)	699	0.04	5,594	0.27

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Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; CO DOL, 1991; FDI, 1993.

operations period. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force. In 2000, this project-related population would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 2,100,000. The city of Golden would experience population growth of less than 1 percent during construction and about 2 percent above the projected No Action baseline during operations.

The less than 1-percent change in population during construction required for consolidating the electrical/mechanical functions would create the need for approximately 266 housing units, which is less than a 1-percent addition to this large urban area. For operations in the year 2000, the less than 1-percent change in population would not create the need for additional housing units beyond a 1-percent increase. Golden is the only city where additional housing units would need to be increased beyond 1-percent, but this need for additional units would not exceed a 2-percent increase. In past years, housing units in the ROI have been built at an annual rate of 3 percent. Therefore, additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

As identified in the Affected Environment section, some wastewater systems would be nearing capacity by the year 2000, given the No Action future baseline. The Boulder system would be operating over 100 percent capacity. However, the RFP alternative would add no more than a 1-percent increase over the baseline projection to any of the affected systems.

In the 1989-1990 school year, school districts in Adams and Arapahoe counties were operating, on average, at 80 percent and 90 percent of capacity, respectively. Under the No Action future baseline, these capacities will not be exceeded in either 1995 or 2000. Currently, two school districts in Adams County exceed their capacities, but these capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the RFP alternative would not add more than 1 percent to enrollments during construction or operations.

Existing health care resources are adequate to accommodate the projected population increases. Current staffing levels for police and fire services in the ROI are also adequate to support the projected population increases, while maintaining current service standards, because none of the counties or cities would grow by more than 1 percent over the No Action baseline.

Relative to baseline traffic projections, consolidation activities would have minimal impacts on the local transportation network serving RFP. Conditions on most route segments in the local transportation network are projected to remain consistent with baseline projections. Average daily truck traffic associated with construction would increase by nine trips daily relative to historic levels (FDI, 1993). Annual vehicle accidents would increase by approximately 10, and associated fatalities would increase by less than 1.

Conditions on most route segments in the local transportation network during typical operations are projected to remain consistent with baseline projections. However, projected conditions along the segment of Colorado State Route 128 between I-70 and Colorado State Routes 93 and 121 would deteriorate from baseline stable flow conditions, with minor deterioration of service from disruptions, to a congested flow with greater deterioration of service from disruptions. Projected conditions along the segment of Indiana Street between Colorado State Routes 72 and 128 would also deteriorate from a baseline stable flow condition to a congested flow with considerable deterioration of service from disruptions. Average commercial truck traffic would increase to 82 trips daily (FDI, 1993). An estimated 110 additional vehicle accidents and 1 associated fatality are projected to occur annually within the ROI due to consolidation activities.

The direct and indirect additional jobs at RFP will help offset the closure of the Technical Training Center at Lowry Air Force Base located in Denver. The 1001st Space Systems Squadron, Defense Finance and Accounting Service, and the Air Force Reserve Personnel Center would remain open, but all technical training would be redistributed to other locations (RF DBCRC, 1991). It is estimated that this closure will result in the loss of approximately 6,500 persons of whom between 3,500 and 4,000 are students at the Technical Training Center.

Under the Rocky Flats alternative, 50 additional employees during peak construction and 75 during operations would be required at LANL (DOE, 1993b; FDI, 1993). The effect of this alternative on LANL would be less than with the Proposed Action. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 90 additional operations employees at LANL would not affect this conclusion. Effects on SNL, SRS, Pinellas, and Mound would be the same as with the Proposed Action. These changes in employment numbers would create no adverse effect on the related ROIs. Some adverse effects would occur at KCP as described in section 4.2.4.7.

4.2.3.8 *Waste Management/ Pollution Prevention*

Solid waste generated during construction of new buildings would include discarded packaging and construction materials (e.g., plasterboard, brick, wood, and scrap steel). All construction waste would be disposed of offsite. Sanitation sewage would be

handled by an outside contractor; therefore, existing site wastewater treatment facilities would not be affected.

Hazardous waste generated during construction would consist of materials such as waste adhesives, oils, cleaning fluids, solvents, and coatings. All hazardous waste would be appropriately packaged, manifested, and shipped under contract with DOT-registered transporters to RCRA-permitted offsite disposal facilities or recyclers.

The consolidation of current nonnuclear manufacturing activities at RFP would generate additional hazardous and nonhazardous wastes at RFP. The additional hazardous wastes generated would consist of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; corrosives; combustibles; TCLP materials; off-specification materials; sludge; oils/solvents; PCBs (expected to be phased out); and caustics and acid solutions. A summary of the wastes, effluents, and emissions, and discussions related to their management, can be found in appendix C, section C.3.

The increase in hazardous and nonhazardous waste volume at RFP due to the consolidation of nonnuclear manufacturing at RFP would have an adverse environmental impact. RFP would have to manage a solid hazardous waste volume increase of more than 10 times existing volumes. The additional solid hazardous waste volume of approximately 12,300 ft^3/yr would require additional waste management considerations.

The additional sanitary/industrial wastewater to be handled as a result of the consolidation of electrical/mechanical functions at RFP is approximately 148 MGY, exceeding the current overall RFP sanitary sewage treatment capacity of 150 MGY. A major upgrade/modification to the existing treatment plant would be necessary.

The estimated 430,000 ft^3/yr of additional solid nonhazardous wastes would reduce the useful operating life of the existing onsite sanitary landfill, resulting in an accelerated schedule for future expansion of the existing landfill, or development of new onsite landfill(s). Amounts of paper and scrap metals available for recycling would also increase.

Each of the functions transferring to RFP due to consolidation of nonnuclear manufacturing at RFP have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities. This environmental benefit would be transferred with the functions. Once the transfer of the functions occurs, RFP would include the processes in required plans and reports on RFP waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

4.2.3.9 *Human Health: Facility Operations and Accidents*

Discussions of impacts to members of the public and the environment, worker exposures, and accidents for the No Action alternatives (Affected Environment) and the Proposed Action are presented in section 4.1 and sections 4.1.1 to 4.1.8. Information specific to RFP (i.e., different from the Proposed Action) is discussed below; actions that are the same as those for the proposed consolidation at KCP were discussed earlier and not repeated here.

Release of chemical pollutants as a result of current RFP operations is discussed in the Air and Water Resources sections for RFP (4.2.3.2 and 4.2.3.3, respectively). New chemicals introduced to RFP which pose a cancer risk are 1,4-dioxane, methylene chloride, and TCE. The risks from 1,4-dioxane onsite (worker) would be 4.4×10^{-7} and 9.4×10^{-9} at

the site boundary (public); the risks from methylene chloride would be 3.7×10^{-8} onsite and 7.4×10^{-10} at the site boundary; the risks from TCE would be 1.2×10^{-6} onsite and 2.6×10^{-8} at the site boundary. Cumulative methylene chloride releases result in a cancer risk of 2.3×10^{-6} to an onsite worker. Cumulative CCl_4 releases primarily due to nuclear operations would result in a cancer risk of 5.3×10^{-4} to an onsite worker and 1.2×10^{-5} at the site boundary. Cumulative TCE releases would result in a cancer risk of 1.2×10^{-6} onsite and 2.6×10^{-8} at the site boundary, all attributable to the new additions due to relocation. In the future, CCl_4 use would be reduced and methylene chloride and TCE replaced by non-carcinogenic solvents. Replacement non-carcinogenic solvents like TCA would be used as a substitute for CCl_4 (see table F-14b). Exposures to members of the public associated with radiological releases from current RFP operations are well below applicable permit, regulatory, and DOE operational requirements (RF EG&G, 1991e). Consolidating functions at RFP would not result in any increases of radiological releases.

A review of the recent RFP annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986–1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future. Because the functions that would be consolidated at RFP are the same as or similar to those currently being performed at RFP and would be conducted in RFP facilities designed for these activities, the current accident profile at RFP would not change as a result of consolidating these functions at RFP.

This alternative involves consolidation of electrical/mechanical functions at RFP as an alternative to consolidation at KCP. Differences in site characteristics between RFP and KCP would cause small differences of pollutant concentrations at RFP from those calculated for the KCP site. However, the conclusion remains that releases associated with consolidating these functions would be below applicable permit, regulatory, and DOE operational and accident situation requirements. Additionally, the concentrations of potentially hazardous chemicals associated with the functions to be relocated are also not expected to exceed levels that would cause adverse human health effects (see appendix F). Releases of CCl_4 associated with current activities exceed applicable limits, as discussed earlier in this section. However, as indicated in section 4.2.3.2, relocating the identified functions to RFP would result in no increase of CCl_4 concentrations there.

4.2.4 Closeout Complex Missions at Kansas City Plant

The closeout of Complex missions at KCP would present no visible change to the facility but would impact the current operations of the Bannister Federal Complex. Under a Memorandum of Understanding, DOE provides utilities to the tenants of the Complex. In addition, maintenance is provided for the utility systems, fire protection loop, and flood protection system. These services would have to be provided by others.

4.2.4.1 *Land Resources*

The closeout of Complex missions at KCP would not adversely impact the comprehensive planning and zoning of the city of Kansas City. A review of socioeconomic data in section 4.2.4.7 would indicate no change to demand placed on regional recreation resources. The closeout would also present no visible change to the facility. Future use of KCP surplus facilities would be evaluated in the transition process.

4.2.4.2 *Air Quality and Acoustics*

Air Quality. Closing out of the Complex missions at KCP would reduce emissions of criteria air pollutants from the major sources; i.e., the steam plant boilers and various manufacturing operations. Hazardous air pollutant emissions would be reduced from the laboratories and manufacturing operations. As a result, the air quality around KCP should improve.

Normal operations do not result in the emission of any radioactive materials at KCP. Therefore, closing out Complex missions at KCP would have no effect on the emissions of radioactive materials.

Acoustic Conditions. Traffic volumes on streets near KCP would be reduced and some reduction in traffic noise levels would result. Minimal reduction in sound levels in the community is expected from elimination of noise sources at KCP.

4.2.4.3 *Water Resources*

Surface Water. The closeout of DP activities would reduce cooling water discharges from KCP. This would not adversely impact water levels in the Big Blue River and Indian Creek.

Surface Water Quality. The closeout of Complex missions would reduce cooling water discharges to local surface waters. This would have no adverse impact on water quality in the Big Blue River and Indian Creek.

Groundwater. By closing out Complex missions at KCP, less water would be required from the Kansas City municipal water supply system. No adverse impact on water resources is expected.

Groundwater Quality. Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from closeout activities. Current environmental restoration programs would not be adversely impacted.

4.2.4.4 *Geology and Soils*

The proposed closeout of the Complex missions at KCP would not result in impacts on the geologic features of the area, nor would the geology have any impacts on the mission closeout of the plant.

Hazardous, radioactive, and mixed waste sources would be eliminated from the plant, thus decreasing future soil contamination potential. The proposed closeout of Complex missions at KCP would not impact the soils of the area.

4.2.4.5 *Biotic Resources*

The closeout of Complex missions at KCP would not adversely affect biotic resources; instead, the closeout would result in a reduction of existing operational impacts to natural habitats on and around the site. Because of continuing non–DP activities within the Bannister Federal Complex, closeout may not increase the quantity or quality of natural habitat.

4.2.4.6 *Cultural Resources*

If the closing out of Complex missions at KCP does not include ground disturbance or building modifications, then there would be no effect on cultural resources.

4.2.4.7 *Socioeconomics*

The following section discusses the potential environmental impacts of closing out existing Complex missions at KCP. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is

included for this alternative, which has not been previously discussed under the No Action or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are shown in table 4.2.4.7-1.

The closeout of Complex missions would result in decreases in economic activity and employment in the ROI. The transfer of functions from KCP would decrease employment in the ROI by an estimated 9,800 jobs (3,800 direct and 6,000 indirect). This reduction in jobs would increase the ROI unemployment rate from a projected baseline level of 6.0 percent to 6.9 percent. Earnings in the ROI would be reduced by about $345.5 million, with a related decrease in total personal income of $429.6 million.

Closeout of Complex missions at KCP would reduce population in the ROI by approximately 4,980 persons. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 1,335,000 persons. Populations in the cities of Belton and Lee's Summit would decrease by slightly more than 1 percent, and Harrisonville would lose about 2 percent of its projected population.

The less than 1-percent change in population after closeout of Complex missions would create an estimated additional 1,900 vacant housing units, a relatively minor increase for this large urban area. The cities of Harrisonville, Belton, and Lee's Summit would be the most affected. Vacant housing units in Belton and Lee's Summit would increase by 1 percent, and by 2 percent in Harrisonville.

The less than 1-percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and

TABLE 4.2.4.7–1.—*Kansas City Plant Alternative Economic and Population Characteristics*

	2000 Peak Operation	Percent Under Baseline
Economics		
Baseline Civilian Labor Force	751,591	NA
Baseline Unemployment Rate	6.0%	NA
Baseline Personal Income (Thousands $)	$32,080,918	NA
Baseline Per Capita Income ($/Person)	$24,034	NA
Baseline Employment	706,818	NA
Direct Jobs Lost	3,793	0.54
Indirect Jobs Lost	5,982	0.85
Out–Migrating Workforce	1,963	0.28
Total Out–Migration	4,980	0.37
Population Decrease		
Cass County	747	1.12
Belton	234	1.23
Harrisonville	149	1.85
Jackson County	3,197	0.45
Kansas City	1,474	0.39
Lee's Summit	598	1.17
Johnson County	901	0.24
Overland Park	368	0.31
Wyandotte County	134	0.07
ROI (County Total)	4,980	0.37

E4 4024

Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; KS DHR, 1991; MO DES 1991.

health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be adversely affected, and local traffic conditions would improve slightly.

The ROI would be further affected by employment losses after the closure of the Defense Finance and Accounting Service Center located next to KCP at the Bannister Federal Complex. It is estimated that this closure will result in the loss of 1,000 jobs (KC DOD, 1992).

4.2.4.8 *Waste Management/ Pollution Prevention*

Closeout of Complex missions at KCP would reduce annual onsite hazardous waste management by approximately 3,101,400 lb, having a beneficial impact on the environment. The majority of the reduction would be due to decreased generation of solvent, industrial wastewater processing facility sludge, demolition wastes, bulk oil, and oil/solvent debris. Operations that constitute the major generators of hazardous wastes such as wastewater treatment, plating and etching processes, and degreasing operations would be discontinued.

Closeout would initiate closure of existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Missouri Department of Natural Resources. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to DOT-registered offsite treatment and disposal facilities. Equipment, structures, and soils (if contaminated) would also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements. Existing inventories of LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Due to the closeout of Complex missions, KCP would no longer generate industrial wastewater effluents, which would have a positive impact on the environment. Treatment of dilute metal finishing rinsewaters, concentrated acids and caustics, chromium waste, and cyanide waste by the onsite industrial wastewater processing facility would discontinue. Treated industrial wastewater discharge effluents from the industrial wastewater processing facility to the Kansas City, MO, wastewater treatment system would cease.

Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, plastics, scrap, and metal containers, would no longer be generated. Trash that would have been disposed of in the local sanitary landfill by a commercial contractor would cease, extending the operating life of the local landfill. Nonhazardous liquid wastes would no longer be discharged to the industrial wastewater processing facility or to the public sanitary sewer system.

4.2.4.9 *Human Health: Facility Operations and Accidents*

Closeout of KCP Complex missions would eliminate hazardous materials currently used in production processes. Consequently, mission closeout would result in a decrease in adverse effects. The impacts at the DOE facilities that would receive the relocated functions from KCP are discussed in their respective sections.

4.3 COMPARISON OF ALTERNATIVES

A comparison of the environmental consequences of the Proposed Action and alternatives is presented in this section and summarized in table 4.3-1 which begins on page 4-244. This table compares the impacts to each environmental resource associated with the No Action alternatives; the Proposed Action (KCP); and the Mound, Pinellas, and RFP

alternatives. Summaries of the environmental consequences associated with each alternative are presented below. Cumulative impacts, mitigation measures, and adverse impacts that cannot be avoided are also discussed in this section.

4.3.1 No Action

Recent initiatives to reduce the number of nuclear weapons are expected to substantially decrease the requirements for the number and type of nuclear weapons from current stockpile levels. As stockpile requirements decrease, fewer weapons would be built, which in turn means less manufacturing capacity would be needed. The impacts expected with the No Action alternative reflect the reduced stockpile requirements and manufacturing capacity.

The No Action alternative would not result in any significant environmental impacts at any sites. Land use surrounding each site would continue with no changes to land use plans or policies and no changes in land ownership. With the No Action alternative, gradual reductions in emissions of criteria and hazardous toxic air pollutants would occur in response to anticipated lessened workloads and facility upgrades. Except for Pinellas and RFP, all sites are in compliance with applicable Federal and state ambient air quality standards and regulations. At Pinellas, the analysis of chemicals used in current operations showed that two chemicals (TCE and methylene chloride) would cause excess cancer risks. The lifetime cancer risk at the site boundary was estimated at 3 in 1 million. At RFP, alternative solvents are gradually being introduced so that ambient concentrations of CCl_4 (due to operation of nuclear functions) will be well below levels which would have any health effect. Noise levels would not increase at any sites, and planned future production level decreases are expected to reduce current operational noise levels.

For the No Action alternative, water use associated with nonnuclear functions would not increase at any site, and planned future production decreases are expected to reduce current water use requirements at KCP, Mound, Pinellas, and RFP. Surface water and groundwater quality would not be degraded at any site and may improve with anticipated reduced production levels. Ongoing cleanup activities related to past contamination would continue with the No Action alternative. All effluents would be required to meet applicable regulatory permits and standards.

The No Action alternative would not have any effects on geology, soils, or biotic resources at any site. No disturbances to any biotic resources are expected from continued normal operations at any site. No impacts to cultural resources are expected due to continued normal operation at any site.

Continued operation at existing sites would not significantly impact socioeconomic and community services. Because of the expected lower future production levels, facility staff levels would be reduced causing economic changes at KCP, Mound, Pinellas, SRS, SNL, and Y-12.

No increases in annual waste volumes due to DP nonnuclear manufacturing activities are expected with normal operations at any site associated with the No Action alternative. Expected lower production levels would reduce annual waste volumes at most sites for certain waste types, thereby requiring less handling and reduced storage and disposal requirements.

At RFP, the toxic effects of chemicals to onsite (workers), a total onsite (worker) cancer risk of 5.3×10^{-4} and a total site boundary (public) cancer risk of 1.2×10^{-5} indicate the potential for adverse human health effects to occur. However, the toxic effects and the excess cancer risk are mainly due to CCl_4 emissions related to nuclear activities at the site. If CCl_4 were eliminated, the primary source for adverse health effects would be removed. At Pinellas, the concentrations of methylene chloride and TCE result in a cancer risk to workers and the public of about 4×10^{-5} and 1.2×10^{-5} respectively. At KCP, there is a cancer risk of 1.2×10^{-5} to workers onsite and 4.7×10^{-6} to the public at the site boundary.

An excess cancer risk of 1.5×10^{-6} would occur to workers onsite at LANL from exposure to chemicals. Impacts associated with potential accidents would remain the same or potentially decrease because of the lower production levels.

4.3.2 Proposed Action

At KCP, SRS, LANL, and SNL, changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

The same sites would experience short-term, minor increases in air emissions and noise during building renovations. During operations, increases in air emissions and noise are also expected but would not exceed applicable air quality standards. At Mound, Pinellas, and RFP, local air quality improvements could occur due to the closeout of Complex missions at these facilities. At KCP, SRS, and LANL, increases in water use would be less than 1 percent of current use. At SNL, the increase would be less than 4 percent. Water supplies are adequate to meet demand at all sites. No impacts to geologic resources or soils are expected at any site. No permanent disturbance of any biotic resources or impacts to wetlands or threatened and endangered species are expected at all sites from building renovations or operations.

Since consolidation activities would be primarily limited to interior renovation of existing buildings, adverse effects are not anticipated. The Federal, state and Native American response to the EA pre-approval review process indicated no adverse effects on NRHP-eligible prehistoric or historic resources or important Native American resources at KCP, SRS, LANL, or SNL.

As a result of ongoing planning, DOE has revised the estimates of new jobs during peak operations. In addition, proposed Fiscal Year 1994 budget estimates would reduce the number of jobs lost at peak operations at Mound, Pinellas, and RFP. These revisions are slightly different than the original estimates used for analysis and are discussed in section 4.1. The revised estimates would not affect the following conclusions.

Changes to socioeconomic and community service at KCP, SRS, LANL, SNL, Mound, Pinellas, and RFP are expected. The Proposed Action would create 1,095 jobs (425 direct and 670 indirect) at KCP during peak operations. Total in-migration would be 558 persons. The change in population during peak construction would be less than 1-percent. The need for additional housing would be negligible.

At SRS, 103 jobs (45 direct and 58 indirect) would be created during peak operations. Total in-migration would be 60 persons. The change in population would be less than 1 percent. The need for additional housing units would be negligible.

At LANL, 294 jobs (115 direct and 179 indirect) would be created. Total in-migration would be 154 persons during peak operations. The change in population would be less than 1 percent. The need for additional housing would be negligible.

At SNL, 940 jobs (385 direct and 555 indirect) would be created during peak operations. Total in-migration would be 515 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible.

Economic consequences would occur at Mound, Pinellas, and RFP due to the closeout of Complex missions at these sites. At Mound, approximately 2,846 jobs (1,070 direct and 1,776 indirect) would be lost. Earnings in the ROI would be reduced by about $93.1 million, with a related decrease in total personal income of $119.3 million. The less than 1 percent change in population after closeout would create an estimated 600 additional vacant housing units. The city of Miamisburg would lose an estimated $760,000 in income tax revenue, which represents about 10 percent of this revenue and about 4 percent of the city's total revenue.

At Pinellas, approximately 3,038 jobs (1,050 direct and 1,988 indirect) would be lost. Earnings in the ROI would be reduced by about $103.1 million, with a related decrease in total personal income of $148.2 million. The less than 1-percent change in population after mission closeout would create an estimated 700 additional vacant housing units.

At RFP, approximately 2,917 jobs (750 direct and 1,167 indirect) would be lost. Earnings in the ROI would be reduced by about $68.5 million, with a related decrease in the total personal income of $82.2 million. The less than 1-percent change in population after closeout would create an estimated 400 additional vacant housing units.

Nonnuclear manufacturing activities associated with the Proposed Action would increase hazardous waste volumes by less than 5 percent at KCP, SRS, and SNL, and less than 7 percent at LANL, and have minor, insignificant waste management effects. Sanitary/industrial wastewater volumes would increase less than 2 percent at all sites. Solid nonhazardous waste volumes would increase by 1 percent or less at KCP, SRS and SNL, and by approximately 3 percent at LANL. At Mound, Pinellas, and RFP, nonnuclear production waste streams would be eliminated.

No adverse impacts to the health of workers and the public are expected from implementation or operation activities associated with the Proposed Action at KCP, SRS, or LANL. Activities relocated to SNL would result in risks of cancer to onsite workers of 6.0×10^{-6} due to the introduction of chemical solvents. These risks are within acceptable guidelines; however, appropriate measures, such as substituting less toxic solvents or modifying production processes, would be implemented to minimize these risks. The probability or consequences of potential accidents would not increase appreciably at any of the sites.

4.3.3 Mound Alternative

The Mound alternative would involve major new building construction; disturb or destroy approximately 62 acres of natural habitat; and require significant water resources and substantial new and/or upgraded infrastructure for wastewater treatment and parking.

For this alternative, SRS would not receive any new tritium-handling functions and would, therefore, not be affected. Impacts at SNL would be the same as those discussed in section 4.1.5 for the Proposed Action and summarized in section 4.3.2. The impacts at LANL (section 4.1.3) would be less with the Mound alternative than with the Proposed Action because only neutron tube target loading, beryllium technology, and pit support functions would be transferred.

New construction at Mound and changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

Construction-related air emissions and noise at Mound would be short-term and not significant with standard construction mitigation measures. Air emissions and noise from operations at Mound would increase but would not exceed applicable air quality standards. At KCP, Pinellas, and RFP, local air quality improvements could occur due to the mission closeout at these facilities. Construction-related soil erosion at Mound could occur but would be short-term and minor after incorporation of standard construction mitigation measures. Consolidation at Mound would increase water requirements during operations by a factor of two over current water use. Water supplies are adequate to meet this demand.

Approximately 62 acres of forested, old field, and other habitats would be lost to new construction. This loss would represent a substantial reduction in the remaining habitat at Mound but an insignificant portion of this type of terrestrial habitat in the general region. No adverse impacts to threatened and

endangered species are expected. Potential adverse impacts to wetlands may occur if the Mound alternative was selected. Consultation would be initiated with the Corps of Engineers to determine potential wetland impacts and appropriate mitigation.

Consultations regarding potential cultural resources at Mound, particularly Native American resources, have not been initiated and the absence of such resources has not yet been confirmed. Construction of new facilities at Mound may have impacts if important Native American resources are present. Consultations would be initiated if Mound was selected as the preferred consolidation site.

Changes to socioeconomic and community services at Mound are expected. The Mound alternative would create 8,298 jobs (3,120 direct and 5,178 indirect) during peak operations. Total in-migration would be 4,143 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible. Local transportation systems near Mound would be affected due to increased worker and in-migration-related traffic. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 2,700 additional direct jobs at Mound would reduce the number of indirect jobs and there would be fewer economic benefits, but the revised estimates would not affect these conclusions.

Economic changes would occur at KCP, Pinellas, and RFP due to the closeout of Complex missions at these facilities. At KCP, approximately 9,800 jobs (3,793 direct and 5,982 secondary) would be lost due to closeout. This reduction in jobs would increase the ROI unemployment rate from a projected baseline level of 6.0 percent to 6.9 percent. The less than 1-percent change in population after closeout would create an estimated additional 1,900 vacant housing units. Socioeconomics effects due to the closeout of the Complex missions at Pinellas and the Complex nonnuclear missions at RFP would be the same as discussed for the Proposed Action in section 4.3.2.

Consolidating nonnuclear manufacturing functions at Mound would increase hazardous waste volumes by approximately 18,664 ft^3/yr over current operational hazardous waste volumes of 5,348 ft^3/yr. Sanitary/industrial wastewater volumes would increase approximately 132 MGY over the current rate of approximately 47 MGY. This volume would exceed the current capacity of the Mound wastewater treatment plant. The closeout of the Complex missions at KCP and of Pinellas, and the Complex nonnuclear missions at RFP, would eliminate those facilities' waste streams.

No impacts to the health of workers and the public are expected from construction and operations activities associated with the Mound alternative at Mound and LANL. Activities relocated to SNL would result in cancer risks to workers of 6×10^{-6} due to the introduction of chemical solvents; however these risks are within acceptable guidelines. The probability or consequences of potential accidents would not increase appreciably with the Mound alternative.

4.3.4 Pinellas Alternative

The Pinellas alternative would involve major new building construction, disturb approximately 63 acres of land, and require significant water resources and new parking areas.

Y-12 would not be part of the Pinellas alternative and impacts discussed for LANL and SNL in sections 4.1.3 and 4.1.5, respectively, would be less because many of the functions transferred to these sites with the Proposed Action would remain at Pinellas (see figure 3.4.2-1). Impacts at SRS would be the same as described for the Proposed Action in section 4.3.2.

New construction at Pinellas and changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

Construction-related air emissions and noise impacts at Pinellas would be short-term and not significant with incorporation of standard construction mitigation measures. Air emission and noise from operations at Pinellas would increase but would not exceed applicable air quality standards. At KCP, Mound, and RFP, local air quality improvements could occur due to the closeout of Complex missions at these facilities. Consolidating nonnuclear manufacturing functions at Pinellas would increase its water use requirements by seven times over current annual water use. Because of the recent rise in regional water demand from drought conditions, periodic restrictions on water use have been initiated in the Pinellas area The expected increase in water use due to the Pinellas alternative could potentially impact the Pinellas County Water System. No impacts to geologic resources are expected. Construction-related soil erosion could occur at Pinellas but would be short-term and not significant after application of standard construction mitigation measures.

At Pinellas, approximately 21 acres of onsite existing old field vegetation would be lost to new construction. All of this habitat is currently in a highly disturbed condition, and none of it is unusual to the surrounding area. No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands may occur if the Pinellas alternative was selected. Consultation would be initiated with the Corps of Engineers to deterine potential wetland impacts and appropriate mitigation.

Consultations on cultural resources at Pinellas have not been initiated and the absence of such resources has not yet been confirmed. Construction of new facilities may have adverse impacts if important Native American resources are present. Consultations would be initiated if Pinellas was selected as the preferred consolidation site.

Changes to socioeconomic and community services at Pinellas are expected. Implementing the Pinellas alternative would create 11,559 jobs (3,995 direct and 7,564 indirect) at Pinellas by peak operations. Total in-migration would be 5,261 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible, except in Seminole, where a 3-percent increase would occur. Local transportation systems at or near the plant would be affected due to increased worker and in-migration-related traffic. As a result of ongoing planning, DOE has revised workforce estimates. Recently revised estimates of 3,500 additional direct jobs at Pinellas would reduce the number of indirect jobs and there would be fewer indirect jobs, but the revised estimates would not affect these conclusions.

Economic changes would occur at KCP, Mound, and RFP due to the closeout of Complex missions at these facilities. Socioeconomic consequences discussed for the closeout of the Complex missions at KCP in section 4.3.3 and in section 4.3.2 for Mound and RFP would be the same for the Pinellas alternative.

Consolidating nonnuclear manufacturing functions at Pinellas would increase liquid hazardous waste volumes by approximately 51,500 gallons annually over current operation volumes of 49,555 gallons annually. Hazardous solid waste would increase by approximately 12,300 ft^3/yr over current operation volumes of 110 ft^3/yr. Sanitary/industrial waste-water volumes would increase 153 MGY over the current rate of 66 MGY. Increases in waste volumes could be handled by existing excess capacities or existing agreements with EPA authorized offsite treatment, reclamation, and disposal facilities. The closeout of Complex missions at KCP and Mound, and of Complex nonnuclear missions at RFP, would eliminate those facilities' waste streams.

Existing operations at Pinellas result in cancer risks of 3.9×10^{-5} and 3.7×10^{-5} to an onsite worker and a member of the public, respectively. These cancer risks would increase slightly to 4.0×10^{-5}, and 3.8×10^{-5}, respectively, after nonnuclear consolidation at Pinellas. Appropriate mitigation measures, such as substituting less toxic solvents or

modifying production processes, would be implemented to reduce the cancer risks to less than 10^{-6} to both workers and the public. No adverse health effects to workers and the public have been identified at SRS, SNL, or LANL with this alternative. The probability or consequences of potential accidents would not increase appreciably with the Pinellas alternative.

4.3.5 Rocky Flats Plant Alternative

The RFP alternative would involve major new building construction, disturb approximately 72 acres of short-grass prairie vegetation, and require substantial new and/or upgraded infrastructure for hazardous waste storage, wastewater treatment, and parking areas.

With this alternative, LANL would not receive beryllium technology and pit support functions and would, therefore, be affected less than with the Proposed Action (as described in section 4.1.4). Impacts at SRS and SNL would be the same as described for the Proposed Action in sections 4.1.3 and 4.1.5, respectively, and summarized in section 4.3.2.

New construction at RFP and changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

Construction-related air emissions and noise impacts at RFP would be short-term and not significant with incorporation of standard construction mitigation measures. Air emissions and noise from operations at RFP would increase but would not exceed applicable standards. At KCP, Mound, and Pinellas, local air quality improvements could occur due to the closeout of Complex missions at these facilities. Consolidation at RFP would triple the current annual water use. Adequate water supplies are available; however, this increase would require renegotiation of the current water supply contract. No impacts to geologic resources are expected. Construction-related soil erosion at RFP could occur but would be minor and short-term after standard construction mitigation measures were instituted.

At RFP, approximately 44 acres of short-grass prairie vegetation would be lost to new construction. No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands may occur if the RFP alternative was selected. Consultation would be initiated with the Corps of Engineers to determine potential wetland impacts and appropriate mitigation.

Consultations on cultural resources at RFP have not been initiated and the absence of such resources has not yet been confirmed. Construction of new facilities at RFP may have adverse impacts if important Native American resources are present. Direct physical impacts are unlikely; however, Native American resources may exist if such resources are identified by Native American Groups. Consultations would be initiated if RFP were selected as the preferred consolidation site.

Changes to socioeconomic and community services at RFP are expected. The RFP alternative would create 9,558 jobs (3,740 direct and 5,818 indirect) during peak operations. Total in-migration would be 5,594 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible. Golden is the only city where additional housing requirements would increase above 1 percent, but this need would not exceed 2 percent. As a result of ongoing planning, DOE has revised workforce estimates. Recently revised estimates of 3,300 additional direct jobs at RFP would reduce the number of indirect jobs and there would be fewer economic benefits, but the revised estimates would not affect these conclusions.

Economic changes would occur at KCP, Mound, and Pinellas due to the closeout of Complex missions at these facilities. Socioeconomic consequences discussed for the closeout of Complex missions at KCP in section 4.3.3 and in section 4.3.2 for Pinellas and Mound would be the same as the RFP alternative.

At RFP, liquid hazardous waste volumes generated from operations would increase by approximately 43,300 gallons per year over current operational waste volumes of 5,005 gallons annually. Solid hazardous waste volumes would increase approximately 12,300 ft^3/yr over the existing volume of 1,090 ft^3/yr. Sanitary/industrial wastewater volumes would increase approximately 148 million gallons annually over the current rate of 55.2 million gallons annually. This volume would exceed the current capacity of the RFP's wastewater treatment plant. A major upgrade/modification to RFP's wastewater treatment plant could, however, mitigate this impact. The closeout of Complex missions at KCP, Mound, and Pinellas would eliminate those facilities' waste streams.

Consolidation operations at RFP would result in cancer risks of 5.3×10^{-4} and 1.2×10^{-5} to an onsite worker and a member of the public, respectively. Activities relocated to SNL would result in cancer risks to workers of 6×10^{-6} due to the introduction of chemical solvents; however, these risks are within acceptable guidelines. Appropriate mitigation measures such as substituting less toxic solvents or modifying production processes would be implemented to reduce the cancer risks at RFP to within acceptable guidelines. The probability or consequences of potential accidents would not increase appreciably with the RFP alternative.

4.3.6 Cumulative Impacts

Cumulative impacts are those effects of the Proposed Action considered with other past, present, and reasonably foreseeable future actions. No past, present, or reasonably foreseeable future projects have been identified onsite or offsite which, when added to the effects of the Proposed Action, would result in a significant impact.

No Complex cumulative effects would occur because the Proposed Action represents a consolidation of existing activities and functions, rather than an initiation of new activities. In most instances, consolidation would reduce potential environmental impacts from those that would occur with the No Action alternative. Nonnuclear activities, now located within aging facilities at donor sites would be transferred to sites with newly refurbished facilities. These facilities would incorporate DOE ES&H planning decisions on Complex reconfiguration; meet all applicable codes, environmental requirements, and standards; and already contain almost all of these operations, materials, and/or hazardous waste streams. Consolidation would also reduce the number of sites with hazardous activities and/or materials within the Complex.

The Proposed Action would have no cumulative effects on land resources, noise, water resources, geology and soils, and cultural resources. No cumulative environmental effects are expected at Mound, Pinellas, or RFP with the Proposed Action.

Cumulative effects would be expected on air resources, socioeconomic and community services, waste management, and health effects to workers.

Implementing the Proposed Action would add air emissions which would contribute to existing and future air quality in the region at each site. The analysis presented in the air quality sections of the EA identify the contribution of pollutants attributed to the Proposed Action to the background, and compares the cumulative (addition plus background) to applicable regulatory standards and guidelines. Changes in background air quality, either increases or decreases, would affect the predicted values. As stated earlier, no major projects have been identified in the site areas that could contribute significant amounts of pollutants that would change the analysis. However, other nonpoint source activities such as a substantial increase of vehicle use in the region could result in cumulative impacts.

The cumulative socioeconomic and community services effects from the estimated peak construction and operations workforce requirements due to the Proposed Action at KCP, SRS, LANL, and SNL

(see table 3.3-1) would result in less than 1-percent change in population and regional economic conditions. Because of the small size of the socioeconomic changes in relation to the socioeconomic study areas and the dispersed location of the sites involved in the Proposed Action, the cumulative socioeconomic impacts are expected to be minor. These effects were analyzed in Socioeconomic and Community Services discussions for each site in sections 4.1.1 to 4.1.8 and summarized in section 4.3.

Solid and liquid waste generated from Proposed Action activities, such as building decontamination to accommodate relocated activities and operations, would add incrementally to KCP, SRS, LANL, and SNL solid and liquid waste volumes and have cumulative impacts to offsite waste management facilities. Only small increases in operational waste volumes would occur, generally ranging from less than 1 percent to 5 percent. These changes in waste volumes when combined with the remediation values would reduce available treatment, storage, and disposal capacities, and would result in a cumulative impact to these sites' waste management activities. All sites can accommodate the anticipated Proposed Action waste volumes as well as all other non-project system demands within existing waste management programs. Offsite commercial waste management facilities can expand as necessary to accommodate market conditions, or the DOE sites can use alternative facilities in their respective areas. The cumulative impact on the onsite and offsite liquid and solid waste storage and treatment facilities is, therefore, expected to be minor in relation to the volumes treated and/or stored annually at each site.

Cumulative effects resulting from existing site and project area releases, and the releases of radionuclides and chemicals associated with relocated functions at KCP, SRS, LANL, and SNL are expected. The cumulative health effects are projected to be below applicable permit, regulatory, and DOE operational requirements, and would not cause adverse health effects. Appropriate waste minimization and pollution prevention program measures, such as substituting less toxic solvents or changing the production process, would be implemented to minimize cumulative health effects from non-radioactive toxic chemicals.

Because relocated functions involve activities that are the same as or similar to those that are currently being performed at the receiving site, the cumulative effects of accidents on human health are not expected to increase appreciably.

4.3.7 Mitigation Measures and Adverse Impacts That Cannot be Avoided

Proposed Action. At all Proposed Action sites, project design would include best available control technologies or modifying processes to reduce criteria and hazardous/toxic air emissions. All applicable mitigation measures for protection of the environment as required in DOE Order 6430.1A, *General Design Criteria,* would be incorporated in project design. Construction mitigation measures (e.g., dust control, vehicle maintenance to reduce air emissions, and erosion/sediment controls) would be used. Appropriate mitigation measures, such as substituting less toxic solvents or modifying processes, would be implemented to reduce chemical-related health effects to workers and the public to less than 10^{-6}. All relocated nonnuclear functions would be designed to meet waste minimization goals at receiving sites, and all modified facilities would include appropriate design features which improve contamination control and release prevention. These features could include measures such as not interconnecting stormwater systems, the sanitary waste systems, and radioactive or other hazardous material handling systems or areas; monitoring and sampling equipment; and spill overfill prevention devices.

Due to the closeout of Complex missions, unavoidable adverse economic consequences and outmigration of population would occur at Mound, Pinellas, and RFP. However, some DP workers could be redeployed to meet new mission require-

ments. Others might receive additional professional and vocational training at local schools during the transition period. DOE could also assist local colleges and vocational schools with the development of specialized curriculums.

Out-placement and counseling services could help mitigate the effects on workers who cannot be transferred. Such services could include academic and vocational counseling, help in preparing resumes and preparing for job interviews, financial planning, and job searching techniques. Other mitigation measures could include maintaining close coordination with local businesses and economic development agencies to identify available jobs, and to inform the business community of skilled personnel in the labor market. Limited opportunities, particularly technical, in the local communities may affect out-placement.

Mound Plant Alternative. Potential waste management impacts could occur with consolidation at Mound (see section 4.2.1.8). Projected waste volumes would greatly exceed existing waste management facility capacities. Potential mitigation measures, such as constructing new onsite hazardous waste storage facilities and upgrading or modifying the Mound wastewater treatment plant to handle the increased waste volumes, could reduce these impacts.

The loss of approximately 62 acres of forested and old field habitats to accommodate new construction at Mound would be an adverse impact that cannot be avoided. This impact would be partially mitigated through using indigenous vegetation to landscape the new facilities and revegetating construction laydown areas and parking lots. Potential mitigation measures for impacts to local transportation systems in the Mound area could include staggering work hours, carpooling, or modifying the road segments experiencing congestion. If cultural resources are found in the areas to be disturbed, mitigation measures would be coordinated with the SHPO.

The closeout of Complex missions at KCP and Pinellas and of the Complex nonnuclear missions at RFP under the Mound alternative would result in unavoidable adverse economic consequences and out-migration of population at these sites. Potential mitigation measures discussed above for the Proposed Action would also be applicable to this alternative.

Pinellas Plant Alternative. Land use impacts could occur during the construction phase because vacant land at Pinellas is limited and 63 acres are needed for construction activities (see sections 4.1.7.1 and 4.2.2.1). Specific mitigation measures would be required during the design phase. Potential measures could include using offsite land for material stockpiles/storage and other construction support, or phasing construction to use available onsite land.

The loss of approximately 21 acres of mowed field to accommodate new construction at Pinellas would be an adverse impact that could not be avoided. This impact would be partially mitigated through using indigenous vegetation to landscape the new facilities and revegetating construction laydown areas and parking lots. Potential mitigation measures for impacts to local transportation systems in the Pinellas area could include staggering work hours, carpooling, or modifying the road segments experiencing congestion. If cultural resources are found in the areas to be disturbed, mitigation measures would be coordinated with the SHPO.

The closeout of Complex missions at KCP and Mound, and the Complex nonnuclear missions at RFP under the Pinellas alternative would result in unavoidable adverse economic consequences and out-migration of population at these sites. Potential mitigation measures discussed above for the Proposed Action would also be applicable to the Pinellas alternative.

Rocky Flats Plant Alternative. Potential waste management impacts could occur with consolidation

at RFP (see section 4.2.3.8). As with the Mound alternative, the volume of expected waste due to consolidation at RFP would exceed existing storage and treatment capacity. Potential mitigation measures and their effectiveness would be similar to those described for Mound.

Approximately 72 acres of mostly short grass prairie vegetation would be disturbed by new construction. Following construction, 28 acres would be revegetated with native species, resulting in a net loss of 44 acres of prairie vegetation. The loss of approximately 44 acres of short-grass prairie vegetation would be an adverse impact that could not be avoided. This impact would be partially mitigated through using indigenous vegetation to landscape the new facilities and revegetating of construction laydown areas and parking lots. Potential mitigation measures for impacts to local transportation systems in the RFP area could include staggering work hours, carpooling, or modifying the road segments experiencing congestion. If cultural resources are found in the areas to be disturbed, mitigation measures would be coordinated with the SHPO.

The closeout of Complex missions at KCP, Mound, and Pinellas with the RFP alternative would result in unavoidable adverse economic consequences and out-migration of population at these sites. Potential mitigation measures discussed for the Proposed Action would also be applicable to the RFP alternative.

4.4 DECONTAMINATION AND DECOMMISSIONING

At the end of their useful life, all Complex facilities, including the nonnuclear manufacturing facilities, may require cleanup and remediation (i.e., D&D). Decontamination is the process of reducing and removing radioactive or hazardous materials from facilities, equipment, or soils. Decontamination techniques include washing, heating, chemical or electrochemical action, and mechanical cleaning. Decommissioning involves removing facilities, including those contaminated with radiation and hazardous materials, from active service. Cleanup and remediation activities involving soil and groundwater are also expected at most of the DP facilities. These cleanup and remediation activities are not addressed in this EA. They are independently driven by regulatory programs (primarily RCRA and CERCLA) and are conducted pursuant to regulatory requirements, independent of Complex activities or programmatic decisions.

It is important to recognize that the decisions to conduct near-term cleanup and D&D activities at the potential weapon mission closeout sites does not depend on whether the proposal for consolidation is implemented. Indeed, regardless of whether Complex missions are closed out at these sites, substantial cleanup of both soil and groundwater contamination is either planned or occurring as is substantial D&D of buildings already determined to be unnecessary for future operations. These cleanup and D&D activities, which are independent of nonnuclear consolidation decisions, represent a large majority of the total scope of activities that must occur at the potential mission closeout sites. At such time as there are specific proposals for the D&D of any facilities surplussed as a result of nonnuclear consolidation, the appropriate NEPA documentation will be prepared.

Depending on the level and type of contamination, D&D may involve decontamination and dismantling and return of an area to its original condition without restrictions on use or occupancy, or partial decontamination and isolation of remaining residues with continued surveillance and restrictions on use or occupancy. D&D of this latter type usually applies to facilities contaminated with long-lived radionuclides which can be expected to decay to levels that permit the property to be released for unrestricted use within a reasonable time (i.e., on the order of 100 years).

The D&D of Complex facilities is the responsibility of the DOE Office of Environmental Restoration

and Waste Management. DOE is committed to remediate these sites, to comply with all applicable environmental requirements, and to protect the public's and workers' health and safety. EM is currently considering many technologies for the treatment of contaminated materials and equipment in D&D operations, and for the long-term management of sites following D&D. DOE is preparing an Environmental Restoration and Waste Management PEIS to analyze alternative strategies and policies for conducting its Environmental Restoration and Waste Management Program (see section 1.4 of this EA). The existing Environmental Restoration and Waste Management Program is divided into three areas: (1) environmental restoration; (2) waste management; and, (3) technology development. The program is driven by specific laws and regulations, and is regulated by the EPA and the states where facilities are located. Activities conducted by the Environmental Restoration and Waste Management program must integrate the requirements of several different regulatory programs under NEPA, CERCLA, TSCA, CAA, CWA, and RCRA, and must also integrate the requirements of state and local regulatory programs. The environmental analyses in the Environmental Restoration and Waste Management PEIS will support DOE decisions on how to best manage processes or facilities for treatment, storage, or disposal of radioactive, hazardous, or mixed waste; approaches to be used to remediate contaminated sites; treatment technology application or development; land use; and technology and policy consideration for D&D of DOE facilities at the end of their useful lives. To the extent that decisions based on the Environmental Restoration and Waste Management PEIS change DOE's current waste management and D&D operations, subsequent site- specific NEPA analysis will consider such new practices. At the same time, any substantial changes to existing regulatory program requirements, and the resulting impacts on DOE's operations will also be addressed by subsequent NEPA analysis.

4.4.1 Decontamination at Consolidation Sites

Site preparation of facilities to be modified to accept the missions associated with nonnuclear consolidation may include some decontamination and remedial measures. As discussed in section 3.3, these may include such measures as removal of asbestos floor tiles and insulation, PCB- and asbestos-contaminated concrete, and removal of tritium-contaminated equipment. These activities are not unlike decontamination and renovation of facilities currently conducted at all sites being considered for nonnuclear consolidation as part of their ongoing health and safety programs to protect workers and to adapt to changes in work requirements. Decontamination of any facilities resulting from nonnuclear consolidation activities would be conducted in accordance with site procedures and guidelines as directed by applicable Federal, state, and local regulations, and relevant DOE orders. Such activities could uncover additional contamination which may require environmental restoration. It is not expected that such activities will entail substantially greater levels of effort or environmental consequences than the ongoing decontamination and remedial activities conducted on a regular basis at all DOE facilities to protect the health and safety of workers.

All proposed facility modifications to accommodate nonnuclear consolidation functions would be designed to make future D&D of such facilities as simple and inexpensive as feasible, and to minimize the impacts of future D&D, as required by DOE Order 5820.2A, *Radioactive Waste Management*, and DOE Order 6430.1A, *General Design Criteria*. Examples of design features that may be incorporated into nonnuclear consolidation to facilitate future D&D are shown in table 4.4-1.

4.4.2 Decontamination and Decommissioning at Complex Mission Closeout Sites

The Proposed Action would result in the closeout of Complex missions at Mound and Pinellas, and

TABLE 4.4–1.—*Potential D&D Design Features*

- Modular, separable confinements for radioactive and other hazardous materials that preclude contamination of fixed portions of the structure
- Localized liquid transfer systems that avoid long runs of buried contaminated piping, including special provisions that ensure the integrity of joints in buried pipelines
- Exhaust filtration components of the ventilation systems at or near individual enclosures to minimize long runs of internally contaminated ductwork
- Equipment, including effluent decontamination equipment, that precludes the accumulation of radioactive or other hazardous materials in relatively inaccessible areas, including curves and turns in piping and ductwork
- Easily decontaminated materials that reduce the amount of radioactive and other hazardous materials requiring disposal
- Designs that ease cutup, dismantlement, removal, and packaging of contaminated equipment from the facility
- Modular radiation shielding in lieu of or in addition to monolithic shielding walls
- Lifting lugs on large tanks and equipment
- Fully drainable piping systems that carry contaminated or potentially contaminated liquids

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the closeout of Complex nonnuclear missions at RFP, and would entail the transition of those plants to the DOE Office of Environmental Restoration and Waste Management for D&D. If one of the alternatives is selected, the Complex missions at KCP would be closed out and transferred to one of the alternative facilities. This would entail transition of KCP to environmental cleanup under the Office of Environmental Restoration and Waste Management.

The complexity and actual conduct of the D&D activities at closeout sites resulting from nonnuclear consolidation would vary from site to site. The required level of effort to complete D&D of sites would be a function of the types of chemical and radiological materials utilized when the site was operational, and the extent to which radioactive and hazardous/toxic materials have been deposited on the internal and external surfaces of components, systems, and structures. For example, at Mound, DP operations have included recovery and purification of tritium from scrap metals and investigations of chemical explosives, pyrotechnics, plastics, elastomers, and adhesives. At RFP, DP operations have included the manufacture of nuclear weapons components from plutonium, uranium, and beryllium; nuclear manufacturing; and chemical processing for plutonium recovery. At Pinellas, past DP operations involved the use of plutonium as a sealed source, while current operations involved the use of tritium in loading of neutron generator components, and analytical laboratory operations. At KCP, the principal operation performed is the manufacture of nonnuclear components for nuclear weapons; no radioactive materials are machined or processed.

The characterization of the extent and type of contamination, the decontamination and remedial measures required, and the schedule of D&D activities would be identified in the transition

planning process conducted by the DOE Office of Environmental Restoration and Waste Management. The transition process is conducted on a building-by-building basis and involves a range of activities that begins when a specific building is formally declared surplus and ends when responsibility is transferred to EM and the building is ready for final disposition (i.e., decontamination and removal from service or transfer for alternative uses, including those by DOE, other government agencies, or the private sector). The transition of a specific building would be detailed in a Transition Program Management Plan prepared by DOE for each facility. Appropriate site-specific NEPA documentation will be performed for the D&D of any surplus building as a result of implementing alternatives selected for the nonnuclear consolidation proposal. As stated above, the proposal for D&D of specific facilities would require the preparation of appropriate NEPA documentation.

To achieve readiness for decontamination due to closeout of Complex missions at Mound, Pinellas, RFP, or KCP, specific building-level activities would be initiated at each proposed mission closeout site. The sequence of activities includes review and correction of immediate safety issues, initial screening of buildings, and hazard assessments; stabilization of physical and chemical conditions in the building; inventory and disposal of hazardous materials and chemicals; consolidation and removal of classified documents, parts, products, tooling, and materials; safety evaluation and preparation of documentation to substantiate building condition (within the safety envelope); and need for decontamination and disposition. The D&D of equipment and facilities would be performed in accordance with standards and procedures based on DOE orders and other Federal and state laws, regulatory programs, and guidelines. As discussed below, D&D at potential closeout sites may be affected by some or all of these.

RFP was placed on the CERCLA National Priorities List in October 1989. The environmental restoration activities at RFP are implemented by an interagency agreement involving EPA, the State of Colorado, and DOE. The interagency agreement encompasses all activities associated with identifying environmental problems and all measures to be implemented for remediation of those problems that pose a threat to human health and the environment. The activities performed according to the interagency agreement are conducted under the regulatory authority and guidance of CERCLA and RCRA. Regulatory constraints at RFP are more stringent than those at the other proposed closeout sites due to the specific provisions of the Federal Facility Compliance Agreements in place, which require extensive site characterization and regulator approval of all demolition and construction activities. These constraints would impact the duration of D&D activities at RFP by limiting the rate at which particular buildings can be cleaned up and restricting the generation of certain waste types expected to result from the D&D activities until suitable treatment, storage, or disposal facilities are available.

Mound was designated as a CERCLA National Priorities List site in November 1989. A Federal Facilities Agreement between DOE and EPA followed in October 1990. The Statement of Work for the Federal Facilities Agreement requires DOE to characterize Mound in terms of all hazardous substances that potentially pose a threat to human health or the environment. A multi-year program of remedial investigations, feasibility studies, and actual remediation is in progress and will continue pursuant to the regulatory requirements of CERCLA and other applicable regulatory requirements, regardless of defense production activities. Mound also has a Groundwater Protection Management Program that was established pursuant to DOE Order 5400.1. These program and agreement constraints could also impact the duration of D&D activities at Mound.

A RCRA Hazardous and Solid Waste Amendments Permit was issued to Pinellas by EPA in February 1990. A condition of this permit requires site characterization and the remediation of several solid waste management units. D&D activities conducted

at Pinellas would have to conform to the requirements of these activities, which could add additional time and administrative requirements to D&D activities.

In March 1989, DOE entered into a RCRA Section 3008(h) Administrative Order on Consent, requiring that DOE conduct all environmental restoration activities at KCP under RCRA. This requirement is not expected to appreciably affect any D&D activities that would be required at KCP.

4.5 INTERSITE TRANSPORTATION

The proposed transfer of nonnuclear functions would not require transporting significant quantities of hazardous materials, such as chemicals, between DOE sites. Any hazardous materials, except tritium, to be transferred would be transported by commercial carriage in compliance with Department of Transportation (DOT) regulations. Tritium would be transported by authorized government means. The disposal or transfer of other hazardous materials at Mound and Pinellas would be addressed separately in site cleanup and closure plans during mission closeout of these sites.

Reservoir surveillance operations, gas transfer systems, neutron tube target loading, and commercial sales/inertial confinement fusion target loading involve the transportation of tritium and tritium components that have the potential to impact the environment under both normal (incident-free) and accident conditions. Of these activities, reservoir surveillance operations have the greatest potential for impact because they involve transportation of the largest quantities of tritium. Existing tritium reserves for the four functions are allocated approximately as follows: 95 percent for reservoir surveillance operations, 4 percent for commercial sales/inertial confinement fusion target loading, and less than 1 percent for gas transfer systems and neutron tube target loading combined. The quantities of tritium transported in connection with gas transfer systems, neutron tube target loading, and commercial sales/inertial confinement fusion target loading are very small. As such, these activities do not have the inherent potential to cause significant impacts from tritium-related transportation, and these activities do not require further analysis as a result of the Proposed Action. Thus, for both the No Action alternative and the Proposed Action, this section assesses the potential transportation impacts associated with reservoir surveillance operations. The reservoir surveillance operations would be transferred to SRS with the Proposed Action. The assessment consists of three elements: (1) a general discussion of normal (incident-free) and accident impacts associated with tritium transportation; (2) a discussion of tritium-related transportation that would continue with the No Action alternative scenario and would result from the Proposed Action; and, (3) a discussion of the changes in impacts that might result from the Proposed Action as compared to the No Action alternative baseline.

Tritium and tritium-containing components are shipped between Complex sites in compliance with regulations established by the DOT, Nuclear Regulatory Commission (NRC), and DOE orders. Tritium is always shipped in DOT/NRC/DOE-approved packagings that are designed and constructed so that under normal transport conditions, there would be no radioactive releases and no reduction in the effectiveness of the packaging.

Tritium shipments between Complex sites are managed by the DOE Transportation Safeguards System, and are made almost exclusively by air via DOE's contractor, Ross Aviation. A small number of shipments is made by DOE-owned and -operated safe secure trailers. The safe secure trailers are vehicles designed specifically to enhance structural and thermal performance and, in conjunction with internal DOT/NRC/DOE-approved packagings, provide a combined package for the safety and security of the tritium cargo. Shipments by safe secure trailers are accompanied by armed guards and are monitored by a tracking system.

Tritium, a low-energy beta emitter, is shielded by stainless steel in its packaging to prevent detectable radiation outside the packaging. Thus, during normal operations, radiation exposure to personnel involved in tritium-related transportation is negligible. The DOE Albuquerque Field Office is currently finalizing an aviation transport study of the Complex materials and components that is expected to show that the cumulative radiation exposure from tritium-related transportation to Ross Aviation flight crew members is zero (DOE, 1992f). Thus, during normal operations, tritium-related transportation poses no significant risk to transportation workers or the public.

The DOE Albuquerque study is also expected to show that the accident probability for Ross Aviation aircraft is 0.00023 per year. This equates to less than 1 accident in 4,000 years of operation. The annual accident probability is based on data from the last 10 of 19 years that Ross Aviation has logged over 60 million miles and 140,000 flying hours of operating transport aircraft for DOE. Finally, there have been no known deaths or serious injuries to the public or transportation industry personnel as a result of the radioactive nature of tritium involved in an accident.

DOE has evaluated the radiological risk to the public of transporting tritium between Mound and SRS (DOE, 1992g). Specifically, the study evaluated the probability of a tritium release corresponding to one shipment. The analysis assumed that 50,000 curies would be the maximum amount of tritium released in the elemental form for each transportation accident, except in the case of a fire combined with the release, where it was assumed that the entire release would be converted to the oxide form. It was estimated that a 50 percent probability of such a fire exists because of the prevalence of ignition sources, especially for an aircraft accident. In either the elemental form or oxide form, DOE's analysis estimated the probability of an environmental release per shipment to be 5.0×10^{-9}. In other words, there is about 1 chance in 200,000,000 shipments that a release would occur.

The closeout of tritium-related operations at Mound and Pinellas as a result of the Proposed Action would not cause any significant increase in the amount of tritium-related transportation from these sites. These sites are currently reducing their existing tritium inventories in response to future workloads that are expected to require less tritium. Thus, any closeout of tritium resulting from the Proposed Action would not cause any significant change and would be consistent with the No Action alternative.

During normal operations, the potential impacts from tritium-related transportation are negligible and independent of transport miles. Therefore, the transfer of reservoir surveillance operations functions from Mound to SRS as part of the Proposed Action would have no effect on potential impacts.

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives* [Page 1 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Land Resources				
• New construction is limited to interior modification or small additions to existing buildings at KCP, SRS, SNL, and LANL.	• New construction would require 62 acres at Mound. New buildings and parking areas would permanently occupy 32 acres of onsite highly developed and undeveloped land. An additional 30 acres disturbed to support construction activities would be revegetated following construction.	• New construction would require 63 acres at Pinellas. New buildings and parking areas would permanently occupy approximately 21 acres of onsite previously disturbed undeveloped and developed land. An additional 42 acres would be required to support construction activities; however, sufficient onsite land is not available. The potential use of offsite land, project design modification, or other measures to accommodate construction would be identified in the design phase. Impacts to visual resources would occur from new 3- and 5-story high-rise structures.	• New construction would require 72 acres at RFP. New buildings and parking areas would permanently occupy 44 acres of onsite undeveloped land. An additional 28 acres disturbed to support construction activities would be revegetated following construction.	• No impact to land use, recreation, or visual resources at any sites from continued operations.
• Impacts from building renovations, or operations to land use, recreation, or visual resources at KCP, SRS, LANL, and SNL are not expected.	• Impacts from building renovations or operation to land use, recreation, or visual resources at Mound, SNL, and LANL are not expected.	• Impacts to recreation resources at Pinellas are not expected. Impacts from building renovations or operation to land use, recreation, or visual resources at SRS, SNL and LANL are not expected.	• Impacts from building renovations or operation to land use, recreation, or visual resources at RFP, SRS, SNL, and LANL are not expected.	

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TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Air Quality and Acoustics				
• Increases in emissions and air quality impacts from operations and building renovations at KCP, SRS, SNL, and LANL.	• Increases in emissions and air quality impacts from construction or operations would be negligible at all sites.	• Increases in emissions and air quality impacts from construction would be negligible at all sites.	• Increases in emissions and air quality impacts from construction or operations would be negligible at all sites.	• Emissions and air quality impacts from routine building renovations would be negligible at all sites.
• No exceedance of applicable Federal and state ambient air quality standards or guidelines associated with this action.	• No exceedance of applicable Federal and state ambient air quality standards or guidelines associated with this action.	• Except for Pinellas where the 24-hour standard for glycol ethers and nitric acid, and the annual standard for methylene chloride, nickel chloride, and TCE would be exceeded at the site boundary, no exceedance of applicable Federal and state ambient air quality standards or guidelines would be associated with this action. Potential mitigation measures could include substituting solvents or modifying processes.	• No exceedance of applicable Federal and state ambient air quality standards or guidelines would be associated with this action.	• No exceedance of applicable Federal and state ambient air quality standards or guidelines at any site except for Pinellas where nickel chloride, TCE, and methylene chloride exceeded state air quality criteria. Gradual reduction in air emissions in response to reduced workloads.

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TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Air Quality and Acoustics (continued)				
• Closeout of Complex missions at Mound and Pinellas, and Complex nonnuclear missions at RFP would reduce emissions of criteria and hazardous/toxic air pollutants. Emissions of tritium at Mound and Pinellas would be eliminated. Air quality in the vicinity of these plants should improve.	• Closeout of Complex missions at KCP and Pinellas, and Complex nonnuclear missions at RFP would reduce emissions of criteria and hazardous/toxic air pollutants. Emissions of tritium at Pinellas would be eliminated. Air quality in the vicinity of these plants should improve.	• Closeout of Complex missions at KCP and Mound, and Complex nonnuclear missions at RFP would reduce emissions of criteria and hazardous/toxic air pollutants. Emissions of tritium at Mound would be eliminated. Air quality in the vicinity of these plants should improve.	• Closeout of Complex missions at KCP, Mound, and Pinellas would reduce emissions of criteria and hazardous/toxic air pollutants. Emissions of tritium at Mound and Pinellas would be eliminated. Air quality in the vicinity of these plants should improve.	• Local air quality should improve due to reduced emissions of criteria and hazardous/toxic pollutants from lower production levels.
• Traffic-related noise during operation would increase less than 2 dB at KCP and LANL, and less than 1 dB at SRS and SNL.	• Traffic-related noise during operation would increase 6 dB along Mound Road. At LANL, traffic noise levels would increase less than 2 dB; at SNL less than 1 dB.	• Traffic-related noise during operation would increase less than 1 dB along Belcher Road. No increase is expected along Bryan Dairy Road. At LANL, traffic noise levels would increase less than 2 dB; at SRS and SNL less than 1 dB.	• Traffic-related noise during operation would increase less than 2 dB along State Highways 72 and 78, and Indiana Street. At LANL, traffic noise levels would increase less than 2 dB; at SRS and SNL less than 1 dB.	• No increase in noise levels at any site.

E4 3465-3

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 4 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Water Resources				
• At KCP, SRS, and LANL, increases in water usage would be less than 1 percent of current usage. At SNL the increase would be less than 4 percent. Water supplies are adequate to meet demand at all sites.	• Groundwater use at Mound would increase twofold from current use. At LANL, increase in water usage would be less than 1 percent of current usage. At SNL, the increase would be less than 4 percent. Water supplies are adequate to meet demand at all sites.	• Water use at Pinellas would increase seven-fold over current annual water use. Potential restrictions imposed by the Pinellas County Water System could impact operations during drought years. Impact on operations could be offset by using closed loop water reserve systems, using treated water from environmental restoration projects, and other water conservation measures which are planned at Pinellas. At SRS, SNL, and LANL, increases in water usage would be less than 1 percent. Water supplies are adequate to meet demand at all sites.	• Water use at RFP would increase threefold over current annual water use. At SRS, SNL, and LANL, increases in water usage would be less than 1 percent. Water supplies are adequate to meet demand at all sites.	• No increase in water use at any site.

E4 3465-4

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Water Resources (continued)				
• Potential adverse impacts from operations and building renovations at KCP, SRS, SNL, and LANL, to surface water quantities or quality or groundwater quantity or quality are not expected. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	• Potential impacts from erosion and increased nonpoint source drainage during construction and operations could occur to surface water quantities or quality. Erosion control measures such as berms and silt fences would be used during construction. Measures to reduce potential impacts of nonpoint source contaminants could involve collection and/or treatment of stormwater runoff. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	• Potential impacts from erosion and increased nonpoint source drainage during operations are not expected since stormwater runoff is collected in onsite retention ponds. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	• Potential impacts from erosion would be controlled with berms and silt fences. Potential impacts from increased nonpoint source drainage would be controlled by existing onsite runoff-control holding ponds. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	• No increase in degradation of surface water and groundwater quality at any sites. Current groundwater remediation activities would continue. All effluents would meet applicable regulatory permits and standards.
• Water use would decrease due to closeout of Complex missions at Mound and Pinellas, and Complex nonnuclear missions at RFP.	• Water use would decrease due to closeout of Complex missions at KCP and Pinellas, and Complex nonnuclear missions at RFP.	• Water use would decrease due to closeout of Complex missions at KCP and Mound, and Complex nonnuclear missions at RFP.	• Water use would decrease due to closeout of Complex missions at KCP, Mound, and Pinellas.	• Potential decrease in water use at KCP, Mound, Pinellas, and RFP due to reduced production levels.

E4 3465-5

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 6 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Geology and Soils				
• No impacts to geological resources. No impacts to soils at KCP, SRS, SNL, or LANL during building renovations.	• No impacts to geological resources. Potential impacts to soils at Mound from erosion and sediment transport during construction would be controlled by berms, silt fences, and watering.	• No impacts to geological resources. Potential impacts to soils at Pinellas from erosion and sediment transport during construction would be controlled by berms, silt fences, and watering.	• No impacts to geological resources. Potential impacts to soils at RFP from erosion and sediment transport during construction would be controlled by berms, silt fences, and watering.	• No impact.
Biotic Resources				
• No permanent disturbance of any biotic resources is anticipated from building renovations or operation at KCP.	• Approximately 62 acres of natural habitats at Mound would be disturbed by new construction. After construction, 30 acres would be revegetated with native species, resulting in a net habitat loss of 32 acres. This would represent a local reduction of terrestrial habitat within Mound.	• Approximately 63 acres would be affected by construction. Most of the remaining vegetation, approximately 21 acres, at the Pinellas site, consisting of mowed fields with clusters of scattered trees, would be disturbed by new construction. The affected habitat is currently in a highly disturbed condition and not unique.	• Approximately 72 acres of mostly short-grass prairie vegetation would be disturbed by new construction. Following construction, 28 acres would be revegetated with native species, resulting in a net loss of 44 acres of prairie vegetation.	• No impact.
• No adverse impacts to wetlands or threatened and endangered species are expected.	• No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands could occur due to new construction.	• No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands could occur due to new construction.	• No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands could occur due to new construction.	
• No permanent disturbance of any historic resource is anticipated at SRS, SNL, or LANL.	• No permanent disturbance of biotic resources is anticipated at SNL or LANL.	• No permanent disturbance of biotic resources is anticipated at SRS, SNL, or LANL.	• No permanent disturbance of biotic resources is anticipated at SRS, SNL, or LANL.	

E4 3465-6

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 7 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Cultural Resources				
• There would be no disturbance of Native American resources at KCP, SRS, LANL or SNL.	• Impacts to cultural resources with regard to 62-acre ground disturbance at Mound cannot be determined until the absence of Native American resources can be confirmed. There would be no disturbance of prehistoric resources at SNL and LANL.	• Impacts to cultural resources with regard to 63-acre ground disturbance at Pinellas cannot be determined until the absence of Native American resources can be confirmed. There would be no disturbance of prehistoric resources at SRS, SNL, or LANL.	• Impacts to cultural resources with regard to 72-acre ground disturbance at RFP cannot be determined until the absence of Native American resources can be confirmed. There would be no disturbance of prehistoric resources at SRS, SNL, or LANL.	• No impact.
• There would be no effect on prehistoric or historic resources at KCP, SRS, LANL, or SNL.	• There would be no effect on prehistoric or historic resources at Mound, LANL, or SNL.	• There would be no effect on prehistoric or historic resources at Pinellas, SRS, LANL, or SNL.	• There would be no effect on prehistoric or historic resources at RFP, SRS, LANL, or SNL.	• No impact.
Socioeconomics and Community Services				
• Changes to socioeconomics and community services are expected during the renovation and operation phases at KCP, SRS, LANL, and SNL. At KCP - 1,095 Total jobs created - 425 Direct jobs - 670 Indirect jobs - 558 in-migration - population <1-percent increase - housing <1-percent increase	• Changes to socioeconomics and community services are expected during the construction and operation phases at Mound, LANL, and SNL. At Mound - 8,298 Total jobs created - 3,120 Direct jobs - 5,178 Indirect jobs - 4,143 in-migration - population <1 percent increase - housing <1 percent increase	• Changes to socioeconomics and community services are expected during the construction and operation phases at Pinellas, SRS, LANL, and SNL. At Pinellas - 11,559 Total jobs created - 3,995 Direct jobs - 7,564 Indirect jobs - 5,261 in-migration - population <1 percent increase - housing <1 percent increase	• Changes to socioeconomics and community services are expected during the construction and operation phases at RFP, SRS, LANL, and SNL. At RFP - 9,558 Total jobs created - 3,740 Direct jobs - 5,818 Indirect jobs - 5,594 in-migration - population <1 percent increase - housing <1 percent increase	• Socioeconomic changes at all sites. Increases and reductions in staff levels at all sites may cause economic changes in the vicinity of each site. At KCP - 198 Direct jobs lost At Mound - 29 Direct jobs lost At Pinellas - 475 Direct jobs lost At RFP - 156 Direct jobs created

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 8 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At SRS - 103 Total jobs created - 45 Direct jobs - 58 Indirect jobs - 60 in-migration - population <1-percent increase - housing <1-percent increase	At SRS - No change from No Action	At SRS - 45 Direct jobs created	At SRS - 45 Direct jobs created	At SRS - 2,978 Direct jobs lost
At LANL - 294 Total jobs created - 115 Direct jobs - 179 Indirect jobs - 154 in-migration - population <1 percent increase - housing <1 percent increase	At LANL - 50 Direct jobs created	At LANL - 105 Direct jobs created	At LANL - 75 Direct jobs created	At LANL - 150 Direct jobs created
At Y-12 (Option) - 23 Total jobs created - 10 Direct jobs - 13 Indirect jobs - 13 in-migration - population <1-percent increase - housing <1-percent increase	At Y-12 - No change from No Action	At Y-12 - No change from No Action	At Y-12 - No change from No Action	At Y-12 - 214 Direct jobs lost

E4 3465-8

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 9 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At SNL - 940 Total jobs created - 385 Direct jobs created - 555 Indirect jobs created - 515 in-migration - population <1 percent increase - housing <1 percent increase	At SNL - 385 Direct jobs created	At SNL - 0 Direct jobs created	At SNL - 385 Direct jobs created	At SNL - 73 Direct jobs lost
• Benefits to local economies would occur at receiving sites. At most of these sites, including KCP, creation of new jobs would partially offset recent staff reductions.	• Benefits to local economies would occur at receiving sites. At most of these sites, including Mound, creation of new jobs would partially offset recent staff reductions.	• Benefits to local economies would occur at receiving sites. At most of these sites, including Pinellas, creation of new jobs would partially offset recent staff reductions.	• Benefits to local economies would occur at receiving sites. At most of these sites, including RFP, creation of new jobs would partially offset recent staff reductions.	• Additional benefits to local economies would not occur.
• At Mound, Pinellas, and RFP, where Complex missions would be closed out, there would be economic consequences as follows:	• At KCP, Pinellas, and RFP, where Complex missions would be closed out, there would be economic consequences as follows:	• At KCP, Mound, and RFP, where Complex missions would be closed out, there would be economic consequences as follows:	• At KCP, Mound, and Pinellas, where Complex missions would be closed out, there would be economic consequences as follows:	• Socioeconomic changes at all potential Complex mission closeout sites.

E4 3465-9

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 10 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At Mound - 2,846 Total jobs lost - 1,070 Direct jobs - 1,776 Indirect jobs - $93.1M loss in earnings - $119.3M loss in income - Population <1-percent decrease - Out-migration of 1,400 - 600 vacant housing units added	At KCP - 9,800 Total jobs lost - 3,793 Direct jobs - 5,982 Indirect jobs - $345.5M loss in earnings - $429.6M loss in income - Population <1-percent decrease - Out-migration of 5,000 - 1,900 vacant housing units added	At KCP - 9,800 Total jobs lost - 3,793 Direct jobs - 5,982 Indirect jobs - $345.5M loss in earnings - $429.6M loss in income - Population <1-percent decrease - Out-migration of 5,000 - 1,900 vacant housing units added	At KCP - 9,800 Total jobs lost - 3,793 Direct jobs - 5,982 Indirect jobs - $345.5M loss in earnings - $429.6M loss in income - Population <1-percent decrease - Out-migration of 5,000 - 1,900 vacant housing units added	At Mound - 29 Direct jobs lost At KCP - 198 Direct jobs lost
At Pinellas - 3,038 Total jobs lost - 1,050 Direct jobs - 1,988 Indirect jobs - $103.1M loss in earnings - $148.2M loss in income - Population <1-percent decrease - Out-migration of 1,400 - 700 vacant housing units added	At Pinellas - 3,038 Total jobs lost - 1,050 Direct jobs - 1,988 Indirect jobs - $103.1M loss in earnings - $148.2M loss in income - Population <1-percent decrease - Out-migration of 1,400 - 700 vacant housing units added	At Mound - 2,846 Total jobs lost - 1,070 Direct jobs - 1,776 Indirect jobs - $93.1M loss in earnings - $119.3M loss in income - Population <1-percent decrease - Out-migration of 1,400 - 600 vacant housing units added	At Mound - 2,846 Total jobs lost - 1,070 Direct jobs - 1,776 Indirect jobs - $93.1M loss in earnings - $119.3M loss in income - Population <1-percent decrease - Out-migration of 1,400 - 600 vacant housing units added	At Pinellas - 475 Direct jobs lost At Mound - 29 Direct jobs lost

E4 3465-10

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 11 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At RFP - 2,917 Total jobs lost - 750 Direct jobs - 1,167 Indirect jobs - $68.5M loss in earnings - $82.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 400 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At RFP - 2,917 Total jobs lost - 750 Direct jobs - 1,167 Indirect jobs - $68.5M loss in earnings - $82.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 400 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At RFP - 2,917 Total jobs lost - 750 Direct jobs - 1,167 Indirect jobs - $68.5M loss in earnings - $82.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 400 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At Pinellas - 3,038 Total jobs lost - 1,050 Direct jobs - 1,988 Indirect jobs - $103.1M loss in earnings - $148.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 700 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At RFP - 156 Direct jobs created At Pinellas - 475 Direct jobs lost
• Local transportation systems would not be affected.	• Local transportation systems near Mound would be affected. Mound Road between Main Street and Benner Road would deteriorate from free flow conditions to a stable flow condition. Potential mitigation could include staggering work hours, carpooling, or modification of the road segments.	• Local transportation systems near Pinellas would be affected. Bekler and Bryan Dairy Roads would deteriorate from heavy to extreme congestion conditions. Potential mitigation could include staggering work hours, carpooling, or modification of the road segments.	• Local transportation systems near RFP would be affected. Colorado State Route 128 and Indiana Street would deteriorate from stable flow conditions to congested flow conditions. Potential mitigation could include staggering work hours, carpooling, or modification of the road segments.	• No change.

E4 3465-11

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 12 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management				
• Waste management requirements during renovations and operations at all sites would be consistent with current waste management activities.	• No waste management impacts are expected during the construction phase at any site.	• No waste management impacts are expected during the construction phase at any site.	• No waste management impacts are expected during the construction phase at any site.	• At all sites increases in annual waste volumes are not expected. Lower production levels would decrease waste management activities at all sites.
Waste Management (continued)–**Liquid Hazardous Waste**				
• Only small increases in hazardous waste volumes over No Action: - At KCP: 8,132 gal/yr - At SRS: no increase - At SNL: 1,252 gal/yr - At LANL: 7,508 gal/yr - At Y-12: 4,370 gal/yr	• Hazardous waste volumes from operations would increase over No Action: - At Mound: 7,600 gal/yr - At SRS: no increase - At SNL: 1,250 gal/yr - At LANL: 508 gal/yr - At Y-12: no increase	• Hazardous waste volumes from operations would increase over No Action: - At Pinellas: 51,500 gal/yr - At SRS: no increase - At SNL: 2 gal/yr - At LANL: 7,508 gal/yr - At Y-12: no increase	• Hazardous waste volumes from operations would increase over No Action: - At RFP: 43,300 gal/yr - At SRS: no increase - At SNL: 1,252 gal/yr - At LANL: 7,000 gal/yr - At Y-12: no increase	• 1991 hazardous waste volumes from operations: - At KCP: 183,000 gal/yr - At Mound: 19,000 gal/yr - At Pinellas: 49,555 gal/yr - At RFP: 5,005 gal/yr - At SRS: 0 gal/yr - At SNL: 198,450 gal/yr - At LANL: 72,000 gal/yr - At Y-12: 273,670 gal/yr
Waste Management (continued)–**Solid Hazardous Waste**				
• Only small increases in hazardous waste volumes over No Action: - At KCP: 108 ft^3/yr - At SRS: no increase - At SNL: 209 ft^3/yr - At LANL: 305 ft^3/yr - At Y-12: 950 ft^3/yr	• Hazardous waste volumes from operations would increase over No Action: - At Mound: 12,300 ft^3/yr - At SRS: no increase - At SNL: 197 ft^3/yr - At LANL: 100 ft^3/yr - At Y-12: no increase	• Hazardous waste volumes from operations would increase over No Action: - At Pinellas: 12,300 ft^3/yr - At SRS: no increase - At SNL: 12 ft^3/yr - At LANL: 305 ft^3/yr - At Y-12: no increase	• Hazardous waste volumes from operations would increase over No Action: - At RFP: 12,300 ft^3/yr - At SRS: no increase - At SNL: 209 ft^3/yr - At LANL: 205 ft^3/yr - At Y-12: no increase	• 1991 hazardous waste volumes from operations: - At KCP: 46,000 ft^3/yr - At Mound: 2,825 ft^3/yr - At Pinellas: 110 ft^3/yr - At RFP: 1,090 ft^3/yr - At SRS: 3,100 ft^3/yr - At SNL: 4,500 ft^3/yr - At LANL: 11,000 ft^3/yr - At Y-12: 37,295 ft^3/yr

E4 3465-12

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 13 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management (continued)**–Liquid Low-Level Waste**				
• Only small increases in low-level waste volumes over No Action: - At KCP: no increase - At SRS: 0 gal/yr - At SNL: 100 gal/yr - At LANL: 30 gal/yr - At Y-12: 0 gal/yr	• Low-level waste volumes from operations would increase over No Action: - At Mound: no increase - At SRS: no increase - At SNL: 100 gal/yr - At LANL: 30 gal/yr - At Y-12: no increase	• Low-level waste volumes from operations would increase over No Action: - At Pinellas: no increase - At SRS: no increase - At SNL: no increase - At LANL: no increase - At Y-12: no increase	• Low-level waste volumes from operations would increase over No Action: - At RFP: no increase - At SRS: no increase - At SNL: 100 gal/yr - At LANL: 30 gal/yr - At Y-12: no increase	• 1991 low-level waste volumes from operations: - At KCP: <1 gal/yr - At Mound: 0 gal/yr - At Pinellas: 0 gal/yr - At RFP: 1,430 gal/yr - At SRS: 20,092,080 gal/yr - At SNL: 4,160 gal/yr - At LANL:5,787,430 gal/yr - At Y-12: 247,495 gal/yr
Waste Management (continued)**–Solid Low-Level Waste**				
• Only small increases in low-level waste volumes over No Action: - At KCP: no increase - At SRS: 500 ft^3/yr - At SNL: 294 ft^3/yr - At LANL: 200 ft^3/yr - At Y-12: 22 ft^3/yr	• Low-level waste volumes from operations would increase over No Action: - At Mound: no increase - At SRS: no increase - At SNL: 294 ft^3/yr - At LANL: 200 ft^3/yr - At Y-12: no increase	• Low-level waste volumes from operations would increase over No Action: - At Pinellas: no increase - At SRS: no increase - At SNL: no increase - At LANL: no increase - At Y-12: no increase	• Low-level waste volumes from operations would increase over No Action: - At RFP: no increase - At SRS: no increase - At SNL: 294 ft^3/yr - At LANL: 200 ft^3/yr - At Y-12: no increase	• 1991 low-level waste volumes from operations: - At KCP: 15 ft^3/yr - At Mound: 176,678 ft^3/yr - At Pinellas: 2,090 ft^3/yr - At RFP: 38,880 ft^3/yr - At SRS: 763,732 ft^3/yr - At SNL: 2,355 ft^3/yr - At LANL: 203,600 ft^3/yr - At Y-12: 210,230 ft^3/yr

E4 3465-13

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management (continued)–**Liquid Mixed Waste**				
• Only small increases in mixed waste volumes over No Action: - At KCP: no increase - At SRS: no increase - At SNL: 0 gal/yr - At LANL: 0 gal/yr - At Y-12: no increase	• Mixed waste volumes from operations would increase over No Action: - At Mound: no increase - At SRS: no increase - At SNL: 0 gal/yr - At LANL: 0 gal/yr - At Y-12: no increase	• Mixed waste volumes from operations would increase over No Action: - At Pinellas: no increase - At SRS: no increase - At SNL: no increase - At LANL: no increase - At Y-12: no increase	• Mixed waste volumes from operations would increase over No Action: - At RFP: no increase - At SRS: no increase - At SNL: 0 gal/yr - At LANL: 0 gal/yr - At Y-12: no increase	• 1991 mixed waste volumes from operations: - At KCP: 0 ft^3/yr - At Mound: 79 gal/yr - At Pinellas: 0 gal/yr - At RFP: 13,859,700 gal/yr - At SRS: 47,427 gal/yr - At SNL: 480 gal/yr - At LANL: 9,000 gal/yr - At Y-12: 778,190 gal/yr
Waste Management (continued)–**Solid Mixed Waste**				
• Only small increases in mixed waste volumes over No Action: - At KCP: no increase - At SRS: no increase - At SNL: 0.005 ft^3/yr - At LANL: 20 ft^3/yr - At Y-12: no increase	• Mixed waste volumes from operations would increase over No Action: - At Mound: no increase - At SRS: no increase - At SNL: 0.005 ft^3/yr - At LANL: 20 ft^3/yr - At Y-12: no increase	• Mixed waste volumes from operations would increase over No Action: - At Pinellas: no increase - At SRS: no increase - At SNL: no increase - At LANL: no increase - At Y-12: no increase	• Mixed waste volumes from operations would increase over No Action: - At RFP: no increase - At SRS: no increase - At SNL: 0.005 ft^3/yr - At LANL: 20 ft^3/yr - At Y-12: no increase	• 1991 mixed waste volumes from operations: - At KCP: 0 ft^3/yr - At Mound: 4.5 ft^3/yr - At Pinellas: 0 ft^3/yr - At RFP: 19,170 ft^3/yr - At SRS: 1,169 ft^3/yr - At SNL: 115 ft^3/yr - At LANL: 4,000 ft^3/yr - At Y-12: 42,705 ft^3/yr

E4 3465-14

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management (continued)–**Liquid Nonhazardous Waste**				
• Only small increases in mixed waste volumes over No Action: - At KCP: 1.7 MGY - At SRS: 0.3 MGY - At SNL: 3.2 MGY - At LANL: 0.4 MGY - At Y-12: 0.004 MGY	• Liquid nonhazardous waste volumes from operations would increase over No Action: - At Mound: 132 MGY - At SRS: no increase - At SNL: 3.2 MGY - At LANL: 0.1 MGY - At Y-12: no increase	• Liquid nonhazardous waste volumes from operations would increase over No Action: - At Pinellas: 153 MGY - At SRS: 0.3 MGY - At SNL: no increase - At LANL: 0.4 MGY - At Y-12: no increase	• Liquid nonhazardous waste volumes from operations would increase over No Action: - At RFP: 148 MGY - At SRS: 0.3 MGY - At SNL: 3.2 MGY - At LANL: 0.4 MGY - At Y-12: no increase	• 1991 liquid nonhazardous waste volumes from operations: - At KCP: 200 MGY - At Mound: 47.4 MGY - At Pinellas: 65.8 MGY - At RFP: 55.2 MGY - At SRS: 185 MGY - At SNL: 200 MGY - At LANL: 183 MGY - At Y-12: 12.4 MGY
Waste Management (continued)–**Solid Nonhazardous Waste**				
• Only small increases in mixed waste volumes over No Action: - At KCP: 282 ft^3/yr - At SRS: 1,000 ft^3/yr - At SNL: 9,340 ft^3/yr - At LANL: 10,680 ft^3/yr - At Y-12: <1 ft^3/yr	• Solid nonhazardous waste volumes from operations would increase over No Action: - At Mound: 359,000 ft^3/yr - At SRS: no increase - At SNL: 9,300 ft^3/yr - At LANL: 6,680 ft^3/yr - At Y-12: no increase	• Solid nonhazardous waste volumes from operations would increase over No Action: - At Pinellas: 473,000 ft^3/yr - At SRS: 1,000 ft^3/yr - At SNL: 40 ft^3/yr - At LANL: 8,680 ft^3/yr - At Y-12: no increase	• Solid nonhazardous waste volumes from operations would increase over No Action: - At RFP: 430,000 ft^3/yr - At SRS: 1,000 ft^3/yr - At SNL: 9,340 ft^3/yr - At LANL: 6,000 ft^3/yr - At Y-12: no increase	• 1991 solid nonhazardous waste volumes from operations over No Action: - At KCP: 494,935 ft^3/yr - At Mound: 140,130 ft^3/yr - At Pinellas: 3,942 ft^3/yr - At RFP: 268,000 ft^3/yr - At SRS: 753,000 ft^3/yr - At SNL: 800,000 ft^3/yr - At LANL: 302,200 ft^3/yr - At Y-12: 289,110 ft^3/yr

F4 3465-15

TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Human Health				
• No adverse health effects to workers and the public have been identified as a result of relocated activities associated with the Proposed Action at KCP, SRS, or LANL. Activities relocated to SNL would result in cancer risks to workers due to the introduction of small amounts of chemical solvents, but these risks would be within acceptable guidelines. Measures to minimize risks such as substituting less toxic solvents or modifying production processes would be implemented.	• No adverse health effects to workers and the public have been identified as a result of operations activities associated with the Mound alternative at LANL. Activities relocated to Mound and SNL would result in cancer risks to workers but these risks would be within acceptable guidelines. Measures such as substituting less toxic solvents or modifying production processes would be implemented to minimize cancer risks.	• At Pinellas, adverse health effects to workers (cancer risk of 4.2×10^{-5}) and the public (cancer risk of 3.1×10^{-6}) have been identified as a result of operations activities associated with the Pinellas alternative. No adverse health effects to workers and the public have been identified at SRS or LANL with this alternative. Measures such as substituting less toxic solvents or modifying production processes would be required to reduce the cancer risks at Pinellas to within acceptable guidelines.	• At RFP, adverse health effects to workers (cancer risk of 5.3×10^{-4}) and the public (cancer risk of 1.2×10^{-5}) have been identified as a result of operations activities associated with the RFP alternative. Activities relocated to SNL would result in cancer risks to workers but these risks would be within acceptable guidelines. Measures such as substituting less toxic solvents or modifying production processes would be implemented to reduce the cancer risks at RFP and minimize worker cancer risks at SNL.	• At RFP, there are toxic effects of chemicals to workers; and cancer risk to workers (5.3×10^{-4}) and the public (1.2×10^{-5}). At Pinellas, there is a cancer risk to workers of 4×10^{-5} and the public of about 1.5×10^{-6}. At KCP, there is a cancer risk of 1.2×10^{-5} to workers and 4.7×10^{-6} to the public. There are no significant human health effects expected at any of the sites as a result of continuing operations. Waste minimization and solvent reduction and substitution programs are being implemented at all sites to reduce and minimize adverse health effects to workers and the public.
• Radiological doses remain within all applicable regulatory limits.	• Radiological doses remain within all applicable regulatory limits.	• Radiological doses remain within all applicable regulatory limits.	• Radiological doses remain within all applicable regulatory limits.	• The radiological doses at all sites fall within applicable regulatory limits.
• Consequences of potential accidents would not increase appreciably at any site.	• Consequences of potential accidents would not increase appreciably at any site.	• Consequences of potential accidents would not increase appreciably at any site.	• Consequences of potential accidents would not increase appreciably at any site.	• Consequences of potential accidents would not increase at any site.

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TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 17 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Cumulative Impacts				
• No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at KCP, SRS, LANL, or SNL.	• No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at LANL or SNL. Potential for minor cumulative noise impacts at Mound due to operation related traffic noise.	• No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at Pinellas, SRS, LANL, or SNL.	• No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at RFP, SRS, LANL, or SNL.	• No cumulative environmental impacts are expected.
• Minor cumulative air quality impacts at KCP, SRS, LANL, and SNL due to increased emissions from relocated activities.	• Minor cumulative air quality impacts at Mound, LANL, and SNL due to increased emissions from relocated activities.	• Minor cumulative air quality impacts at Pinellas, SRS, LANL, and SNL due to increased emissions from relocated activities.	• Minor cumulative air quality impacts at RFP, SRS, LANL, and SNL due to increased emissions from relocated activities.	• No cumulative air quality impacts are expected.
• Minor beneficial cumulative direct and indirect economic impacts at KCP, SRS, LANL, and SNL due to increased workforce. Minor adverse direct and indirect impacts at Mound, Pinellas, and RFP due to closeout of Complex nonnuclear missions and reduction in workforce.	• Minor beneficial cumulative direct and indirect economic impacts at Mound, LANL, and SNL due to increased workforce. Minor adverse direct and indirect impacts at KCP, Pinellas, and RFP due to closeout of Complex nonnuclear missions and reduction in workforce.	• Minor beneficial cumulative direct and indirect economic impacts at Pinellas, SRS, LANL, and SNL due to increased workforce. Minor adverse direct and indirect impacts at KCP, Mound, and RFP due to closeout of Complex nonnuclear missions and reduction in workforce.	• Minor beneficial cumulative direct and indirect economic impacts at RFP, SRS, LANL, and SNL due to increased workforce. Minor adverse direct and indirect cumulative economic impacts at KCP, Mound, and Pinellas due to closeout of Complex nonnuclear missions and reduction in workforce.	• Reduced workforce numbers due to lower production levels at KCP, Mound, Pinellas, SRS, and SNL. Minor adverse cumulative direct and indirect economic effects would be expected. At RFP and LANL, increased workforce numbers would have minor beneficial cumulative direct and indirect economic effects.

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TABLE 4.3–1.—*Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives*—Continued
[Page 18 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Cumulative Impacts (continued)				
• Cumulative worker health impacts are expected at KCP, SRS, LANL, and SNL due to relocated processes and hazardous materials. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workers' health effects would be implemented at all sites.	• Cumulative worker health impacts would be expected at Mound, LANL, and SNL. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workers' health effects would be implemented at all sites.	• Cumulative worker health impacts would be expected at Pinellas, LANL, and SNL. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workers' health effects would be implemented at all sites.	• Cumulative worker health impacts would be expected at RFP, SRS, LANL, and SNL. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workers' health effects would be implemented at all sites.	• No cumulative workers' health impacts are expected.
• No cumulative environmental effects are expected at Mound, Pinellas, or RFP with the Proposed Action.	• No cumulative environmental effects would be expected at KCP, Pinellas, or RFP with the Mound alternative.	• No cumulative environmental effects would be expected at KCP, Mound, or RFP with the Pinellas alternative.	• No cumulative environmental effects would be expected at KCP, Mound, or Pinellas with the RFP alternative.	

E4 3465-18

CHAPTER 5

CHAPTER 5: ENVIRONMENTAL PERMITS AND REGULATIONS

Chapter Five identifies the major laws, regulations, Executive orders, DOE orders, agreements, and approval requirements that apply to the Proposed Action and alternatives.

Federal environmental regulations have been established to protect the environment and to control the handling, emission, discharge, and disposal of waste substances. At the Federal level, these environmental regulations are promulgated and enforced primarily by the Environmental Protection Agency (EPA). Compliance with these national requirements must be met by all Federal agencies whether they are enforced directly by the Federal Government or delegated to the states. In many cases, these requirements are applied to sources of potential impact through review, approval, and permitting programs that control the release of pollutants or other impacts on the environment.

States can set stricter standards than those required by Federal law. Some of the Federal legislation that delegates permitting or review authority to qualifying states includes: the National Emission Standards for Hazardous Air Pollutants (NESHAP) and the Prevention of Significant Deterioration (PSD) permits under the *Clean Air Act,* as amended (CAA); the Water Quality Standards and the National Pollutant Discharge Elimination System (NPDES) program under the *Clean Water Act* (CWA); the Hazardous Waste Programs under the *Resource Conservation and Recovery Act* (RCRA); and the Drinking Water and Underground Injection Control programs under the *Safe Drinking Water Act* (SDWA). Conversely, the *Toxic Substances Control Act* (TSCA) is administered entirely by the Federal Government.

Except for limited Presidential exemptions, Federal agencies must comply with all provisions of Federal environmental statutes and regulations, as well as all applicable state and local requirements. In addition, Executive orders stress the mandate for Federal facilities to fully comply with environmental requirements and establish procedures for ensuring that this is accomplished. The Department of Energy (DOE) also expresses many of these requirements through DOE orders and regulations.

When a specific site is unable to comply with regulatory standards, needs additional time to achieve compliance, or when the applicability of the actual standard is in doubt, DOE may enter into an agreement with the regulatory agency or agencies. Parties to the agreement normally concur on a time frame, interim standards, and a schedule for reaching full compliance. The agreement then becomes the applicable standard during the agreed-upon time frame.

Table 5-1 presents the Federal legislation applicable to the Proposed Action and other alternatives. This legislation is divided into seven categories: air resources, water resources, waste management, biotic resources, cultural resources, public/worker health, and other. Within each category a law is cited, the responsible agency is named, the permitting requirements are identified, and the "potential applicability" of that particular law is briefly indicated.

Table 5-2 presents the state legislation applicable to the Proposed Action at Kansas City Plant (KCP) in Missouri. Under the Proposed Action, different sites may receive various nonnuclear functions. When a function (e.g., neutron generator) is relocated to a site, a modification to an existing permit or the acquisition of a new permit may be required. In the "potential applicability" column, the permit requirements for each state are discussed. This approach is also used for the other three alternatives in table 5-3.

Table 5-3 presents the state legislation that is applicable to the other alternatives: the Mound alternative (Ohio), the Pinellas alternative (Florida), and the Rocky Flats Plant (RFP) alternative (Colorado).

Each alternative is composed of specific DOE sites that transfer or receive specific nonnuclear functions. In turn, each site must comply with its respective state legislation. This legislation covers air resources, water resources, waste management, and chemical and material storage.

Under each alternative, DOE must comply with the legislation of the respective state in which the specific sites are located.

Each alternative and the states affected by the respective alternative are listed below:

<u>Proposed Action</u>
Missouri
New Mexico
Tennessee
South Carolina

<u>Mound Alternative</u>
Ohio
New Mexico

<u>Pinellas Alternative</u>
Florida
New Mexico
South Carolina

<u>RFP Alternative</u>
Colorado
New Mexico
South Carolina

If the Mound alternative is chosen, the specific sites (and corresponding states) include: Mound (Ohio) and Sandia National Laboratories, New Mexico, and Los Alamos National Laboratory (New Mexico).

If the Pinellas alternative is chosen, the specific sites (and corresponding states) include: Pinellas (Florida); Sandia National Laboratories, New Mexico and Los Alamos National Laboratory (New Mexico); and, the Savannah River Site (South Carolina).

If the RFP alternative is chosen, the specific sites (and corresponding states) include: RFP (Colorado); Sandia National Laboratories, New Mexico and Los Alamos National Laboratory (New Mexico); and, the Savannah River Site (South Carolina).

Table 5-4 presents the environmental agreements currently in force that are applicable to the Proposed Action and other alternatives. The agreements between regulatory agencies and the DOE include Federal Facility Agreements, Federal Facility Compliance Agreements, Settlement Agreements, Agreements in Principle, and Consent Orders. They are divided into three categories: air resources, water resources, and land resources. The table identifies the facility, parties involved and effective date for each agreement plus a brief "scope of agreement" description.

TABLE 5–1.—*Federal Legislation and DOE Orders Applicable to All Alternatives* [Page 1 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Air Resources	Clean Air Act (CAA)	42 USC 7401 et seq.	EPA	Permit	DOE shall comply with all applicable sections of CAA.
	National Ambient Air Quality Standards (NAAQS)	42 USC 7409	EPA	Permit	DOE shall comply with standards regulating chemicals including SO_2, NO_x, CO, PM_{10}, O_3, and Pb.
	Standards of Performance - New Stationary Sources	42 USC 7411	EPA	Permit	DOE shall comply with state-submitted standards governing stationary sources.
	National Emission Standards for Hazardous Air Pollutants (NESHAP)	42 USC 7412	EPA	Permit	DOE shall comply with standards governing hazardous pollutants including radionuclides.
	Prevention of Significant Deterioration (PSD)	42 USC 7470 et seq.	EPA	Permit	DOE will be held accountable for preventing the further deterioration of air quality.
	CAA Amendments of 1990 - State Implementation Plan (SIP)	42 USC 7410	EPA	Permit	DOE shall comply with the relevant requirements from each state's SIP.
Water Resources	Clean Water Act (CWA)	33 USC 1251 et seq.	EPA	Permit	DOE shall comply with all applicable sections of CWA.
	National Pollutant Discharge Elimination System Permit (NPDES)	33 USC 1342	EPA	Permit	DOE shall obtain a new, or modify an existing, NPDES permit if required.
	Storm Water Discharge Permit (section 402 of NPDES)	40 CFR 122.26	EPA	Permit	DOE shall obtain a new, or modify an existing, storm water permit if required.
	Dredge and Fill Activity	33 USC 1344	Corps of Engineers	Permit	DOE shall obtain a new, or modify an existing, dredge/fill permit if required.
	Underground Injection Control Program	40 CFR 144-149	EPA	Permit	DOE shall obtain approval from EPA for any modification to the drinking water supply resulting from underground injection activities.
	Rivers and Harbors Appropriations Act of 1899	33 USC 401 et seq.	EPA	Permit	DOE shall obtain a section 10 permit for work affecting navigable waters.
	Safe Drinking Water Act (SDWA)	42 USC 300 (f) et seq.	EPA	Permit	DOE shall obtain approval from EPA for any modification to the drinking water supply.
	Wild and Scenic Rivers Act	16 USC 1274 et seq.	DOI	Compliance	If applicable, DOE shall not degrade the physical or biological properties of a river designated wild and scenic.
	Executive Order 11988: Floodplain Management	3 CFR, 1977 Comp., p. 117	EPA	Compliance	DOE shall comply with all applicable requirements of the order, as amended.
	Executive Order 11990: Protection of Wetlands	3 CFR, 1977 Comp., p. 121	EPA	Compliance	DOE shall comply with all applicable requirements of the order.
	Compliance with Floodplain/Wetlands Environmental Review Requirements	10 CFR 1022	DOE	Compliance	DOE shall follow implementing procedures.

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TABLE 5–1.—*Federal Legislation and DOE Orders Applicable to All Alternatives*—Continued [Page 2 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Waste Management	Resource Conservation and Recovery Act (RCRA)	42 USC 6901 et seq.	EPA	Permit	DOE shall comply with all applicable sections of RCRA.
	Authorization under subpart C	42 USC 6926	EPA	Part B Permit	DOE shall modify any part B permits if required.
	Subtitle 1 - Underground Storage Tanks (UST)	42 USC 6991 et seq.	EPA	Compliance	DOE shall comply with the design criteria and permit requirements for USTs.
	Comprehensive Environ. Response, Compen., and Liability Act (CERCLA)	42 USC 9601 et seq.	EPA	Permit	DOE shall comply with all applicable sections of CERCLA.
	Executive Order 12580: Superfund Implementation	3 CFR, 1987 Comp., p. 193	EPA	Compliance	DOE shall comply with the National Contingency Plan (NCP) in addition to the other requirements of the order, as amended.
	Hazardous Materials Transportation Act	49 USC 1801 et seq.	DOT	Compliance	DOE shall comply with the requirements governing hazardous materials transportation.
	Toxic Substances Control Act (TSCA)	15 USC 2601-2671	EPA	Compliance	DOE shall comply with all applicable sections of TSCA.
	Hazardous Materials Packaging for Transport-Administrative Procedures	DOE Order 1540.2	DOE	Compliance	DOE shall comply with the order.
	Base Technology for Radioactive Material Transportation Packaging Systems	DOE Order 1540.3	DOE	Compliance	DOE shall comply with the order.
	Hazardous and Radioactive Mixed Waste Program	DOE Order 5400.3	DOE	Compliance	DOE shall comply with the order.
	CERCLA Requirements	DOE Order 5400.4	DOE	Compliance	DOE shall comply with the order.
	NEPA Compliance Program	DOE Order 5440.1E	DOE	Compliance	DOE shall comply with the order.
	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes	DOE Order 5480.3	DOE	Compliance	DOE shall comply with the order.
	Radioactive Waste Management	DOE Order 5820.2A	DOE	Compliance	DOE shall comply with the order.
Biotic Resources	Wild Free-Roaming Horses and Burros Act of 1971	16 USC 1331 et seq.	DOI	Compliance	DOE shall consult with DOI and minimize impact.
	Wilderness Act of 1964	16 USC 1131 et seq.	DOI	Compliance	DOE shall consult with DOI and minimize impact.

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TABLE 5–1.—*Federal Legislation and DOE Orders Applicable to All Alternatives*—Continued [Page 3 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Biotic Resources (continued)	Endangered Species Act	16 USC 1531 et seq.	DOC/DOI	Compliance	DOE shall study the impact on endangered species and comply with the act.
	Migratory Bird Treaty Act	16 USC 703 et seq.	DOI	Compliance	DOE shall consult with DOI and minimize impact.
	Bald and Golden Eagle Protection Act	16 USC 668-668d	DOI	Compliance	DOE shall consult with DOI and minimize impact.
	Fish and Wildlife Coordination Act	16 USC 661 et seq.	FWS	Compliance	DOE shall consult with the U.S. Fish and Wildlife Service and minimize impact.
Cultural Resources	Archaeological Resources Protection Act	16 USC 470aa-470ll	DOI	Compliance	DOE shall obtain authorization for any excavation or removal of archaeological resources.
	Archaeological and Historic Preservation Act	16 USC 469a et seq.	DOI	Compliance	DOE shall obtain authorization for any disturbance of archaeological resources.
	Antiquities Act	16 USC 431-33	DOI	Compliance	DOE shall comply with all applicable sections of the act.
	National Historic Preservation Act of 1966	16 USC 470 et seq.	DOI	Compliance	DOE shall consult with the State Historic Preservation Office (SHPO).
	Executive Order 11593: Protection and Enhancement of the Cultural Environment	3 CFR, 1971-1975 Comp., p. 559	DOI	Compliance	DOE shall aid in the preservation of historic and archaeologic data that may be lost during construction activities pursuant to the order.
	American Indian Religious Freedom Act of 1978	42 USC 1996	DOI	Compliance	DOE shall consult with pertinent Native American groups regarding their inherent rights to religious freedom.
	Native American Graves Protection and Repatriation Act of 1990	25 USC 3001	DOI	Compliance	DOE shall consult with pertinent Native American groups regarding the disposition of human remains and certain objects of cultural patrimony.
Public / Worker Health	Occupational Safety and Health Act	5 USC 5108	OSHA	Compliance	DOE shall comply with all applicable safety and health legislation.
	Occupational Safety and Health Administration (OSHA) Guidelines	29 USC 660	OSHA	Compliance	DOE shall comply with all applicable safety and health legislation.
	Occurrence Reporting and Processing of Operations Information	DOE Order 5000.3A	DOE	Compliance	DOE shall comply with the order.

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TABLE 5–1.—*Federal Legislation and DOE Orders Applicable to All Alternatives*—Continued [Page 4 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Public / Worker Health (continued)	Radiation Protection of the Public and the Environment	DOE Order 5400.5	DOE	Compliance	DOE shall comply with the order.
	Environmental, Safety, and Health Program for DOE Operations	DOE Order 5480.1B	DOE	Compliance	DOE shall comply with the order.
	Environmental Protection, Safety, and Health Protection Standards	DOE Order 5480.4	DOE	Compliance	DOE shall comply with the order.
	Safety of DOE-Owned Nuclear Reactors	DOE Order 5480.6	DOE	Compliance	DOE shall comply with the order.
	Fire Protection	DOE Order 5480.7	DOE	Compliance	DOE shall comply with the order.
	Construction Safety and Health Program	DOE Order 5480.9	DOE	Compliance	DOE shall comply with the order.
	Contractor Industrial Hygiene Program	DOE Order 5480.10	DOE	Compliance	DOE shall comply with the order.
	Radiation Protection for Occupational Workers	DOE Order 5480.11	DOE	Compliance	DOE shall comply with the order.
	Nuclear Safety Analysis Reports	DOE Order 5480.23	DOE	Compliance	DOE shall comply with the order.
	Safety Analysis and Review Systems	DOE Order 5481.1B	DOE	Compliance	DOE shall comply with the order.
	Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities	DOE Order 5483.1A	DOE	Compliance	DOE shall comply with the order.
	Environ. Protection, Safety, and Health Protection Info. Reporting Requirements	DOE Order 5484.1	DOE	Compliance	DOE shall comply with the order.
	Safeguards and Security Program	DOE Order 5630.11	DOE	Compliance	DOE shall comply with the order.
	Safeguards and Security Inspection and Evaluation Program and Assessment Program	DOE Order 5630.12A	DOE	Compliance	DOE shall comply with the order.
	Atomic Energy Act of 1954	42 USC 2011	DOE	Compliance	DOE shall follow its own standards and procedures to ensure the safe operation of its facilities.

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TABLE 5–1.—*Federal Legislation and DOE Orders Applicable to All Alternatives*—Continued [Page 5 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Other	National Environmental Policy Act (NEPA)	42 USC 4321 et seq.	Council on Environmental Quality	Compliance	DOE shall comply with all applicable sections of NEPA.
	National Environmental Policy Act; Implementing Procedures and Guidelines Revocation	57 CFR 15122, April 24, 1992, to be codified at 10 CFR 1021	DOE	Compliance	DOE shall comply with NEPA implementing procedures.
	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	7 USC 136	EPA	Compliance	DOE shall comply with all applicable sections of FIFRA.
	Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA)	42 USC 11001-11050	EPA	Compliance	DOE shall comply with the requirements of the act.
	Executive Order 12088: Federal Compliance with Pollution Control Standards	3 CFR, 1978 Comp., p. 243	EPA	Compliance	DOE shall comply with all relevant Federal pollution control standards pursuant to the order, as amended.
	Noise Control Act of 1972	42 USC 4901 et seq.	EPA	Compliance	DOE shall comply with reducing noise levels that jeopardize the health and safety of the public.
	Uranium Mill Tailings Radiation Control Act	42 USC 7901 et seq.	EPA	Compliance/ Licenses	DOE shall enforce and implement health and environmental standards.
	General Environmental Protection Program	DOE Order 5400.1	DOE	Compliance	DOE shall comply with the order.
	Environmental Compliance Issue Coordination	DOE Order 5400.2A	DOE	Compliance	DOE shall comply with the order.
	Environment, Safety, and Health Appraisal Program	DOE Order 5482.1B	DOE	Compliance	DOE shall comply with the order.
	Emergency Management System	DOE Order 5500.1B	DOE	Compliance	DOE shall comply with the order.
	Planning and Preparedness for Operational Emergencies	DOE Order 5500.3A	DOE	Compliance	DOE shall comply with the order.
	Quality Assurance	DOE Order 5700.6C	DOE	Compliance	DOE shall comply with the order.
	General Design Criteria	DOE Order 6430.1A	DOE	Compliance	DOE shall comply with the order.
	Farmland Protection Policy Act	7 USC 4201 et seq.	Soil Conservation Service	Compliance	DOE shall prevent any adverse effects to prime and unique farmlands.

E4 3713-5

TABLE 5–2.—*State Permit and Notification Requirements–Proposed Action* [Page 1 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Air Resources	Missouri Air Conservation Law	MO Stat., Title 40, Chapter 643	MO Department of Natural Resources	Permit	Required prior to the construction or modification of an air contaminant source.
	Missouri Air Quality Standards	MO Code 10-6.060	MO Department of Natural Resources	Permit	Required prior to the construction or modification of an air contaminant source.
	South Carolina Pollution Control Act	SC Code, Title 48, Chapter 1	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of an air contaminant source.
	New Mexico Air Quality Control Act	NM Stat., Title 74, Article 2	NM Health and Environ. Dept.	Permit	Required prior to the construction or modification of an air contaminant source.
	New Mexico Air Quality Standards and Regulations	NM Air Quality Control Regs., §100	NM Health and Environ. Dept.	Permit	Required prior to the construction or modification of an air contaminant source.
	Tennessee Air Quality Act	TN Code, Title 68, Chapter 25	TN Air Pollution Control Board	Permit	Required prior to the construction or modification of an air contaminant source.
	Tennessee Air Pollution Control Regulations	TN Rules, Division of Air Pollution	TN Air Pollution Control Board	Permit	Required prior to the construction or modification of an air contaminant source.

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TABLE 5–2.—*State Permit and Notification Requirements–Proposed Action*—Continued [Page 2 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Water Resources	Missouri Clean Water Law	MO Stat., Title 40, Chapter 644	MO Department of Natural Resources	Permit	Required prior to the construction or modification of a water discharge source.
	New Mexico Water Quality Act	NM Stat., Title 74, Article 6	NM Water Quality Control Com.	Permit	Required prior to the construction or modification of a water discharge source.
	New Mexico Water Quality Regulations	NM Water Regulations	NM Water Quality Control Com.	Permit	Required prior to the construction or modification of a water discharge source.
	South Carolina Pollution Control Act	SC Code, Title 48, Chapter 1	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of a water discharge source.
	South Carolina Water Quality Standards	SC Code, Chap. 61, Regulation 68	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of a water discharge source.
	Tennessee Water Quality Control Act	TN Code 70-324 et seq.	TN Water Quality Control Board	Permit	Required prior to the construction or modification of a water discharge source.
	Tennessee General Regulations	TN Code, §1200-4-1-.05	TN Water Quality Control Board	Permit	Required prior to the construction or modification of a water discharge source.

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TABLE 5–2.—*State Permit and Notification Requirements–Proposed Action*—Continued [Page 3 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Waste Management	Missouri Solid Waste Law	MO Code, Title 10, Division 80	MO Department of Natural Resources	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	Missouri Hazardous Waste Management Law	MO Code, Title 10, Division 25	MO Department of Natural Resources	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
	New Mexico Solid Waste Act	NM Stat., Chap. 74, Article 8	NM Health and Environ. Dept.	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	New Mexico Solid Waste Management Regulations	NM Solid Waste Mgmt. Regs.	NM Environmental Improvement Div.	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	New Mexico Hazardous Waste Management Regulations	NM Hazardous Waste Mgmt. Regs.	NM Environmental Improvement Div.	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
	South Carolina Solid Waste Regulations	SC Code, Chap. 61, Regulation 60	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	South Carolina Industrial Solid Waste Disposal Site Regulations	SC Code, Chap. 61, Regulation 66	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of a solid waste disposal facility.

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TABLE 5–2.—*State Permit and Notification Requirements–Proposed Action*—Continued [Page 4 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Waste Management (continued)	South Carolina Hazardous Waste Management Act	SC Code, Title 44, Chapter 56	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
	Tennessee Solid Waste Processing and Disposal Regulations	TN Rules, §1200-1-7-.02	TN Division of Solid Waste Mgmt.	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	Tennessee Hazardous Waste Management Act	TN Code, Title 68, §1200-1-11	TN Division of Solid Waste Mgmt.	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	New Mexico Underground Storage Tank Regulations	NM Under-ground Storage Tank Regulations	NM Health and Environ. Dept.	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
	Missouri Underground Storage Tank Act	MO Code, Title 10	MO Department of Natural Resources	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
	South Carolina Underground Storage Tanks Act	SC Code, Title 44, Chapter 2	SC Department of Health and Environ. Control	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
	Tennessee Underground Storage Tank Program Regulations	TN Rules, Chapter 1200-1-15	TN Division of UST Programs	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.

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TABLE 5–3.—*State Permit and Notification Requirements–Alternatives* [Page 1 of 2]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Air Resources	Ohio Air Pollution Control Law	OH Code, Title 37, Chapter 3704	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of an air contaminant source.
Water Resources	Ohio Water Pollution Control Act	OH Code, Title 61, Chapter 6111	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a water discharge source.
	Ohio Water Quality Standards	OH Admin. Code, Title 3745	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a water discharge source.
Waste Management	Ohio Solid Waste Disposal Regulations	OH Admin. Code, Title 3745	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	Ohio Hazardous Waste Management Regulations	OH Admin. Code, Title 3745	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	Ohio Underground Storage Tank Law	OH Admin. Code, Title 37	OH Fire Marshal/Bureau of Underground Storage Tanks	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
Air Resources	Florida Air Pollution Rules	FL Rules/ Regulations, Title 17	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of an air contaminant source.
Water Resources	Florida Air and Water Pollution Control Act	FL Stat., Title 29, Chapter 403	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of a water discharge source.
Waste Management	Florida Solid and Hazardous Waste Management Act	FL Stat., Title 29, Chapter 403	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of a solid/hazardous waste disposal facility.

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TABLE 5–3.—*State Permit and Notification Requirements–Alternatives*—Continued [Page 2 of 2]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Waste Management (continued)	Florida Statewide Multipurpose Hazardous Waste Facility Citing Act	FL Stat., Title 29, Chap. 403	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	Florida Underground Storage Tanks Regulations	FL Rules/ Regulations, Title 17	FL Department of Environ. Regs.	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
Air Resources	Colorado Air Quality Act	CO Stat., Title 25, Article 7	CO Air Quality Control Com.	Permit	Required prior to the construction or modification of an air contaminant source.
Water Resources	Colorado Discharge Permit System Regulations	CO Code, Title 5	CO Water Quality Control Com.	Permit	Required prior to the construction or modification of a water discharge source.
	Colorado Primary Drinking Water Regulations	CO Code, Title 5, Chapter 1003	CO Water Quality Control Com.	Permit	Required prior to the construction or modification of a water discharge source.
Waste Management	Colorado Solid Waste Disposal Sites and Facilities Law	CO Stat., Title 20, Article 20	CO Department of Health	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	Colorado Hazardous Waste Notification and Permit Rules	CO Code, Title 6, Chapter 1007	CO Department of Health	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	Colorado Underground Storage Tanks Law	CO Stat., Title 24, Article 18	CO Department of Waste	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.

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TABLE 5–4.—*DOE Agreements with Federal and State Environmental Regulatory Agencies*

Resource Area	Facility	Parties	Scope of Agreement	Date
Air Resources	Savannah River Site	DOE/EPA	CAA-NESHAP	10/31/91
	Oak Ridge/Y-12	DOE/EPA	CAA-NESHAP	05/26/92
Water Resources	Savannah River Site	DOE/SC	CWA-Thermal discharge limitations	01/03/84, 08/31/87
	Savannah River Site	DOE/SC	CWA-Construction of a wastewater treatment facility	02/27/90, 01/16/91
	Savannah River Site	DOE/SC	CWA-Thermal mitigation of minor discharges	06/05/90
	Savannah River Site	DOE/SC	CWA-Fish kill mitigation	06/05/90
	Savannah River Site	DOE/SC	CWA-NPDES	07/31/91
	Rocky Flats Plant	DOE/EPA	CWA-NPDES	03/25/91
	Los Alamos	DOE/EPA	CWA-NPDES permit violation	08/29/91
Land Resources	Kansas City Plant	DOE/EPA	RCRA-Groundwater cleanup primarily for VOCs and PCBs	06/23/89
	Savannah River Site	DOE/SC	RCRA-Generator requirements	10/06/86
	Savannah River Site	DOE/SC	RCRA-Part A & B application deficiencies; groundwater monitoring	05/01/87, 06/14/89
	Savannah River Site	DOE/SC	RCRA-Part B application deficiencies; groundwater monitoring	11/12/87, 05/10/91
	Savannah River Site	DOE/SC	RCRA-Management of salt-crete drums; 90-day accumulation	02/16/89
	Savannah River Site	DOE/SC	RCRA-Greater than 90-day storage violations	09/05/90
	Savannah River Site	DOE/EPA	RCRA-Land disposal restrictions	03/13/91, 04/24/92
	Savannah River Site	DOE/SC	RCRA-(Solvent rags)	08/26/91
	Savannah River Site	DOE/SC	RCRA	04/13/92
	Savannah River Site	DOE/SC	RCRA	04/29/92
	Oak Ridge/Y-12	DOE/EPA/TN	CERCLA	01/01/92
	Oak Ridge/Y-12	DOE/EPA	RCRA-Land disposal restrictions	06/12/92
	Sandia (New Mexico)	DOE/NM	RCRA-Groundwater monitoring at chemical waste landfill	12/29/89
	Mound Plant	DOE/EPA	CERCLA-RI/FS and RD/RA	08/06/90
	Rocky Flats Plant	DOE/EPA/CO	CERCLA/RCRA-Cleanup permits, closure plans, waste analysis	7/31/86
	Rocky Flats Plant	DOE/CO	RCRA-Part A for mixed waste	07/14/89
	Rocky Flats Plant	DOE/CO	RCRA-Classification of plutonium residues	11/03/89
	Rocky Flats Plant	DOE/EPA	CERCLA-RI/FS and RD/RA	01/22/91
	Rocky Flats Plant	DOE/EPA	RCRA-Land disposal restrictions	05/10/91

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CERCLA Comprehensive Environmental Response, Compensation and Liability Act
PCB polychlorinated biphenyl
RD/RA Remedial Design/Remedial Action
RI/FS Remedial Investigations/Feasibility Studies
VOC volatile organic compounds

REFERENCES

REFERENCES

All references cited in the text can be found in the following list, organized by site. References or regulations that apply to multiple sites are found in the first two sections of this list. The references are organized in this same manner at the 15 designated reading rooms located near cities shown in figure 1.7-1.

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GLOSSARY

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Absorbed dose: The energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest in that material. Expressed in units of rad or grays (Gy), where 1 rad = 0.01 Gy.

Acute standard: A numerical limit on the amount of a particular contaminant that an organism may be exposed to over a short period of time.

Air Quality Control Region: An interstate area designated by the Environmental Protection Agency (EPA) for the attainment and maintenance of National Ambient Air Quality Standards.

Air quality standards: The level of pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.

Alkalinity: Acid-neutralizing capacity of water.

Alluvial deposits: Deposits of earth, sand, gravel, and other materials carried by moving surface water and deposited at points of weak water flow.

Alpha wastes: Wastes containing radioactive isotopes which decay by producing alpha particles.

Ambient air: The surrounding atmosphere, as it exists around people, plants, and structures.

American Indian Religious Freedom Act (AIRFA) (1978): This Act establishes national policy to protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions, including the rights of access to religious sites, use and possession of sacred objects, and the freedom to worship through traditional ceremonies and rites.

Aquatic biota: The sum total of living organisms within any designated aquatic area.

Aquifer: A saturated geologic unit through which significant quantities of water can migrate under natural hydraulic gradients.

Archaeological sites (resources): Any location where humans have prehistorically altered the terrain or discarded artifacts.

Atmospheric dispersion: The process of air emissions being dispersed in the atmosphere. This occurs by the wind that carries the pollutants away from their source and by turbulent air motion that results from solar heating of the earth's surface and air movement over rough terrain and surfaces.

Atomic Energy Act (1946): Created the Atomic Energy Commission (AEC) to supervise nuclear weapons design, development, manufacturing, maintenance, modification, and dismantlement.

Atomic Energy Commission (AEC): A five-member commission, established by the *Atomic Energy Act.* In 1974, the AEC was abolished and some of its functions were transferred to the Energy Research and Development Administration, and was subsequently merged in 1977 with other Federal energy functions into the Department of Energy (DOE).

Attainment area: An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the *Clean Air Act.* An area may be an attainment area for one pollutant and a non-attainment area for others.

Average Daily Traffic (ADT): The total volume of traffic during a given time period, in whole days greater than one day and less than one year, divided by the number of days in that time period.

Baseline: A quantitative expression of conditions, costs, schedule, or technical progress to serve as a base or standard for measurement during the performance of an effort; the established plan against which the status of resources and the progress of a project can be measured. The environmental baseline is the site environmental conditions as they are projected to occur in a specified time period.

Bedroom community: An area, adjacent to a city, where a large number of individuals who work in the city reside.

Beryllium: An extremely lightweight, strong metal used in weapons systems.

Calorimeter: A device used for measurement of thermal constants, such as specific heat, latent heat, or calorific value.

Capable fault: A fault which has had movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years.

Carbon monoxide (CO): A colorless, odorless gas that is toxic if inhaled in high concentration over a period of time.

Carolina bay: Ovate, intermittently flooded depression of a type occurring on the Coastal Plain from New Jersey to Florida.

Chronic standard: A numerical limit on the amount of a particular contaminant that an organism may be exposed to over an extended period of time. The allowable exposure concentration for the chronic standard is less than that of the acute standard.

Clean Air Act Amendments (CAAA) of 1990: Expands the EPA enforcement powers and adds restrictions on air toxics, ozone depleting chemicals, stationary and mobile emissions sources, and emissions implicated in rain and global warming.

Clean Air Act (CAA): Federal law mandating and enforcing air pollutant emissions standards for stationary sources and motor vehicles.

Clean room: An uncontaminated room with filtered air that meets a specific level of cleanliness in which work is performed or in which uncontaminated equipment and materials are stored.

Clean Water Act (CWA) (1972, 1987): This law makes it illegal to discharge pollutants from a point source into navigable waters of the U.S. except in compliance with a National Pollution Discharge Elimination System (NPDES) permit.

Code of Federal Regulations (CFR): All Federal Regulations in force are published in codified form in the Code of Federal Regulations.

Committed dose equivalent: The predicted total dose equivalent to a tissue or organ over a 50-year period after an intake of radionuclide into the body. It does not include external dose contributions. Committed dose equivalent is expressed in units of rem (or Sv).

Committed effective dose equivalent: The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is expressed in units of rem (or Sv).

Community (biotic): All plants and animals occupying a specific area under relatively similar conditions.

Complex: The U.S. Nuclear Weapons Complex which is a set of Federal sites and government owned/contractor operated facilities administered by the DOE.

Complex 21: The reconfigured nuclear weapons complex to be fully operational early in the 21st century that will sustain the nation's nuclear deterrent until the middle of that century.

Comprehensive Environmental Response Compensation and Liability Act (CERCLA or Superfund): A statutory framework for remediation of past contamination from hazardous waste.

Concentration: The quantity of a substance in a unit of sample media (e.g., milligrams per liter, or micrograms per kilogram).

Confined aquifer: A permeable geological unit with an upper boundary that is at a pressure higher than atmospheric pressure.

Consumptive water use: The difference in the volume of water withdrawn from a body of water and the amount released back into the body of water.

Container: The metal envelope in the waste package that provides the primary containment function of the waste package and is designed to meet the containment requirements of 10 CFR Part 60.

Contrast: The effect of a striking difference in form, line, color, or texture of a landscape's features.

Criteria pollutants: Six air pollutants for which national ambient air quality standards are established by EPA: sulfur dioxide, nitric oxides, carbon monoxide, ozone, particulate matter (smaller than 10 microns in diameter or PM_{-10}), and lead.

Cultural chronology: The science of arranging time in periods and ascertaining the dates and historical order of past events.

Cultural resources: Archaeological sites, architectural features, traditional use areas, and Native American sacred sites.

Cumulative impact: An impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what organization or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time and may be direct or indirect.

Day-Night Average Level (DNL): The average noise level in dBA over a 24-hour period with a 10dB adjustment for events occurring during the night (10 p.m. to 7 a.m.), and ignoring an evening-hour adjustment.

Decibel (dB): A unit of sound measurement. In general, a sound doubles in loudness for every increase of 10 decibels.

Decibel, A-weighted (dBA): A unit of weighted sound pressure level, measured by the use of a metering characteristic and the "A" weighting specified by the American National Standard Institute (ANSI) S1.4-1971(R176).

Decommissioning: Removing facilities contaminated with radiation (such as processing plants, waste tanks, and burial grounds) from service and reducing or stabilizing radioactive contamination. Decommissioning includes the following concepts: (1) decontamination, dismantling, and return of an area to its original condition without restrictions on use or occupancy, and (2) partial decontamination, isolation of remaining residues, and continued surveillance and restrictions on use or occupancy.

Decontamination: The removal of radioactive or chemical contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.

Depleted uranium: Uranium whose content of the isotope U-235 is less than 0.7 percent, which is the U-235 content of naturally occurring uranium.

Derived concentration guide: The concentration of a radionuclide in air or water which, under conditions of continuous exposure by one exposure mode (i.e., ingestion of water or submersion or inhalation of air), for one year, a "Reference Man"

would receive the most restrictive of: (1) an effective dose equivalent or 100 mrem, or (2) a dose equivalent of 5 rem to any tissues, including skin and lens of the eye.

Design Laboratory: DOE facilities involved in the design of nuclear weapons.

Direct economic effects: The initial increases in output from different sectors of the economy resulting from some new activity within a predefined geographic region.

Disposition: The ultimate "fate" or end use of a surplus DOE facility following the transfer of the facility to the Office of Environmental Restoration and Waste Management (EM).

Dose equivalent: The product of absorbed dose in rad (or Gy) in tissue (quality factor.) Dose equivalent is expressed in units of rem or Sievert (Sv), where 1 rem = 0.01 Sv. The dose equivalent to an organ, tissue, or the whole body will be that received from the direct exposure plus the 50-year committed dose equivalent received from the radionuclides taken into the body during the year.

Drainage basin: An above-ground area that supplies the water to a particular creek or stream.

Drawdown: The height difference between the natural water level in a formation and the reduced water level in the formation caused by the withdrawal of groundwater.

Drinking-water standards: The prescribed level of constituents or characteristics in a drinking water supply that cannot be exceeded legally.

Effective dose equivalent: The summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor. This sum is a risk-equivalent value and can be used to estimate the health effects risk of the exposed individual. The tissue-specific weighting factor represents the fraction of the total health risk resulting from uniform whole-body irradiation that would be contributed by that particular tissue. The effective dose equivalent includes the committed effective dose equivalent from internal deposition of radionuclides, and the effective dose equivalent due to penetrating radiation from sources external to the body. Effective dose equivalent is expressed in units of rem (or Sv).

Effluent: A gas or fluid discharged into the environment.

Emission standards: Legally enforceable limits on the quantities and kinds of air contaminants that can be emitted into the atmosphere.

Endangered Species Act: Established in 1973, this act requires Federal agencies, with the consultation and assistance of the Secretaries of the Interior and Commerce, to insure that their actions will not likely jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of such species.

Endangered species: Animals, birds, fish, plants, or other living organisms threatened with extinction by man-made or natural changes in their environment. Requirements for declaring species endangered are contained in the *Endangered Species Act.*

Environment, Safety, and Health Program (ES&H): In the context of DOE, this program encompasses those DOE requirements, activities, and functions in the conduct of all DOE and DOE-controlled operations that are concerned with impacts to the biosphere; compliance with environmental laws, regulations, and standards controlling air, water, and soil pollution; limiting the risks to the well-being of both operating personnel and the general public to acceptably low levels; and protecting property adequately against accidental loss and damage. Typical activities and functions related to this program include, but are not limited to, environmental protection, occupational safety, fire protection, industrial hygiene,

health physics, occupational medicine, and process and facilities safety.

Environmental Assessment (EA): A written environmental analysis which is prepared pursuant to the *National Environmental Policy Act* (NEPA) to determine whether a Federal action would significantly affect the environment and thus require preparation of a more detailed Environmental Impact Statement (EIS). If the action does not significantly affect the environment, then a finding of no significant impact (FONSI) is prepared.

Environmental audit: A documented assessment of a facility to monitor the progress of necessary corrective actions, to ensure compliance with environmental laws and regulations, and to evaluate field organization practices and procedures.

Environmental documentation: Documents describing information and results from studies and evaluations required by NEPA. This documentation includes both an EA and EIS.

Environmental Impact Statement (EIS): A document required of Federal agencies by NEPA for major proposals or legislation significantly affecting the environment. A tool for decision making, it describes the positive and negative effects of the undertaking and alternative actions.

Equivalent sound (pressure) level (L_{eq}): The equivalent steady sound level that, if continuous during a specified time period, would contain the same total energy as the actual time-varying sound. For example, L_{eq} (1-hr) and L_{eq} (24-hr) are the 1-hour and 24-hour equivalent sound levels, respectively.

Exceedance: Violation of environmental protection standards by exceeding allowable limits or concentration levels.

Finding of No Significant Impact (FONSI): A document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and will not require an EIS.

Floodplain: The lowlands adjoining inland and coastal waters and relatively flat areas including at a minimum that area inundated by a 1 percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500-year (0.2 percent) floodplain (Source: 10 CFR Part 1022.4(i)).

Gaussian plume: The distribution of material (a plume) in the atmosphere resulting from the release of emissions from a stack or other source. The distribution of concentrations about the centerline of the plume, which is assumed to decrease as a function of its distance from the source and centerline (Gaussian distribution), depends on the mean wind speed and atmospheric stability.

General public: Individuals who are normally at and beyond the DOE facility boundary; includes individuals who are on DOE facility open-access ways (roads, rivers, creeks, railways, etc.).

Glass melter: A development refractory chamber containing molten glass over which the waste is burned.

Glove box: An airtight box used to work with hazardous material, vented to a closed filtering system, having gloves attached inside of the box to protect the worker.

Groundwater: The supply of fresh water found beneath the Earth's surface, usually in aquifers, which may supply wells and springs.

Guideline level: A suggested, desired level of concentration. It is not a regulatory value, but is a value offered as desirable by an agency to protect human health or the environment.

Hazardous material: A substance or material, including a hazardous substance, which poses a risk

to health, safety, and property when transported or handled.

Hazardous/toxic waste: Any solid waste (can also be semisolid or liquid, or contain gaseous material) having the characteristics of ignitability, corrosivity, toxicity, or reactivity, defined by the *Resource Conservation and Recovery Act* (RCRA) and identified or listed in 40 CFR 261 or by the *Toxic Substances Control Act* (TSCA).

Heavy metals: Metallic or semimetallic elements of high molecular weight, such as mercury, chromium, cadmium, lead, and arsenic, that are toxic to plants and animals at known concentrations.

HEPA Filter: A filter used to remove particulates from dry gaseous effluent streams.

High-level waste: The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid. High-level waste contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation.

Highly-enriched uranium: Uranium in which the abundance of the isotope U-235 is increased well above normal (naturally occurring) levels.

Historic resources: Archaeological sites, architectural structures, and objects produced after the advent of written history dating to the time of the first Euro-American contact in an area.

Honeycomb: A structural configuration of material that allows for an increase in strength without a significant increase in weight.

Inertial confinement fusion: A laser initiated nuclear fusion using the inertial properties of the reactants as a confinement mechanism.

In-migration: The relocating of persons to a defined geographic area as a result of the proposed program, usually calculated on an annual basis.

Interim (Permit) Status: Period during which treatment, storage, and disposal facilities coming under RCRA in 1980 are temporarily permitted to operate while awaiting denial or issuance of a permanent permit. Permits issued under these circumstances are usually called "Part A" or "Part B" permits.

Isotope: An atom of a chemical element with specific atomic number and atomic mass. Isotopes of the same element have the same number of protons but different numbers of neutrons and different atomic masses.

Lab packs: Small containers that contain laboratory hazardous wastes such as chemical bottles, rags, wipes, etc. These lab packs are placed in over-packed drums.

Lacustrine: Found or formed in lakes; also, a type of wetland situated on or near a lake.

Level of service (LOS): A qualitative measure describing operating conditions within a traffic stream as perceived by motorists and/or passengers.

Lithic scatter: An archaeological site consisting only of stone artifacts (incomplete and complete tools).

Low-level waste (LLW): Waste that contains radioactivity but is not classified as high-level waste, transuranic waste, spent nuclear fuel, or "11e(2) by-product material" as defined by DOE Order 5820.2A. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic waste is less than 100 nCi/g. Some LLW is considered classified because of the nature of the generating process and/or

constituents, as the waste would tell too much about the process.

Maximum Contaminant Level: The maximum permissible level of a contaminant in water delivered to any user of a public water system. MCLs are enforceable standards.

Milliwatt generator heat source surveillance (MGHS): The heat source, encapsulated plutonium-238 used in an Radioisotopic Thermoelectric Generator (RTG).

Mixed Waste: Waste that contains both hazardous and radioactive waste.

Modified Mercalli Intensity (MMI): A level on the Modified Mercalli scale. A measure of the perceived intensity of earthquake ground shaking with 12 divisions, from I (not felt by people) to XII (damage nearly total).

Nano: Prefix indicating one thousandth of a micro unit; one billionth; 1 nanocurie=10^{-9} curie.

National Ambient Air Quality Standards (NAAQS): Air quality standards established by the *Clean Air Act*. The primary NAAQS are intended to protect the public health with an adequate margin of safety, and the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Emission Standards for Hazardous Air Pollutants (NESHAP): A set of national emission standards for listed hazardous pollutants emitted from specific classes or categories of new and existing sources. These were introduced in the *Clean Air Act Amendments* of 1977.

National Environmental Policy Act (NEPA) (1969): The basic national charter for the protection of the environment. It requires the preparation of an EIS for every major Federal action that may significantly affect the quality of the human or natural environment. Its main purpose is to provide environmental information to decision makers so that their actions are based on an understanding of the potential environmental consequences of a proposed action and its reasonable alternatives.

National Environmental Research Parks (NERP): Outdoor laboratories set aside for research to study the environmental impacts of energy developments. The parks were established under DOE to provide protected land areas for research and education in the environmental sciences and to demonstrate the environmental compatibility of energy technology development and use.

National Historic Preservation Act (NHPA) 1966, as amended: This law provides that property resources with significant national historic value be placed on the National Register of Historic Places. It does not require any permits but, pursuant to Federal code, if a proposed action might impact an historic property resource, consultation with the proper agencies is required.

National Pollutant Discharge Elimination System (NPDES) Federal permitting system required for hazardous effluents regulated through the *Clean Water Act* (CWA).

National Register of Historic Places (NRHP): A list maintained by the National Park Service of architectural, historical, archaeological, and cultural sites of local, state, or national significance. The list is expanded as authorized by Section 2(b) of the *Historic Sites Act of 1935* (16 U.S.C. 462) and Section 101(a)(1)(A) of the NHPA.

Nitric acid (HNO_3): The acid used to dissolve nuclear fuel rods so that the fissionable elements can be extracted.

Nitrogen dioxide (NO_2): A major component of photochemical smog. When nitrogen dioxide combines with volatile organic compounds, such as ammonia or carbon monoxide, ozone is produced.

Noise Control Act (1972): This law directs all Federal agencies to carry out programs in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health or welfare.

Nonattainment Area: An air quality control region (or portion thereof) in which the U.S. Environmental Protection Agency has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.

Nonnuclear production: Production operations for components of nuclear weapons that are not fabricated from plutonium, uranium, or other special nuclear materials. Raw material stock may include beryllium.

Notification level: A term used only in NPDES permitting. Discharges are permitted under NPDES for particular parameters; however, when parameters that have not been permitted appear in excess of a predetermined concentration (i.e., 100 μg/L), the discharger is required by his NPDES permit to notify the permitter (EPA) that a new parameter has appeared. Violations of NPDES concentration limits are usually called "noncompliances."

NO_X: Refers to the oxides of nitrogen, primarily NO and NO_2. These are produced in the combustion of fossil fuels and can constitute an air pollution problem.

Nuclear facility: A facility whose operations involve radioactive materials in such form and quantity that a nuclear hazard potentially exists to the employees or the general public. Included are facilities that: produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium; conduct separations operations; conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations; or, conduct fuel enrichment operations. Incidental use of radioactive materials in a facility operation (e.g., check sources, radioactive sources, and X-ray machines) does not necessarily require a facility to be included in this definition.

Nuclear material: Composite term applied to: (1) special nuclear material; (2) source material such as uranium or thorium or ores containing uranium or thorium; and, (3) by-product material, which is any radioactive material that is made radioactive by exposure to the radiation incident to the process of producing or using special nuclear material.

Nuclear production: Production operations for components of nuclear weapons that are fabricated from nuclear materials, including plutonium and uranium.

Nuclear reactor: A device in which a fission chain reaction is maintained, and which is used for irradiation of materials or heat for the generation of electricity.

Nuclide: A species of atom characterized by the constitution of its nucleus and hence by the number of protons, the number of neutrons, and the energy content.

Occupational Safety and Health Administration (OSHA): Oversees and regulates workplace health and safety, created by the *Occupational Safety and Health Act* (1970).

Outfall: The discharge point of a drain, sewer, or pipe as it empties into a body of water.

Ozonation process: A water treatment process in which ozone is employed as a disinfectant.

Ozone (O_3): The triatomic form of oxygen; in the stratosphere, ozone protects the Earth from the sun's ultraviolet rays, but in lower levels of the atmosphere, ozone is considered an air pollutant.

Paleoindian: American hunting and gathering peoples existing in the late Pleistocene and later who hunted large game animals.

Palustrine: Found or formed in marshes; also, a type of wetland situated in or near a marsh.

Peak Hour Volume (PHV): The maximum volume of vehicles in an hour long period passing a point during a given day, often estimated to be 10 percent of total ADT.

pH: A measure of the hydrogen ion concentration in an aqueous solution; specifically, the negative logarithm of the hydrogen ion concentration. Acidic solutions have a pH from 0 to 7; basic solutions have a pH greater than 7.

Pits: An assembly at the center of a nuclear device containing a sub-critical mass of fissionable material.

Plume: The elongated pattern of contaminated air or water originating at a point-source, such as a smokestack or a hazardous waste disposal site.

Plutonium: A heavy, radioactive, metallic element with the atomic number 94. It is produced artificially in a reactor by bombardment of uranium and is used in the production of nuclear weapons.

Population (biological term): All the members of a given species that live at a given time in a particular area.

Potentiometric surface: An imaginary surface defined by the level that water will rise to in a tightly-cased well.

Prevention of Significant Deterioration (PSD): Regulations established by the 1977 *Clean Air Act Amendments* to limit increases in criteria air pollutant concentrations above baseline.

Prime farmland: Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oil-seed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor without intolerable soil erosion, as determined by the Secretary of Agriculture (*Farmland Protection Policy Act*, 7 CFR 7, paragraph 658).

Protected area: An area encompassed by physical barriers, subject to access controls, surrounding material access areas, and meeting the standards of DOE order 5632.2A.

Protohistoric: Of or relating to times just preceding recorded history.

Quality factor: The principal modifying factor that is employed to derive dose equivalent from absorbed dose.

Radioisotopic Thermoelectric Generators (RTG): An electric generator using a thermocouple with the decaying heat of encapsulated plutonium-238 as its heat source.

Radioactive waste: Materials from nuclear operations that are radioactive or are contaminated with radioactive materials, for which use, reuse, or recovery are impractical.

Radionuclide: A radioactive element characterized according to its atomic mass and atomic number which can be man-made or naturally occurring. Radioisotopes can have a long life as soil or water pollutants, and are believed to have potentially mutagenic effects on the human body.

Receiving waters: Rivers, lakes, oceans, or other bodies of water into which wastewaters are discharged.

Rem: The unit of radiation dose for biological absorption: equal to the product of the absorbed dose in rads, a quality factor, and a distribution factor.

Residual noise level: The residual level represents a low-level value to which the ambient environmental noise level frequently drops, but seldom goes below.

Resource Conservation and Recovery Act (RCRA): A "cradle to grave" regulatory program for hazardous waste which established, among other things, a system for managing hazardous waste from its generation until its ultimate disposal.

Retort: A container in which substances are distilled or decomposed by heat.

Riparian wetlands: Wetlands on or around rivers and streams.

Risk assessment: The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific pollutants.

Safe Drinking Water Act (SDWA): This law protects the quality of public water supplies, water supply and distribution systems, and all sources of drinking water.

Safety Analysis Report (SAR): A safety document providing a concise but complete description and safety evaluation of a site, design, normal and emergency operation, potential accidents, predicted consequences of such accidents, and the means proposed to prevent such accidents or mitigate their consequences. A safety analysis report is designated as final when it is based on final design information. Otherwise, it is designated as preliminary.

Saltcrete: A solidified mixture of salt residue from the evaporation process at a liquid waste treatment facility and Portland Cement.

Saltstone: A low-permeability (less than 10^{-7} centimeter per second) mixture of cement/flyash/slag or lime/flyash/slag used to immobilize low-level radioactive or mixed wastes for disposal.

Sanitary wastes: Any waste, liquid or solid (includes sludge), which is neither a RCRA-regulated waste, a TSCA-regulated waste, nor radioactive.

Scintillation: Minute flash caused when alpha, beta, or gamma rays strike certain phosphors.

Secondary system: The system that circulates a coolant (water) through a heat exchanger to remove heat from the primary system; also called the cooling water or light-water system.

Sedimentation: The settling out of soil and mineral solids from suspension in water.

Seepage basin: An unlined excavation in the ground that receives aqueous effluent.

Seismic zone: An area defined by the U.S. Uniform Building Code (1991), designating the amount of damage to be expected as the result of earthquakes. The U.S. is divided into six zones: (1) Zone 0 - no damage; (2) Zone 1 - minor damage; corresponds to intensities V and VI of the MMI scale; (3) Zone 2A - moderate damage; corresponds to intensity VII of the MMI scale (eastern U.S.); (4) Zone 2B - slightly more damage than 2A (western U.S.); (5) Zone 3 - major damage; corresponds to intensity VII and higher of the MMI scale; (6) Zone 4 - areas within Zone 3 determined by proximity to certain major fault systems.

Seismic: Pertaining to any earth vibration, especially an earthquake.

Shrink-swell potential: Refers to the potential for soils to contract while drying and expand after wetting.

Silica: Silicon dioxide, a common mineral that occurs naturally as quartz.

Sinter: To coalesce into a single mass under the influence of heat, without actually liquefying.

Special nuclear materials: Plutonium, uranium enriched in the isotope 233 or 235, and any other material that DOE, pursuant to the provisions of Section 51 of the *Atomic Energy Act of 1954*, determines to be special nuclear material.

Sulfur dioxide (SO_2): A heavy pungent, colorless gas (formed in the combustion of coal), which is considered a major air pollutant.

Surface water: Water on the earth's surface, as distinguished from water in the ground (groundwater).

Surplus: Any equipment, facility, building, or site that has no identified or planned programmatic use as determined by the program secretarial office currently administering the program.

System: A collection of interdependent equipment and procedures assembled and integrated to perform a well-defined purpose. It is an assembly of procedures, processes, methods, routines, or techniques united by some form of regulated interaction to form an organized whole.

Threatened species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Threshold limit values (TLV): The recommended concentrations of airborne contaminants workers may be exposed to according to the American Council of Governmental Industrial Hygienists.

Tiger Team: A team set up by the Secretary of Energy to assess the environment, safety, and health operations at all DOE facilities to determine whether changes were needed to improve the protection of the environment, safety, and health.

Transition: The range of activities that begins when a building is formally declared surplus to its production mission and ends when responsibility is formally transferred to the Office of Environmental Restoration and Waste Management and is ready for final disposition.

Transuranic (TRU) waste: Waste contaminated with alpha-emitting radionuclides with half-lives greater than 20 years and concentrations greater than 100 nanocuries/gram at time of assay. It is not a mixed waste.

Trim: Machine cutting fluids used to cool parts that are being milled.

Tritium: A radioactive isotope of the element hydrogen with two neutrons and one proton. Common symbols for the isotope are H^3 and T.

Unconsolidated: Loosely arranged or uncemented sediment.

Uranium: A heavy (atomic mass = 238.03), silvery-white metal with 14 radioactive isotopes. Uranium-235 is most commonly used as a fuel for nuclear fission. Another isotope, uranium-238, is transformed into fissionable plutonium-239 following its capture of a neutron in a nuclear reactor.

Viewshed: The extent of the area that may be viewed from a particular location. Viewsheds are generally bounded by topographic features such as hills or mountains.

Visual Resource Management (VRM) Classes: These classes define the different degrees of modification allowed to the basic elements of landscape. They are Class 1–applied to wilderness areas, wild and scenic rivers, and other similar situations; Class 2–contrasts are seen but do not attract attention; Class 3–contrasts caused by a cultural activity are evident, but remain subordinate to the existing landscape; Class 4–contrasts that attract attention and are dominant features of the landscape in terms of scale, but repeat the contrast of the characteristic landscape; Class 5–applied to areas where unacceptable cultural modification has lowered scenic quality, (where the natural character of the landscape has been disturbed to a point where rehabilitation is needed to bring it up to one of the four other classifications).

Vitrification: A waste treatment process that uses glass (e.g., borosilicate glass) to encapsulate or

immobilize radioactive wastes to prevent them from reacting in disposal sites.

Volatile organic compounds (VOC): A broad range of organic compounds, often halogenated, that vaporize at ambient or relatively low temperatures, such as benzene, chloroform, and methyl alcohol.

Water quality standard and criteria: Concentration limit of constituents or characteristics allowed in water; often based on water use classifications (e.g., drinking water, recreation use, propagation of fish and aquatic life, and agricultural and industrial use). Water quality standards are legally enforceable: water quality criteria are non-enforceable recommendations based on biotic impacts.

Weighting factor: Represents the fraction of the total health risk resulting from uniform whole-body irradiation that could be contributed to that particular tissue.

Well injection: Process in which liquids are injected into an underlying geologic formation through wells.

Wetland: Land or areas exhibiting hydric soil conditions, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions.

Woodland Period: A stage of prehistoric cultural development, recognized throughout North America, primarily characterized by horticultural economies in most regions. The material remains are usually recognized by the presence of ceramics, and the construction of earthworks and burial mounds. Specific characteristics and dates of the Woodland Period vary from one region to another.

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Y-12 Plant

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GLOSSARY

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Nuclear Weapons Complex Reconfiguration Program

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ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

ADT	average daily traffic
AQCR	Air Quality Control Region
BEIR	Biological Effects of Ionizing Radiation
CAA	Clean Air Act, as amended
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
EA	Environmental Assessment
EPA	Environmental Protection Agency
HAP	hazardous air pollutants
HE	high explosive
HEPA	high efficiency particulate air
IDLH	Immediate Danger to Life and Health
ISCST	Industrial Source Complex Short Term
KAFB	Kirtland Air Force Base, Albuquerque, NM
KCP	Kansas City Plant
L_{eq}	equivalent sound level
LANL	Los Alamos National Laboratory
LLW	low-level waste
LOS	level of service
Mound	Mound Plant
NAAQS	National Ambient Air Quality Standards
NCP	Nonnuclear Consolidation Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NTS	Nevada Test Site
NWS	National Weather Service
OEL	occupational exposure limit
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PHV	peak hour volume
Pinellas	Pinellas Plant
PSD	Prevention of Significant Deterioration
RAPCA	Regional Air Pollution Control Agency
RCRA	Resource Conservation and Recovery Act, as amended
RfC	reference concentration
Rfd	reference dose
RFP	Rocky Flats Plant
ROI	region-of-influence
SARA	Superfund Amendment and Reauthorization Act

SNL	Sandia National Laboratories, New Mexico
SRS	Savannah River Site
TLV	threshold limit value
TSCA	Toxic Substances Control Act, as amended
TSP	total suspended particulates
TWA	time-weighted average
Y-12	Y-12 Plant, Oak Ridge Reservation

CHEMICALS AND UNITS OF MEASURE

CCl_4	carbon tetrachloride
CO	carbon monoxide
dB	decibel
dBA	decibel A-weighted
ft^2	square feet
ft^3	cubic feet
ft^3/s	cubic feet per second
gal	gallon
GPD	gallons per day
GPY	gallons per year
HMX	cyclotetramethylenetetranitramine, or 1,3,5,7-tetranitro-1,3,5,7-tetrazocine
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meters
MGD	million gallons per day
MGY	million gallons per year
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
O_3	ozone
Pb	lead
PCB	polychlorinated biphenyl
PETN	pentaerythritoltetranitrate
PM_{10}	particulate matter of aerodynamic diameter (diameter less than 10 micrometers)
ppb	parts per billion
SO_2	sulfur dioxide
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
VOC	volatile organic compounds
yd^3	cubic yards
yr	year
μg	microgram (one-millionth of a gram)
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
μm	micron (one-millionth of a meter)

APPENDIX A

APPENDIX A: CURRENT OPERATIONS

This appendix contains more detailed descriptions of the nonnuclear manufacturing activities currently located at existing facilities which might be consolidated. It also contains backup data concerning waste management operations at these facilities. The Kansas City Plant (KCP) is discussed in section A.1, the Mound Plant (Mound) in section A.2, the Pinellas Plant (Pinellas) in section A.3, and Rocky Flats Plant (RFP) in section A.4.

A.1 KANSAS CITY PLANT (SECTION 3.2.1)

A.1.1 Description of Kansas City Plant Functions

Electrical/Mechanical Activities.

Squib Valve Assembly. The manufacture of pyrotechnic devices that provide valving functions for various nuclear weapons systems. Assembly of these valves requires handling of Class 1.4 explosives in a static-free environment using fixture-assisted assembly techniques.

Hybrid Microcircuit Assembly. The manufacture of hybrid microcircuit resistor/conductor networks using alumina oxide substrates with thin-film or thick-film technologies for radars, programmers, timers, and fire sets. Assembly includes the attachment of electrical components to these networks. Assembly of this product requires a Class 10,000 clean room with temperature and humidity controls.

Hybrid Microcircuit Assembly for Joint Test Assemblies. The manufacture of hybrid microcircuits that consist of an insulating substrate, such as alumina, that contains a thin or thick resistor/conductor network interconnected with active (transistors and integrated circuits) and passive (resistors and capacitors) components that are enclosed in a metal or ceramic package.

Microminiature Electrical Assembly. The manufacture of hybrid microcircuits (semiconductors packaged in ceramic leadless chip carriers, transistor outline headers, or kovar (alloy of nickel, cobalt, and iron) flatpacks). These products perform multiple electronic functions in weapons systems such as switches, radars, programmers, fire sets, clocks, and telemetry.

Telemetry Assembly. The manufacture of telemetry assemblies, neutron detectors, and test component firing systems. The telemetry assemblies and neutron detectors, as part of the joint test assembly, provide warhead scoring data in flight tests. The test component firing systems are high energy transfer systems manufactured for use in underground testing at the Nevada Test Site (NTS).

Radar Assembly. The manufacture of radars used in weapons fuzing systems for bombs and warheads. Included in this product line are antenna assemblies that can be an integral part of a radar fuze assembly or a separate component used in the fuzing system. Facility requirements include controlled humidity environment, solvent cleaning stations, and electrostatic control.

Timers, Programmers, and Trajectory Sensing Signal Generators. The manufacture of trajectory sensing signal generators (electronic assemblies that accept environmental data, verify correctness of that data, and produce predetermined and sequenced output functions for the weapon). The trajectory

sensing signal generators product is part of the nuclear safety system of the weapon. The primary function is to help assure that accidental detonation due to abnormal thermal and shock environments does not occur.

Test Equipment Design and Fabrication. The manufacture of custom designed and fabricated test equipment able to accept products produced internally and by vendors. This function is capable of performing electrical and mechanical design, producing definition drawings, developing computer software, and fabricating the necessary hardware.

Cellular Silicone and Filled Elastomers. The production of cellular silicone cushions that are used as filler to cushion components and to allow for thermal expansion.

Foam Molding. The production of structural foam supports using urethane foam materials.

Syntactic Foam Molding and Plastics Machining. The production of foam molding that is capable of withstanding higher operating temperatures than conventional foam molding supports. These products are made using high temperature resins and microspheres, which are sintered in a high temperature oven. Facility requirements include an environmentally-controlled (temperature & moisture) plastics machining facility, due to the physical requirements of plastic products.

Laminates and Desiccants. The production of aluminum silicate desiccant powders and resins used to provide a dry environment in sealed nuclear assemblies, and the production of fiber-reinforced plastic laminates.

Noncryptographic Coded Switch Assembly. The manufacture of electronic devices utilizing hybrid microcircuits and magnetic core memory used in the Permissive Action Link to permit the controlled use of nuclear weapons upon proper authorization and to prevent unauthorized use under all conditions.

Strong Link Switch Assembly. The manufacture of complex electromechanical safety devices used in all modern weapons programs. Facility requirements include clean rooms for switch assembly and testing.

Fire Set Assembly. The manufacture of high-voltage circuitry firing systems capable of supplying the energy required to initiate a weapon system. Energy is derived from low-voltage battery power and is converted by this system to several thousand volts and stored until an initiating signal is received. Components include: capacitors, inductors, hybrid microcircuits, flat cable and flex circuit technologies, and switches.

Composite Structures. The manufacture of fiber-reinforced molding resins.

Stockpile Support. Evaluation of components and subsystems removed from stockpile for reuse, systems testing, or component cycle testing. No unique processes, materials, or technologies are utilized for stockpile support.

Category F Permissive Action Link Electronics Assembly. The manufacture of electronic assemblies that are part of the nuclear surety system.

Special Products-Special Electronics Assembly. Restricted access area where electronic products having special security requirements are manufactured. The primary product line is a special access program; the product description and function are limited to those with an absolute need-to-know.

Cryptographic Coded Switch Assembly. The assembly of a Permissive Action Link Switch Adapter, an electronic device designed to provide an "electrical block" to the arming switch of the weapon. The Permissive Action Link Switch Adapter utilizes both thin and thick film hybrid microcircuit technology and is packaged in a foam plastic housing.

T-Gear Containing Cryptographic Keying Material. The manufacture of cryptographic keying material used to code and recode Permissive Action Link Switch Adapter devices in weapons. The presence of these codes prevents unauthorized access to weapons.

MK5 Arming, Fuzing, and Firing Set Assembly. The assembly of arming, fuzing, and firing assemblies. This assembly incorporates a radar, a programmer, an accelerometer, a decelerometer, thermal batteries, a fire set, a contact fuze, and a force balance integrating accelerometer.

B83 Weapon Subassembly. The assembly of electronic and mechanical structures into a case structure with environmental protection. Assemblies provide distance, timing, velocity sensing, velocity control, and electrical power for weapon assemblies.

Machining Technology. Activity providing a wide variety of traditional and non-traditional metal-removing processes including conventional and numerically controlled turning, milling, drilling, boring, and grinding processes.

Other Mechanical Technology. Activity providing support for mechanical product manufacturing including sheet metal hydroforming, fire edge blanking, punch pressing, riveting, laser marking, threaded insert installation, and manual assembly operations.

Plastics Technology. The manufacture of a wide range of polyurethane foam components, epoxy encapsulants, and modified commercial products for the Nuclear Weapons Complex (Complex).

Electrical/Electronic Fabrication and Assembly Technology. The fabrication of printed wiring assemblies which are used in weapon timers, programmers, trajectory sensing devices, and various other electrical and electronic components.

Secondary Support Areas. Activity providing support functions that service nearly all product lines, including a broad range of standard industrial processes (plating, painting, heat treating & welding), some of which are uniquely tailored to meet special weapon requirements.

A.1.2 Waste Management

Waste operations at KCP consist of management of four broad waste types: low-level waste (LLW), mixed waste, hazardous/toxic waste, and non-hazardous waste. Information on waste stream generation processes and activities, onsite management, storage and treatment capabilities and ultimate disposition of the four waste types is provided in tables A1-1 through A1-4.

Yearly inventories of hazardous waste are provided in table A1-1. The numbers reflect quantities generated, disposed of, or reclaimed. The major hazardous waste streams and the current offsite disposal methods are listed in table A1-2. KCP currently operates ten *Resource Conservation and Recovery Act* (RCRA) interim status waste storage areas for containerized nonradioactive hazardous waste, one RCRA interim status waste storage area for containerized LLW and mixed waste, and six bulk storage tanks for nonradioactive hazardous waste, as shown in table A1-3. Onsite waste processing facilities at KCP are listed in table A1-4. A summary of hazardous waste disposal quantities and number of shipments is provided in table A1-5.

TABLE A1–1.—*Kansas City Plant: Hazardous/Toxic Waste Streams*

Waste Stream	Process	Quantities (ft^3) [a]		
		Actual (1990)	Actual (1991)	Actual (1992)
Acid	Plating Operations	475	363	336
Acid[b]	Precious Metal Recovery	30	40	45
Alkaline	Plating Operations	1,297	1,323	968
Alkaline[b]	Precious Metal Recovery	2	6	6
Oil/Coolants	Machining & Lubrication Services	6,062	1,697	750
Halogenated & Non-Halogenated Solvents	Degreasing Operations	7,312	3,756	1,506
PCB Liquid & Debris	Oil	3,466	81	1,144
	Heat Transfer System	238,840 lb	118,100 lb	298,900 lb
	Electrical Units & Debris			
PCB Soil & Debris	Miscellaneous on-site Remediation	243 tons	27 tons	348 tons
Cyanide Salts[b]	Precious Metal Recovery	1	115	4
Resin, Paint, Curing Agents Adhesive & Rubber	Potting and Manufacturing Operations	1,934	1,213	1,806
Infectious Waste	Medical Lab Operations	447	582	1,111
Mercury Contaminated Debris	Manufacturing Operations	58	15	15
Solvent/Oil Contaminated Filters & Debris	Manufacturing, Potting, Cleaning & Degreasing Operations	10,301	5,895	7,763
F006, F019 Sludge	Wastewater Treatment	7,722	5,346	4,158
Batteries[b], Lead-acid Sold for Lead Reclamation[b]	Lead-acid Batteries from Vehicle Maintenance	83,600 lb	49,960 lb	57,740 lb
Batteries, Thermal Lithium, Gel-Cell and Miscellaneous	Manufacturing Operations	110	88	103
Toluene Diisocyanate	Molding and Encapsulation	111	68	369
Classified Hazardous Material	Manufacturing Operations	15	9	9
Cyanide, Liquid	Precious Metals Recovery	60	115	41
MDA Contaminated Debris	Potting & Encapsulation Operations	3,060	48	368
Acid/Chromate Contaminated Debris	Metal Finishing, Spill Clean-up, Filtration	27	60	266
Cyanide/Alkaline Contaminated Debris	Spill Clean-up, Lab Trash, Filtration	20	32	160
Miscellaneous Lab Reagents, Off-spec. Commercial Product	Facility Clean-out of Discarded Chemicals	78	60	70
Non-empty Aerosol Cans	Use of Items With Aerosol Propellants	0	0	588
Compressed Gas Cylinders	Miscellaneous Manufacturing Operations	0	0	29
Trichloroethylene Contaminated Soil	Miscellaneous Site Soil Assessments	0	15,525	1,147

E4 3191

[a] Quantities are in cubic feet unless otherwise stated.
[b] Recycled.

Source: KC ASAC, 1993b.

TABLE A1–2.—*Kansas City Plant: Hazardous/Toxic Waste Streams and Offsite Disposal Methods*

Waste	Disposal Method
Acid	Incineration
Adhesive	Incineration
Alkaline	Incineration
Asbestos	Landfill
Cyanide	Incineration
Oil/Solvent Solid Debris	Incineration
Infectious Waste	Incineration
Oil/Coolant	Incineration
Paint	Incineration
PCB Liquids	Incineration
PCB Solid	Landfill
Resin	Incineration
Rubber Compounds	Incineration
Solvents	Incineration

E4 3190

Source: KC DOE, 1991b.

TABLE A1–3.—*Kansas City Plant: Hazardous/Toxic and Radioactive Waste Storage Facilities*

Facility	Contents	Capacity
Above-Ground Tanks (2)	Waste Oil/Coolant (Bulk)	16,000 gal
Above-Ground Tanks (2)	Nonchlorinated and Chlorinated Solvents (Bulk)	16,000 gal
Above-Ground Tanks (2)	Acidic and Alkaline Solutions (Bulk)	12,000 gal
Tank Farm Container Area	PCB, Solvent, Oil, and Acid Alkaline (Container)	3,677 ft^3
Red-X Lot	Rubber, Paint, Adhesive, Epoxy, and Misc. Ignitable (Container)	8,824 ft^3
L-Lot	Acid, Alkaline, Lead-Acid Batteries, and Oil (Container)	26,737 ft^3
Demolition Lot	PCB Infectious Wastes	23,561 ft^3
Waste Storage Test Cells (4)	Cyanide, PCB, and Lab-Pack (Container)	11,648 ft^3
Mixed Waste Storage Area	LLW and LL-Mixed Waste With Toxic Metal and/or Organic Concentration	705 ft^3
Acid Pad	Acid, Alkaline Cyanide (Carboys)	6,353 ft^3
Reclamation Area	Cyanide, Acid, and Alkaline	552 ft^3

E4 3375

Source: KC ASAC, 1992a.

TABLE A1–4.—*Kansas City Plant: Waste Processing Facilities*

Facility	Operation
Scrap Dock	Nonhazardous metal scrap segregation
Papermill and Solid Waste Building	Glass and metal container crushing, plant refuse compacting
Oil Skimmer	Separation of oil/water mixtures before discharge of water to municipal sewer system
Container Rinse Area	Rinsing of hazardous material containers
Solvent Distillation Unit	Reclaim various solvents for reuse in-plant
Precious Metal Recovery	Silver Recovery
Thermal Emulsion Breaker	Thermally separates water-based coolants and water for volume reduction
Oil/Water Separator and Carbon Filter	Separates oil with trace amounts of PCBs and removes VOCs from water

E4 3187

Source: KC DOE, 1991b.

TABLE A1–5.—*Kansas City Plant: Hazardous/Toxic Waste Disposal–Annual Summary (1991)*

Waste Material	Amount (lb)	Number Of Shipments
Alkaline Liquid, Bulk	63,400	2
Alkaline Liquid MacDermid	25,915	1
Chromium/Cyanide Contaminated Demolition Debris	9,220	1
Flammable Liquids (Overpacks-Adhesives, Resins, Curing Agents, Paint, and Rubber)	48,820	2
Combined Misc. Isocyanates	10,780	1
Industrial Waste Processing Facility F006/F019 Sludge	192,320	7
Lab Reagents (Misc.) & Off-Spec Commercial Product	3,565	1
Oil, Bulk	45,000	1
Oil/Solvent Debris	127,700	6
Oil/Solvent Debris (Step Can Waste)	40,340	2
PCB Liquid, Bulk	1,805	6
PCB Solid Debris	171,300	28
Precious Metals	11,786	2
Solvent, CHL	201,780	5
Trichloroethlylene Contaminated Soil	733,580	23
Total	1,692,311	88

E4 3224

Source: KC ASAC, 1993a.

A.2 MOUND PLANT (SECTION 3.2.2)

A.2.1 Description of Mound Plant Functions

Electrical/Mechanical Activities.

Flat Cable Products. The manufacture of slapper used to detonate the main explosive charge of the weapon.

Mechanical Assemblies. The manufacture of electro-mechanical devices consisting of a slapper cable discriminator assembly and actuator assembly.

Round Wire Detonator Cables. The manufacture of exploding bridgewire detonators for igniting various explosive devices used in weapons systems.

Nonnuclear Acorn. The manufacture of the nonnuclear components of reservoirs. This activity complements the RFP reservoir production activities.

Plastic Headers. The manufacture of transfer molded plastic devices having imbedded electrode wires, to which bridgewires are ultimately attached.

Tritium Handling.

Reservoir Surveillance Operations. The activity providing assessment of quality, reliability, and safety of gas boosting systems, including pre-production evaluations, gas transfer systems functions, material testing, and product acceptance testing.

Gas Transfer Systems. The activity providing the development of processes and components for the manufacture of gas transfer systems. This includes research into component manufacturing/development, filling and storage, and function testing. In addition, activities necessary to empty tritium from transfer system components are included.

Commercial Sales/Inertial Confinement Fusion Target Loading. This function consists of loading small uranium beds (U-beds), stainless steel cylinders, and inertial confinement fusion microspheres for commercial customers.

Detonators.

High Power Detonators. This function includes the following components:

- Slapper Detonators. The manufacture of detonator assemblies used in explosive devices.
- Explosive Powder Processing. The processing of explosives such as cyclotetramethylenetetranitramine (HMX) and pentaerythritoltetranitrate (PETN) powders to be incorporated into various devices in weapons systems.
- Explosive Component Testing. The process of destructively testing explosive components in support of production, development, and surveillance efforts.
- Explosive Component Surveillance. Activities such as stockpile, shelf life, and accelerated aging evaluations, specified by the three design laboratories.
- Exploding Bridgewire Detonators. The assembly of detonators used in main charge initiation trains, timing subsystems, disablement devices, and other applications.
- Explosive Fireset Assembly. The assembly of precision electrical components used to produce the electrical energy required to initiate explosive systems.

Special Products.

Calorimeters. This mission consists of manufacturing, calibrating, testing, and storing heat standards equipment.

A.2.2 Waste Management

The major hazardous waste types, nature, and handling procedures at Mound are described in table A2-1. Low-level mixed waste types and quantities in storage at Mound are described in table A2-2. Hazardous waste storage and treatment facilities at Mound are described in table A2-3. Radioactive waste management facilities at Mound are described in table A2-4.

TABLE A2–1.—*Mound Plant: Hazardous/Toxic Waste Nature and Handling Procedures*

Waste Stream	Nature of Waste	Handling of Waste	Location
Organic Solvents	Flammable liquids	Picked up weekly, consolidated at staging area, and stored in steel drums in Bldg. 72 prior to offsite disposal	B-Bldg., E-Bldg., R-Bldg., COS Bldg.
Waste Oils	Flammable or combustible liquids	Consolidated in 55-gal drums at operating area, and stored in Bldg. 72 for offsite disposal	PM-Bldg., M-Bldg., garage
Discarded Excess Paints and Thinners	Flammable or combustible liquids	Consolidated in 55-gal drums at operating area, and stored in Bldg. 72 for offsite disposal	Paint shop
Waste Corrosive Solutions	Mostly caustic and acid solutions	Consolidated in 55-gal or other size drums at operating area, and stored in Bldg. 72 for offsite disposal	Plating shop, DS Bldg., garage
Spent Plating-Bath Solution	Toxic liquid containing heavy metals	Consolidated in 55-gal or other size drums at operating area, and stored in Bldg. 72 for offsite disposal	Plating shop
Waste PCBs	Toxic liquid	Stored in marked cans or drums labeled and placed in diked area and covered vaults or controlled storage facility near P-Bldg.	Various transformers and capacitors throughout the plant
Toxicity Characteristic Waste	Various liquid and solid wastes	Consolidated in 55-gal or other size drums at operating area, and stored in Bldg. 72 for offsite disposal	Approx. 10 locations throughout the plant
Photoprocessing Waste	Waste containing precious metals, caustic solution, and acetic acid	Picked up weekly, consolidated into polyethylene-lined 55-gal drums and stored in Bldg. 72 for potential silver recovery (fixer) or offsite disposal (nonfixer)	OSW Bldg., OSE Bldg., Bldg. 2
Explosive Solid Waste	Containing small amounts of explosives/ pyrotechnics	Stored in magazine; small quantities are treated by open burning, retorting, or "incineration" in controlled-access area	Approx. 15 locations throughout the plant
Solvent-Water Wastes Containing Trace Amounts of Explosives	Ignitable and possibly reactive	Filtered and containerized in polyethylene-lined 55-gal drums and staged near Bldg. 27 prior to offsite shipment for treatment/disposal	Bldg. 27
Laboratory Wastes	Solvents; flammable, reactive, toxic liquids in small quantities	Packed in steel containers with vermiculite for incineration or land-filling	Various labs throughout the plant

E4 3245

Source: MD DOE, 1991b.

TABLE A2–2.—*Mound Plant: Low-Level Mixed Waste Types and Quantities in Storage*

Waste Type	Quantity
Liquid Scintillation (vials)	189 drums (1,418 ft^3) containing closed vials
Lead Residue and Bricks	One 30-gal drum of residue, two 30-gal drum bricks; one 55-gal drum of lead scrap, two 5-gal 37-A can of bricks and scrap, two 55-gal drums of RCRA corrosive TRU waste, two plywood boxes (strong, tight) containing waste batteries, one steel box (U.S. DOT 7A) containing lead waste; total volume waste lead - 185 ft^3
PCBs	21 drums of solid, 10 drums of liquid,1 box of solid (equipment-machine press); total volume PCBs - 250 ft^3
Contaminated Mercury	Four containers totalling less than 3 liters

E4 3243

Source: MD DOE, 1991b.

TABLE A2–3.—*Mound Plant: Hazardous Waste Storage and Treatment Facilities*

Facility	Use	Approximate Dimensions
Hazardous Waste Storage Facility (Bldg. 72)	Principal hazardous waste storage area	40 ft x 60 ft; 10 ft high
Explosive Waste Storage Magazine 53	Explosive waste storage bunker	10 ft x 15.5 ft; 10 ft high
Pyro Shed Storage	Storage area for pyrotechnic materials	9 ft x 15 ft; 7 ft high
Glass Melter Thermal Treatment	System in Waste Disposal Annex to be used for burning hazardous and radioactive mixed waste	Melter, with internal dimensions 87 in long, 30.5 in high, 27.5 in wide, is located at 24 ft x 57 ft area
Thermal Treatment of Explosive	Drum unit for burning explosives-contaminated materials	55-gallon drum in 10 ft x 10 ft x 10 ft structure
Open Burning of Explosive Waste	Apparatus for burning solid explosives-contaminated materials/scrap	Located in same structure with drum unit (above)
Retort	Unit for burning fabricated components/assemblies containing/explosives	3 ft diameter, 10 ft long
Pyro Waste Conversion Unit	Apparatus for treatment of pyrotechnic cleanup solutions	1 ft diameter, 2 ft high cylinder in a 30 in x 30 in x 6 in tray

E4 3392

Source: MD DOE, 1991b.

TABLE A2–4.—*Mound Plant: Radioactive Waste Management Facilities*

Facility	Waste Managed	Facility Description
Waste Disposal Solidification (WD Bldg.)	Liquid alpha waste (Pu-238)	Equipment for coprecipitation/flocculation of waste, solidification of sludge, and adsorption/filtration of supernatant liquid
Staging Area (Bldg. 23)	Tritiated waste; TRU waste; non-TRU alpha waste; mixed waste	One-story concrete block building, 14 ft high x 30 ft wide x 117 ft long, having a gross area of 3,500 ft^2
Compactor (WD Bldg.)	Alpha waste	Hydraulic-ram compactor
Staging Area (Bldg. 31)	Tritiated waste; TRU waste; non-TRU alpha waste	One-story sheet metal building, 12 ft high x 60 ft wide x 102 ft long having a gross area of 6,100 ft^2
Waste Solidification Facility (SW-149)	Tritiated waste	Tritiated liquid solidification and packaging for off-site shipment and burial
Effluent Removal System (SW)	Tritiated waste	Air detritiation system removes tritium from process effluent streams before they are released to the atmosphere
Compactor (T-Bldg.)	Low Specific Activity (beta)	Hydraulic-ram compactor
Glass Melter (WDA)	(alpha, beta, gamma)	Development refractory chamber containing molten glass over which waste is burned, wet off-gas treatment system, and high-efficiency filter used for line-generated wastes (Mound expects to permit the unit for use with radioactive mixed and hazardous waste)
Compactor (SW Bldg.)	Low Specific Activity (beta)	Hydraulic-ram compactor
Equipment at Various Waste Generating Areas	Low-level alpha solid waste	Where practical, compactors are used to reduce waste volume in drums prior to shipment

E4 3391

Source: MD DOE, 1991b.

A.3 PINELLAS PLANT (SECTION 3.2.3)

A.3.1 Description of Pinellas Plant Functions

Electrical/Mechanical Activities.

Support Pads. The manufacture of model pads from synthetic foam materials with controllable mechanical crushing characteristics that are used to protect weapons components within the weapon assembly.

Optoelectronics Assemblies. The production of electrical devices using the properties of light rather than electrical conductivity to transfer information, perform switching functions, and act as sensors.

Neutron Detectors. The production of electronic detectors used to verify the output of neutron generators in joint test assemblies.

Lightning Arrestor Connectors. The production and testing of electrical connectors for weapons cables that are designed to short circuit lightning strike pulses to ground.

Transducers. The manufacture of mechanical shock sensing devices used in weapons testing sequences.

Tritium-Handling Activities.

Neutron Tube Target Loading. The loading of small amounts of tritium into specific neutron generator components.

Neutron Generators, Cap Assemblies, and Batteries.

Thermal Batteries. This activity provides for development and backup manufacturing capabilities for thermal batteries. Thermal batteries are currently procured from commercial sources.

Neutron Generators. The production of neutron generators which provide a controlled source of neutrons. Major subassemblies that are produced include neutron tubes, electronic and ferroelectric power supplies, and vacuum switch tubes. These tubes are low-energy arc-activated, high-vacuum gap switches designed to withstand high thermal and mechanical shock and capable of holding off 10,000 volts.

Cap Assemblies. This process involves the manufacture of a weapons component associated with gas transfer systems.

Lithium Ambient Batteries. The production of long-life battery assemblies using individual lithium ambient battery cells procured from commercial suppliers.

A.3.2 Waste Management

Waste operations at Pinellas consist of management of three broad types of waste: LLW, hazardous/toxic waste, and nonhazardous waste.

Pinellas does not dispose of hazardous/toxic wastes onsite. Annually, Pinellas shipped approximately 400 drums of hazardous/toxic waste (including laboratory wastes), 3,500 gallons of ignitable hazardous waste, and an average of 422 drums of LLW for offsite disposal in 1990, 1991, and 1992 (PI DOE, 1992d).

Table A3-1 provides quantities of hazardous wastes shipped offsite in 1992. Table A3-2 shows the offsite disposition of the hazardous wastes. Table A3-3 defines the hazardous waste container and tank storage units at the site and table A3-4 shows radioactive solid waste volumes for 1990, 1991, and 1992.

TABLE A3–1.—*Pinellas Plant: Hazardous Waste Quantities Shipped Offsite in 1992*

Waste	EPA Waste Code Number	Quantity (yd^3)
Calcium Chromate (Solid)[a]	D007, U032	4.63
Calcium Chromate Batteries	D003	0.54
Lithium Silicon Batteries	D003	1.09
Lithium Silicon	D003	0.00
Flammable Liquids[b]	F003, F005, D001, & TCLP	13.62
Halogenated Hydrocarbons[c]	F001, F002, & TCLP	1.36
Methylene Chloride Resin	F001, F002	5.17
Trim Cutting Coolants[d]	—	51.73
Laboratory Wastes[e]	—	47.60
New Waste Streams (Contingency)	—	4.08
Waste Cyanide	D002, D003, F007	0.03
Waste Oxidizer	D001, D007	0.54
Electroplating Waste Sludge	F006	116,760 (gal)
Lead Oxide	D008	0.84
Chlorofluorocarbons	F001, F002	0.84
Corrosive Liquid	D002, D007, D008	1.09
Plating Waste	D002, D007, D008	5.00
Photodeveloping Waste	F002, F003	0.54
Waste Paint	D006, D002, D011, D001	0.54

E4 3199

[a] High rate of generation due to elimination of this product line.
[b] Consists of acetone, ethanol, alcohol, amylacetate, toluene, and mineral spirits.
[c] Consists of 1,1,2-trichlorofluoroethane, methylene chloride, 1,1,1-trichloroethane, and trichloroethylene.
[d] Treated onsite using a wastewater treatment unit.
[e] Based on a total of 240 drums (5-gal, 20-gal, 30-gal, and 55-gal drums).

Source: PI DOE, 1992d.

TABLE A3–2.—*Pinellas Plant: Offsite Disposition of Hazardous Wastes*

Waste	Disposal Method
Laboratory Packs	Incineration
Asbestos	Landfill
Calcium Chromate	Landfill
Halogenated and Nonhalogenated Solvents	Recycling
Lead (Contaminated)	Treatment
Thermal Batteries and Reactive Metals	Incineration and hydrolysis
Still Bottoms from Recycling	Landfill
Ashes from Incineration	Landfill

E4 3198

Source: PI DOE, 1991c.

TABLE A3–3.—*Pinellas Plant: Hazardous Waste Drum and Tank Storage*

Storage Location/ Storage Capacity	Waste Description	Waste Defined by EPA Waste Code Number
Building 1040, Bay 1 Drum Storage—forty 55-gallon drums; 24 lab-pack drums	Waste halogenated solvents, spent plating bath solutions, stripping compounds. Waste methylene chloride/resin, waste epoxy resin	F001-F003, F005-F009, D001, D002, D004, D007, D008, D009, D011, D018, D019, D022, D023, D024, D025, D026, D027, D028, D029, D030, D036, D037, D040, D041, D042, U032, U223 (will contain free liquids)
Building 1040, Bay 2 Drum Storage—thirty-six 55-gallon drums; 18 lab-pack drums	Calcium chromate contaminated solid waste, thermal batteries (calcium chromate and lithium silicon)	D001-D004, D007-D009, U032, U223 (does not contain free liquids)
Building 1040, Bay 3 Drum Storage—three 55-gallon drums	Miscellaneous laboratory chemicals stored until properly identified and classified for packaging, shipping, and disposal	D002, D004, D008, D009 (does not contain free liquids)
Building 1000, Center Bay Drum Storage—thirty-eight 55-gallon drums	Mixed waste storage when necessary	D008 mixed with low-level radioactive waste (does not contain free liquids)
Tank No. 1—5,000 gallons	—	Standby–any of below
Tank No. 2—2,000 gallons	Mixtures of methylene chloride, 1,1,1-trichloroethane, trichloroethylene, and chlorofluorocarbons	F001, F002
Tank No. 5—5,000 gallons	Mixture of alcohol, toluene, acetone, amyl acetate and liquids with ignitable characteristics	F003, F005, D001

E4 3197

Source: PI DOE, 1991c and 1992d.

TABLE A3–4.—*Pinellas Plant: Radioactive Solid Waste Volumes*

Tritium Waste Type	1990 Actual Volume (ft^3)	1991 Actual Volume (ft^3)	1992 Actual Volume (ft^3)
Contaminated Equipment	700	665	640
Contaminated Dry Solids	3,900	1,758	787
Contaminated Product	330	298	242
LLW Total	4,930	2,717	1,669

E4 3196

Source: PI DOE, 1992d.

A.4 ROCKY FLATS PLANT (SECTION 3.2.4)

A.4.1 Description of Rocky Flats Plant Nonnuclear Functions

Electrical/Mechanical Activities.

Reservoirs. Production involves the fabrication, assembly, and shipping of weapon and working gas reservoir assemblies. Typically these units are fabricated from stainless steel. The fabrication process for these parts begins with metal forging at the Oxnard, CA, facility. The parts are then machined, inspected, radiographed, cleaned, and welded. Assemblies undergo final dimensional, visual, nondestructive, and proof testing.

Special Products.

Nuclear Grade Steels/Oxnard. This activity involves the procurement, certification, and storage of bulk stock for a variety of metals for the Complex. These materials are fabricated and certified to tightly defined material specifications, and are generally available in a wide range of sizes in bar, plate, and thin-wall tubing configurations.

Safe Secure Trailers. The fabrication, repair, and refurbishment of safe and secure highway semi-tractor trailers used to transport weapon components and material.

Weapon Trainer Shop. This activity provides weapon component and assembly illustrations as well as display and instructional models for use within the Complex and the Department of Defense (DOD). The illustrations are of delivery systems and cutaway views of weapon assemblies, missiles, and bombs. The models range from fractional scale to full size. The models often incorporate working features and cutaway sections to illustrate internal features. Typical models include nuclear warheads, aircraft, and transport vehicles.

Metrology Services. Metrology services are provided to several nonnuclear weapon component customers. The metrology activities are related to calibration of dimensional standards such as thread gauges, height blocks, comparator charts, special design gauges, surface plates, optical flats, etc.

Beryllium Technology and Pit Support.

Beryllium Technology. A commercial supplier provides semi-machined beryllium parts to RFP for finish machining, ultrasonic cleaning, heat treatment, inspection, nondestructive testing, and other post-machining processing such as coating or brazing. Development and support activities include:

- Vacuum Induction Melting. This facility combines recycled scrap beryllium with varying amounts of pure beryllium flake to produce a casting of the desired chemical composition and impurity levels for powder production. Vacuum Induction Melting is also used to cast the scrap metal into anodes for the electrorefining process.

- Near Net Shape Forming. These processes consolidate powder into formed part shapes for machining. The processes provide the range of combinations of shape and mechanical properties required by customers.

Pit Support Functions.

- Pit Support Forming Operation. This operation consists of spin-forming and press-forming techniques which produce parts from vendor-supplied metal blanks. The parts are manufactured from various non-uranium materials.

- Heat Treating Operation. This operation involves heat treating various metal shells. Heat treating occurs in

electrically heated furnaces after spin-forming operation.

- Machining Operation. This operation consists of a machine shop utilizing a T-bed lathe to perform the finish machining of the various metal shells, provide material samples for certification and testing, and support miscellaneous developmental efforts.

- Post-Machining Operation. This is performed on finished metal shells. The operations consist of analysis, testing, and certification of the finished metal shells.

- Pit Support Functions (Tubes). These functions consist of machining, joining, and post-joining operations. Machining operations involve cutting and boring the tubing with a small jeweler's lathe. The tubing is procured as certified tubing from an outside vendor and cut and bored to meet required specifications.

- Joining Operations. These consist of operations required to join the tubes to various pit components and involves brazing and welding. The welding operations required for the tubing consist of electron beam and gas tungsten arc welds, depending on the type of material being welded and the location of the welded tubing on the pit components. The brazing operation is performed in a vacuum brazing furnace.

- Post-Joining Operations. These involve inspecting, testing, and certifying the tubes that are installed on the pit components.

A.4.2 Waste Management

The majority of the process wastes generated at the site are radioactive; thus, treatment and handling facilities have been designed to provide the additional safeguards necessary to effectively manage radioactive wastes. Treatment technologies include thermal, chemical, physical, immobilization, and waste solidification techniques.

Table A4-1 provides the quantities of hazardous wastes shipped offsite in 1992. Table A4-2 shows the capacities of the onsite hazardous/toxic and radioactive waste storage facilities.

Table A4-3 shows the low-level and low-level mixed waste streams generated at RFP in 1990. Table A4-4 lists the principal RFP treatment facilities and the categories of waste treated.

TABLE A4–1.—*Rocky Flats Plant: Hazardous Waste Quantities Shipped Offsite in 1992*

Waste	EPA Waste Code Number	Quantity (yd^3)
Benzene	D018	4.90
Chromium (Contaminated)[a]	D007, D008, D018	10.89
Flammable Liquids[b]	D001, F002, F003, F005	9.26
Flammable Liquids, (PCB Contaminated)[c]	D001	0.27
Halogenated Solvents[d]	F001, F002, D008	32.41
Lead (Contaminated)	D008	2.72
Mercury (Contaminated)	D009	2.45
Polychlorinated Biphenyls, Liquid	----------	37.31
Polychlorinated Biphenyls, Solid	----------	12.53
Waste, Sodium Nitrate Mixture, Oxidizer (Chromium Contaminated)	D001, D007	13.07

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[a] Also contaminated with lead and benzene.
[b] Consists of isopropyl alcohol and toluene.
[c] Consists of hexane.
[d] Consists of 1,1,1-trichloroethane, methyl chloride, methylene chloride, trichlorotrifluoroethane.

Source: RF DOE, 1992a.

TABLE A4–2.—*Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage Facilities* [Page 1 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Main Hazardous Waste Storage Area	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	39,160 gallons and 4,050 ft^3
Chip Drum Storage Area: Bldg. 447 Rm 501	D001, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, and F003	160 ft^3
Drum Storage Area: Bldg. 561	D001, D002, D003[a], D004, D005, D006, D007, D008, D009, D010[a], D011[a], D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F007, F009, P Series[a], and U Series[a]	17,600 gallons
Drum Storage Area: Bldg. 776, Rm 134	D001, D005[a], D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005[a], F006, F007, F008, F009, P Series, and U Series	7,000 gallons and 8,100 ft^3
Drum Storage Area: Bldg. 776, Rm 237	D001, D005[a], D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005[a], P Series, and U Series	10,101 gallons and 9,450 ft^3
Mixed Waste Storage: Bldg. 884	D001, D003, D006, D007, D008, D009, D010[a], D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, P Series, and U Series	55,440 gallons and 7,425 ft^3
Mixed Waste Storage Area: 904 Pad Outside [b]	D001, D002, D003, D004[a], D005[a], D006, D007, D008, D009[a], D010[a], D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series[a], and U Series[a]	288,900 ft^3
Mixed Waste Storage Area: 904 Pad Cargo Containers [b]	D001, D002, D003, D004[a], D005[a], D006, D007, D008, D009[a], D010[a], D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series[a], and U Series[a]	4,785 gallons and 28,350 ft^3
Mixed Waste Storage: Bldg. 777, Rm 432C	D001, D008, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, and U239	44 ft^3
Remedial Action Decontamination Pad Tanks	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	12,500 gallons
Granular Activated Carbon Treatment	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	5,000 gallons
Environmental Waste Drum Storage - Tent 1	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	145,200 gallons or 17,280 ft^3
Environmental Waste Drum Storage Unit	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	110,000 gallons or 13,500 ft^3

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Footnotes at end of table.

TABLE A4–2.—*Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage Facilities*—Continued [Page 2 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Mixed Waste Storage Area: Bldg. 374, Rm 3813	D002, D004, D005[b], D006, D007, D008, D009, D010[b], D011[b], D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series[b], and U Series[b]	6,372 ft^3
Shipping Storage Area: Bldg. 684	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010[c], D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series[c], and U Series[c]	67,500 ft^3
Pondcrete Storage Area: Bldg. 788	D002, D003, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, and F009	32,400 ft^3
Gas Cylinder Storage: Bldg. 952	D001, D002, D003, P Series, and U Series	6400 cylinders
Mixed Waste Storage: Bldg. 964	D004, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, (vacuum filter sludge)	16,470 ft^3
Mixed Waste Storage Area: 750 Pad	D002, D003, D004[b], D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, (Pondcrete and Saltcrete)	378,000 ft^3
Mixed Waste Storage: Bldg. 776, Rm 201	D001, D005[a], D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F005[a]	2,750 gallons or 356 ft^3
Storage Area: Bldg. 889 [b]	D001, D003, D006, D007, D008, D009, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, and P015	4,050 ft^3
Low-Level Mixed Waste Baler: Bldg. 776	D004, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F005	1,350 ft^3
Process Waste Transfer and Collection System	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F007, F008, F009, P Series, and U Series	150,000 gallons
Process Waste Storage Tanks: Bldg. 774	D001, D002, D004, D005, D007, D008, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F009	21,000 gallons
Process Waste Treatment Facility: Bldg. 374	D001, D002, D003[b], D004, D005, D006[b], D007, D008, D009, D010[b], D011, D018, D019, D022[b], D028, D029, D035, D038, D040, D043, F001, F002, F003, F005[b], F007, F008, F009, P Series[b], and U Series[b]	116,160 gallons
Process Wastewater Tanks	D001, D002, D003, D004, D005, D006[b], D007, D008, D009[b], D010, D011[b], D018, D019, D022[b], D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F007, F008, F009, P Series[b], and U Series[b]	1,200,000 gallons

Footnotes at end of table.

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TABLE A4–2.—*Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage Facilities*—Continued [Page 3 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Oil Storage Tanks: Bldg. 776	D001, D006, D007, D008, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F005	750 gallons
Aqueous Process Waste Treatment: Bldg. 774	D001, D002, D003[b], D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005[b], F007, F008, F009, P Series[b], and U Series[b]	122,060 gallons
Organic Waste Immobilization: Bldg. 774	D001, D006[b], D007[b], D008[b], D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002[b], F003, F005, P Series[b], and U Series[b]	2,400 gallons
Drum/Crate Storage Area: Bldg. 774, Rm 154	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F008, F009, P Series, and U Series	2,700 ft^3
Drum Storage Area: Bldg. 774, Rm 41	D001[b], D002[b], D003[b], D004, D005[b], D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005[b], F007, F008, F009, P Series[b], and U Series[b]	4,000 gallons or 459 ft^3
Passive/Active Drum Counter: Bldg. 371, Rm 2202 [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	221 ft^3
Container Storage Area: Bldg. 371, Rm 3189 [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	221 ft^3
Container Storage Area: Bldg. 371, Rm 3187B [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft^3
Container Storage Area: Bldg. 371, Rm 2325 [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft^3
Container Storage Area: Bldg. 771 Annex [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft^3

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Footnotes at end of table.

TABLE A4–2.—*Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage Facilities*—Continued [Page 4 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Container Storage Area: Bldg. 371, Rm 3189 [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	221 ft^3
Container Storage Area: Bldg. 371, Rm 3187B [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft^3
Container Storage Area: Bldg. 371, Rm 2325 [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft^3
Container Storage Area: Bldg. 771 Annex [a]	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft^3

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[a] Indicates that a permit modification request has been submitted. However, this unit or waste code has been granted temporary authorization.
[b] A request for change to interim status has been submitted for this unit or waste code.
[c] Reflects approval to store waste for the purpose of real-time radiography as stated in a letter from Colorado Department of Health to DOE on October 24, 1990.

Source: RF DOE, 1992a.

TABLE A4-3.—*Rocky Flats Plant: Types of Low-Level/Low-Level Mixed Waste Generated in 1990*

Waste Stream	Percentage
Combustibles	49
Saltcrete	19
Metals	14
Mixed Item Description Codes (Residues)	8
Aqueous Sludge	3
Filters	2
Blacktop, Concrete, Dirt & Sand	2
Other	2
Pondcrete	1
Total	100

E4 3247

Source: RF DOE, 1991b.

TABLE A4-4.—*Rocky Flats Plant: Principal Treatment Facilities*

Location	Waste Description	Treatment Description
Building 774	TRU and TRU-mixed caustic waste, acidic waste, and organic waste—370,000 gallons of aqueous waste processed annually.	Concentration and solidification of TRU and low-level liquid radioactive materials; TRU caustic waste and TRU acidic waste-two stage precipitation process. TRU organic waste-neutralized, then solidified with gypsum cement. Transfer of remaining water for evaporation in Bldg. 374.
Building 374	Radioactive and nonradioactive liquid wastes—11.2 million gallons of aqueous waste processed in 1990—a total of 2,700 boxes of saltcrete and 8,100 drums of filtered sludge should be produced.	Precipitation, filtration, scrubbing, chemical preparation and drying of radioactive and nonradioactive liquid wastes. TRU waste streams treated in a precipitation process, and the resultant sludge is solidified. Low-level waste streams treated in evaporation process, resultant salts are immobilized with cement. Waste acids are neutralized, then treated in the precipitation process. Produces distilled product water for utility reuse.
Building 776	TRU, TRU-mixed, low-level, low-level mixed waste and hazardous wastes combustibles, metal, glass, large HEPA filters, waste filter media, insulation, glove box filters.	Waste volume reduction activities, repackaging, and adding cement for neutralization.

E4 3455

Source: RF DOE, 1991b.

APPENDIX B

APPENDIX B: WASTE MANAGEMENT—PROPOSED ACTION

This appendix contains detailed information concerning waste management operations at the sites involved in consolidating activities in the Proposed Action.

B.1 KANSAS CITY PLANT CONSOLIDATION (SECTION 3.3.1) WASTE MANAGEMENT

Products from the nonnuclear weapons component manufacturing operations at the Pinellas Plant (Pinellas), the Mound Plant (Mound), and Rocky Flats Plant (RFP) would be consolidated into the existing production space at the Kansas City Plant (KCP). Table B1-1 lists the operations proposed for transfer to KCP. Table B1-2 shows the additional annual amounts of liquid and solid hazardous/toxic and nonhazardous wastes. It is not anticipated that low-level waste (LLW) or mixed waste would be generated by the relocated functions.

Support Pads. All processes that are being transferred would affect the volume of plant waste streams. However, there would be no additional waste streams. Because only the volumes of existing plant waste streams are affected, no special waste-handling capability would be needed.

Optoelectronics Assemblies. All processes that are being transferred would affect the volume of plant waste streams. However, there would be no additional waste streams added. Existing capabilities would be used to handle the small yearly increase from the optoelectronics production.

Neutron Detectors. The volume of plant waste streams would be affected, but no new waste streams would be added. No special waste-handling capability would be needed.

Lightning Arrestor Connectors. The most significant new process is the chemical preparation of varistor (variable resistance semiconductor) material. No significant increases in wastes and effluents have been identified as a result of lightning arrestor connector production. No new waste-handling capability would be required. Additional lead-monitoring equipment would be required in the lead titanate development area.

Transducers. The volume of plant waste streams would be affected, but no new waste streams would be added due to the transfer processes. No special waste-handling capabilities would be needed.

TABLE B1–1.—*Operations Transferring to KCP*

Pinellas	Mound	RFP
Support Pads	Flat Cable Products	Reservoirs
Optoelectronics Assemblies	Mechanical Assemblies	Nuclear Grade Steels/Oxnard
Neutron Detectors	Round Wire Detonator Cables	Safe Secure Trailers
Lightning Arrestor Connectors	Nonnuclear Acorn	Weapon Trainer Shop
Transducers	Plastic Headers	Metrology Services
Lithium Ambient Batteries		

E4 3715

TABLE B1–2.—*Kansas City Plant: Estimated Additional Annual Wastes Associated With Relocated Functions*

Product	Waste Type[a]							
	Hazardous/Toxic				Nonhazardous			
	Liquid		Solid		Liquid		Solid	
	lb	gal	lb	ft^3	lb	gal	lb	ft^3
Support Pads	100	10	518	7	1,548,800	154,880	1,371	18
Optoelectronics Assembly	365	37	128	2	5,280	528	109	1
Neutron Detectors	153	15	30	<1	0	0	13	<1
Lightning Arrestor Connectors	510	51	23	<1	1,725	172	213	3
Transducers	153	15	55	<1	0	0	5	<1
Lithium Ambient Batteries	22	2	23	<1	0	0	0	0
Flat Cable Products	2,414	241	3,327	44	5,956	596	1,965	26
Mechanical Assemblies	6,646	665	702	9	42,078	4,208	1,046	14
Round Wire Detonator Cables	50	5	25	<1	150,000	15,000	7	<1
Plastic Headers	0	0	0	0	0	0	404	5
Reservoirs and Nonnuclear Acorn	68,850	6,885	250	3	15,003,100	1,500,310	13,400	179
Nuclear Grade Steel/Oxnard	0	0	0	0	0	0	0	0
Safe Secure Trailers	2,000	200	3,000	40	7,000	700	2,000	27
Weapon Trainer Shop	60	6	0	0	0	0	600	8
Metrology Services	0	0	0	0	0	0	0	0
Total	81,323	8,132	8,081	108	16,763,939	1,676,394	21,133	282

E4 3716

[a] No LLW or mixed waste is anticipated.

Note: Table assumes conversion of 1 gallon = 10 lb = 0.1337 ft^3.

Source: KC ASAC, 1992a and 1993b.

Flat Cable Products. There would be no new waste streams, but there would be slight increases in existing stream volume. No special waste-handling capability would be needed.

Round Wire Detonator Cables. This work would result in a small volume increase in waste streams that are the same as the waste streams in machining. No special waste-handling capability would be needed.

Plastic Headers. This work would result in a slight increase in volume of KCP waste streams. No special waste-handling capability would be needed.

Lithium Ambient Batteries. This work would result in a slight increase in volume of KCP waste streams. No special waste-handling capability would be needed.

Reservoirs and Nonnuclear Acorn. The volume of plant waste streams would be affected, but no new waste streams would be added due to the transferred processes.

Nuclear Grade Steels/Oxnard. Procurement and testing activities would yield no new waste streams at KCP. Any waste generated would be minor incremental additions to existing KCP waste streams.

Safe Secure Trailers. Manufacturing of trailers at KCP would yield no new waste streams. Any wastes generated would be incremental additions to existing KCP waste streams.

Weapon Trainer Shop. Shop activities would yield no new waste streams at KCP. Any waste generated would be minor incremental additions to current KCP waste streams.

Metrology Services. Metrology support activities would yield no new waste streams at KCP. Any waste generated would be minor incremental additions to current KCP waste streams.

B.1.1 Management of Radioactive Waste Streams

No radioactive solid or liquid waste streams are anticipated as a result of the relocated nonnuclear functions.

B.1.2 Management of Hazardous/Toxic Waste Streams

No new hazardous waste streams would be generated at KCP as a result of consolidation operations.

As shown in table B1-2, the largest annual liquid hazardous waste streams are from the reservoirs and nonnuclear Acorn function (68,850 lb), mechanical assemblies (6,646 lb), and flat cable products (2,414 lb). The major contributor to the reservoirs and nonnuclear Acorn waste stream is 64,000 lb of coolant.

The major contributors of hazardous wastes from existing KCP operations include wastewater treatment, plating and etching processes, degreasing operations, and remedial action. The quantities of solid and liquid hazardous wastes due to the Proposed Action represent incremental additions to the current KCP waste streams.

Waste generated from the consolidation of operations would continue to be managed and disposed of through KCP's Waste Management Department. KCP's existing 11 waste storage areas for containerized waste and 6 bulk storage tanks are identified in table A1-3. The March 1987 *Resource Conservation and Recovery Act* (RCRA) Part A Application identifies the use of container-storage and tank-storage facilities with total storage design capacities of 44,000 cubic feet (ft^3) for liquid hazardous wastes and 83,000 ft^3 for solid hazardous wastes, respectively (KC DOE, 1988).

The goals of KCP's Pollution Prevention Program call for the reduction of chlorofluorocarbons,

chlorinated hydrocarbons, and potential carcinogenic materials. The reduction or elimination of these materials would be pursued both during and after actual transition of operations. Table B1-3 shows the waste minimization activities for incoming processes.

B.1.3 Management of Nonhazardous Waste Streams

As shown in table B1-2, more than 16.7 million lb of liquid industrial effluents would be generated annually from the relocated functions. Most of these liquid acidic and alkaline effluents would be suitable for treatment in the KCP industrial waste pretreatment facility. The largest annual waste streams would include aqueous cleaners from the reservoirs (15 million lb) and the support pads (1.5 million lb). KCP's industrial waste pretreatment facility design capacity is approximately 1.3 million gallons per day (MGD). According to the supervisory engineer, the addition of less than 5,000 gallons per day (GPD) of relatively "clean" wastewater, as compared to spent plating baths, is beneficial to operations.

Nonhazardous solid waste streams consist mainly of recyclable products such as steel chips, copper, and aluminum wire, and would not place any long-term storage burdens on existing KCP storage capabilities. Machining in the production of reservoirs could generate an estimated 12,000 lb of stainless steel metal chips, which would require recycling at a scrap processor.

B.2 Savannah River Site (Section 3.3.2) Waste Management

Tritium-handling functions from operations at Mound would be relocated to the Savannah River Site (SRS). Table B2-1 lists the three operations proposed for transfer to SRS. Table B2-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and liquid and solid mixed waste associated with the relocated functions.

Reservoir Surveillance Operations. Functions include measurement, monitoring, testing, and evaluation operations.

Gas Transfer Systems. Activities include: component manufacturing and development; general metal cleaning, machining, welding, assembly and inspection-type operation; tritium recovery; and, environmental storage, an activity where tritium-containing units transferred from Mound would be stored in environmental chambers.

Commercial Sales/Inertial Confinement Fusion Target Loading. This activity receives empty, small uranium beds, small stainless steel cylinders, and glass/plastic microspheres from various commercial sources that use tritium in their operation. Uranium beds and cylinders are checked for exterior contamination, measured to determine any residual amounts of tritium, and filled and shipped to commercial customers or research institutions. Helium-3, a decay byproduct of tritium, is purified for sale to commercial users.

B.2.1 Management of Radioactive Waste Streams

No high-level radioactive, transuranic (TRU), or mixed wastes would be generated at SRS from relocated tritium functions. All radioactive waste generated would be LLW. A small portion of the LLW would be classified.

The reservoir surveillance operations, gas transfer systems, and commercial sales/inertial confinement fusion target loading would generate both compactible and non-compactible LLW from nitrogen- and argon-blanketed glove boxes and waste resulting from decontamination of tritium-contaminated components (gloves, aprons, plastic sheets). Non-compactible materials may include nonrepairable contaminated equipment such as

TABLE B1–3.—*Kansas City Plant: Waste Minimization Scenario for Processes Being Transferred To Kansas City Plant*

Incoming Process to KCP	Waste Minimization Activity
Lithium Ambient Batteries (LAMB)–cleaning processes using trichloroethylene for removal of flux from solder joints.	Alternate cleaning agents that would eliminate the use of trichloroethylene are being investigated. Similar processes in Department 855, where LAMB is slated to transfer, have been successfully converted to cleaning with d'limonene for flux removal.
Lightning Arrester Connector (LAC)-The connector assemblies are potted with a polyurethane potting compound containing toluene diisocyanate (TDI).	Alternate potting materials that do not contain TDI are being investigated. An alternative potting material has been identified and is being qualified for use in the LAC. Should the alternate potting not be qualified, LAC will be potted with TDI in the existing Department 65 cable potting area.
Neutron Detectors-Hand soldering process and stripping and tinning of electrical wires using trichloroethylene for flux removal.	Alternate cleaning agents that would eliminate the use of trichloroethylene are being investigated.
Optoelectronics-Metal piece parts are cleaned using methylene chloride in an ultrasonic cleaner to prepare them for subsequent plating operations.	Alternate aqueous and semiaqueous solvents and processes for cleaning metal piece parts will replace methylene chloride.
Soldering operations require removal of flux using trichloroethylene in an ultrasonic cleaner.	Trichloroethylene is being replaced with d'limonene, a new, environmentally safe, terpene-based solvent, for cleaning electrical and electronic assemblies.
Support Pads-Equipment used in preparation of a polyurethane foam mixture is cleaned using methylene chloride.	Alternate cleaning agents will be qualified for use in cleaning of foam-mixing equipment.
Transducers-Trichloroethylene used for flux removal following hand soldering operations, and for surface preparation of wires during a stripping and tinning operation.	Alternate cleaning solutions for transducer fabrication are being investigated; at this time, it appears that d-limonene will replace trichloroethylene.
Transducer assemblies are potted using an epoxy encapsulating material to add mechanical strength. One of the components of this material is "Z" Hardener, which contains methylene dianiline (MDA).	Alternative potting materials that do not contain MDA are being investigated. If an alternate cannot be qualified, potting of transducers will be performed in a dedicated MDA potting area (D/59).
Round Wire Detonator Cables/Plastic Headers-Trichloroethylene is used as a cleaning agent.	Alternative aqueous-based cleaning processes will be substituted.
Reservoir Production-Trichloroethylene and methylene chloride are used in cleaning processing.	Alternative aqueous-based cleaning processes will be substituted.

E4 4630

Source: KC ASAC, 1993b.

TABLE B2–1.—*Operations Transferring to SRS*

Mound
Reservoir Surveillance Operations
Gas Transfer Systems
Commercial Sales/ICF Target Loading

E4 3720

disabled pumps, motors, metal shavings, etc. Such wastes must be free of liquids prior to disposal. These wastes would be checked for radioactivity, off-gassing tritium, and hazardous contamination, and placed in 96-ft^3 metal containers, before removal to a temporary storage facility and eventual disposal in the Area-E burial ground per DOE Order 5820.2A. The reservoir surveillance operations would generate 200 ft^3/yr of LLW. The quantity of LLW anticipated at SRS due to gas transfer systems and commercial sales/inertial confinement fusion target loading is 300 ft^3/yr.

B.2.2 Management of Hazardous/Toxic Waste Streams

The reservoir surveillance operations functions, gas transfer systems, and commercial sales/inertial confinement fusion target loading operations would not generate hazardous liquid or solid wastes.

B.2.3 Management of Nonhazardous Waste Streams

The reservoir surveillance operations functions would generate 82,125 gallons annually and 500 ft^3/yr, respectively, of liquid and solid nonhazardous wastes. Nonhazardous wastes would be sent to the onsite sanitary landfill for disposal.

Gas transfer systems and commercial sales/inertial confinement fusion target loading operations would generate 219,000 gallons annually and 500 ft^3/yr, respectively, of liquid and solid nonhazardous wastes.

The gas transfer systems process, in which component parts are cleaned using ethanol and water, would generate small quantities of wastewater. The wastewater is not expected to be hazardous, and will be disposed of at the onsite industrial wastewater treatment plant. The remaining gas transfer systems missions would not generate any liquid wastes. The commercial sales/inertial confinement fusion target-loading operation would not generate any wastewater effluents.

TABLE B2–2.—*Savannah River Site: Estimated Additional Wastes Associated With Relocated Functions*

	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
Product	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
Reservoir Surveillance Operations	None None	82,125 gal 500 ft^3	None 200 ft^3	None None
Gas Transfer Systems and Commercial Sales/ICF Target Loading	None None	219,000 gal 500 ft^3	None 300 ft^3	None None
Total **Liquid** **Solid**	None None	301,125 gal 1,000 ft^3	None 500 ft^3	None None

E4 3719

Source: SR DOE, 1992a.

B.3 Los Alamos National Laboratory (Section 3.3.3) Waste Management

As shown in table B3-1, high-power detonators and calorimeters operations at Mound are proposed for transfer to Los Alamos National Laboratory (LANL). The beryllium technology and pit support functions from RFP and neutron tube target loading from Pinellas would also be transferred to LANL. Table B3-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and solid mixed wastes associated with the relocated functions.

High-Power Detonators. This activity includes manufacture of detonator assemblies used in explosive devices, explosive powder processing, explosive component testing, surveillance, and assembly of precision electrical components.

Calorimeters. This activity is required for measurement of various heat-producing nuclear materials for accountability purposes. No new waste management facilities would be required for LANL to manage calorimeter waste streams.

Neutron Tube Target Loading. In this process, pure tritium gas is transferred from a uranium bed onto the assemblies where it is captured by a previously deposited, thin, metal film through the hydriding process.

Beryllium Technology. The liquid waste streams generated would include beryllium-contaminated process water, beryllium-contaminated dilute nitric acid solutions, and non-contaminated waste machine oils and lubricants. It is assumed that the only solvents used in the process would be the non-RCRA solvent "Water Chaser 140" and, possibly, small amounts of isopropyl alcohol (not in RCRA amounts). The solid wastes generated would include beryllium-contaminated scrap metal, beryllium-contaminated combustibles, and beryllium-contaminated non-metals. Several steps in the processing of beryllium would generate scrap metal in the form of fines, chips, prototype parts, destructive testing remnants, etc. Since the scrap beryllium is recyclable, it is not considered waste.

Pit Support Functions. Pit support function components could be manufactured in Building 141 where permitted beryllium activities currently take place.

B.3.1 Management of Radioactive Waste Streams

Low-level Waste. The high-power detonators, calorimeters, pit support function, and beryllium technology operations would generate no additional LLW.

It is expected that there will be as much as 30 gallons annually of liquid LLW from analysis dissolution and 200 ft^3/yr of solid LLW consisting of cloth, protective clothing, and contaminated tools generated. The liquid and solid LLW will be treated/solidified or packaged and stored on site until disposed of as solid LLW at LANL or an alternate offsite burial site.

TABLE B3–1.—*Operations Transferring to LANL*

Mound
High-Power Detonators Calorimeters
Pinellas
Neutron Tube Target Loading
RFP
Beryllium Technology Pit Support Functions

E4 3732

Mixed Waste. Only neutron tube loading is expected to generate any mixed waste. The estimated 20 ft^3/yr will be stored onsite until a disposal option can be identified.

TABLE B3–2.—*LANL: Estimated Additional Wastes Associated With Relocated Functions*

Product	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
High-Power Detonators	7,000 gal 205 ft^3	244,400 gal 2,000 ft^3	None None	None None
Calorimeters	None None	98,800 gal 2,000 ft^3	None None	None None
Neutron Tube Target Loading	None None	41,600 gal 2,000 ft^3	30 gal 200 ft^3	None 20 ft^3
Beryllium Technology Functions	500 gal 60 ft^3	26,000 gal 3,120 ft^3	None None	None None
Pit Support Functions	8 gal 40 ft^3	31,200 gal 1,560 ft^3	None None	None None
Total **Liquid** **Solid**	7,508 gal 305 ft^3	442,000 gal 10,680 ft^3	30 gal 200 ft^3	None 20 ft^3

E4 3733

Source: LA FDI, 1993; LA DOE, 1992.

B.3.2 Management of Hazardous Waste Streams

Calorimeter operations and neutron tube target loading would generate no hazardous liquid or solid wastes.

The high-power detonator operations would generate 7,000 gallons annually of liquid hazardous waste and 205 ft^3/yr of solid hazardous waste after onsite processing and incineration. Liquid waste would include high explosive (HE)-contaminated solvents. Solid waste would include scrap HE, HE-contaminated metal parts, HE-contaminated solid waste, epoxies, and glues. No new storage facilities would be required to store these wastes. All HE hazardous waste and potentially contaminated HE waste is picked up by LANL and delivered to the TA-16 incinerator or flash pad where it is burned. Ash residue is treated to remove its hazardous characteristics and the residue disposed of in the industrial non-RCRA landfill. All developer and fix photo wastes, ferric chloride and sodium hydroxide liquid, and solid hazardous wastes would be packaged for transport and incineration at offsite RCRA-approved facilities by a commercial contractor.

Beryllium technology functions would generate 500 gallons annually of liquid hazardous wastes from acid etching of steel cans and solvent baths. Sixty ft^3/yr (ten 55-gallon drums) of solid hazardous wastes from dust collectors, high efficiency particulate air (HEPA) filters, and residue from destructive testing will also be generated. Beryllium activities are currently conducted in LANL Building 141. No additional waste management facilities would be necessary to support the additional waste streams.

Pit support functions would generate 8 gallons annually of liquid hazardous wastes from solvents used in parts cleaning, and 40 ft^3/yr of solid hazardous wastes from various miscellaneous metal-contaminated materials, filters, tools, protective clothing, and destructive examination residues that cannot be recycled.

B.3.3 Management of Nonhazardous Waste Streams

The high power detonator facility would generate 2,000 ft^3/yr of nonhazardous solid wastes and 244,400 gallons annually of nonhazardous liquid

wastes. Nonhazardous solid wastes would be disposed of at an offsite sanitary landfill.

The neutron tube target loading facility would generate 2,000 ft^3/yr of nonhazardous solid wastes and 41,600 gallons annually of nonhazardous liquid wastes. Acidic wastewater from various analyses and lab uses will be treated in the wastewater treatment plant. The disposal of nonhazardous solid wastes would be disposed of at an offsite sanitary landfill.

The calorimeter operations would generate 2,000 ft^3/yr of nonhazardous solid wastes and 98,800 gallons annually of nonhazardous liquid wastewater effluents. The solid wastes would be checked for radiation, stored in 55-gallon drums, and sent offsite for disposal in a sanitary landfill. The liquid waste stream would be treated in the onsite industrial wastewater treatment system.

The beryllium technology functions would generate 26,000 gallons annually of wastewater effluent, which would be treated onsite at the LANL wastewater treatment plant. This function would also generate 3,120 ft^3/yr of solid nonhazardous waste that would be disposed of at an offsite sanitary landfill.

The pit support functions would generate 31,200 gallons annually of liquid nonhazardous wastes, which would be treated onsite at the LANL wastewater treatment plant. This function would also generate 1,560 ft^3/year of solid nonhazardous waste that would be disposed of at an offsite sanitary landfill.

B.4 Y-12 Plant (Section 3.3.4) Waste Management

Beryllium technology and pit support functions from RFP might be relocated to Y-12 Plant, Oak Ridge Reservation (Y-12). Table B4-1 lists the two operations proposed for transfer to Y-12. These operations are discussed in section B.3. Table B4-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and liquid and solid mixed wastes associated with the relocated functions. Process-specific wastes, generation rates, and waste management alternatives are shown in table B4-3. Beryllium technology and pit support function waste streams are described in section B.4.1.

Table B4–1.—*Operations Transferring to Y-12*

RFP
Beryllium Technology
Pit Support Functions

E4 3756

B.4.1 Management of Radioactive Waste Streams

Due to relocation of the beryllium technology and pit support functions, 22.2 ft^3/yr of additional solid LLW would be generated at Y-12. The LLW would be compacted, if necessary, in the Y-12 Waste Feed Preparation Facility, placed in metal 4 ft x 6 ft x 4 ft waste storage boxes, and temporarily stored in the salvage yard. No liquid LLW or mixed wastes would be generated.

B.4.2 Management of Hazardous/Toxic Waste Streams

Beryllium technology functions would generate less than 100 gallons annually of liquid organic hazardous wastes. These wastes would be treated and disposed of in the K-25 *Toxic Substances Control Act* (TSCA) incinerator. An estimated 4,210 gallons annually of liquid aqueous hazardous wastes would be treated in the West End Treatment Facility and Central Pollution Control Facility waste treatment facilities at Y-12. An estimated 632 ft^3/yr of solid hazardous waste sludges would be stored at the Y-12 tank farm and removed offsite to RCRA-permitted disposal facilities. Other solid hazardous wastes (less than 318 ft^3/yr) would be

TABLE B4–2.—*Y-12 Plant: Estimated Additional Annual Wastes Associated with Relocated Functions*

Product	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
Beryllium Technology and Pit Support Functions	4,310 gal 950 ft^3 [a]	3,579 gal [b] Negligible	None [c] 22.2 ft^3	None None
Total	4,310 gal 950 ft^3 [a]	3,579 gal [b] Negligible	None 22.2 ft^3	None None

B4 3757

[a] Assumes 15 percent sludge generated from water during treatment at the Y-12 Central Pollution Control Facility and West End Treatment Facility.

[b] This amount is Central Pollution Control Facility & West End Treatment Facility–treated water discharged into East Fork Poplar Creek.

[c] The LLW machine coolant, identified in table B4-3, is first treated at the Waste Coolant Processing Facility in which the organics are removed. The remaining LLW aqueous waste is then taken to the West End Treatment Facility or Central Pollution Control Facility for further treatment. After treatment a small amount of LLW solid and nonhazardous liquid remains. These quantities are included in the LLW solid and nonhazardous liquid columns.

Source: Y-12 DOE, 1992b.

disposed of onsite in a new hazardous waste landfill. No additional waste management facilities would be necessary to support the additional waste streams.

Pit support functions would generate small quantities of various metallic wastes as a result of the shell and tube component manufacture. These wastes would be recycled or stored for future disposal.

B.4.3 Management of Nonhazardous Waste Streams

The beryllium technology functions and the pit support functions would generate 3,579 gallons annually of wastewater effluents, which would be treated onsite at the Y-12 wastewater treatment plants. Negligible amounts of solid nonhazardous waste would be generated.

TABLE B4–3.—*Y-12 Plant: Process–Specific Wastes, Generation, and Waste Management Alternatives*
[Page 1 of 2]

Category	Description	Generation Point(s)[a]	Estimated Generation Rate	Waste Handling Procedures/Facilities
Aqueous Waste	Beryllium (Be)-contaminated, nonradioactive process water	MACH, PH, UC	3,600 gal/yr	Ship to Y-12 Central Pollution Control Facility (CPCF) for Be removal
Solid, Non-RCRA Hazardous Waste	Nonsolvent contaminated. Be-contaminated wipes, rags, gloves, plastic bags and other combustibles	VIM, MACH, PH	Variable < 5 drums/yr	Declare "no-radiation added" and ship to offsite secure hazardous landfill or Convert to beryllium oxide (BeO) and dispose of in Y-12 permitted landfill or Store onsite
Recyclable Feed	Be metal scrap (fines, chips, spilled powder, scrap parts, etc.)	VIM, MACH, GA, PH	Variable	Recycle–NA
Recyclable Scrap Metal and Nonrecyclable Scrap Metal (Solid Non-RCRA Hazardous Waste)	Be-contaminated scrap metal (elements, shielding, foils, machine tools, steel tooling, etc.)	VIM, HT, MACH, GA, PH, BRAZ	Variable < 1 drum/yr	Decontaminate via surface cleaning and recycle metal as scrap. Process cleaning water as process water above or For non-cleanable metals, prove "no radiation added" and ship to offsite secure (RCRA) landfill or Store onsite (Y-12 Salvage Yard) in 8 ft x 8 ft x 20 ft waste storage boxes
Free Gases and Emissions	Helium (He), Argon (Ar) process gas exhausts, Be particulates	GA, HIP, VIM, PH, HT	Variable	Existing air permits for tie-in sources will be upgraded as required for beryllium
Solid, Non-RCRA Hazardous Waste	Be-contaminated floor sweepings	VIM, PH, MACH, GA	<2 drums/yr	Declare "no radiation added" and ship to offsite secure landfill or Store onsite
Liquid Organic Waste	Noncontaminated hydraulic oils and lubricants	MACH, GA, HT	<100 gal/yr	Store and analyze. Declare "no radiation added" and ship to offsite disposal or Store onsite for future Toxic Substances Control Act (TSCA) incineration

E4 3758-1

Footnotes at end of table.

TABLE B4–3.—*Y-12 Plant: Process–Specific Wastes, Generation, and Waste Management Alternatives*—Continued
[Page 2 of 2]

Category	Description	Generation Point(s)[a]	Estimated Generation Rate	Waste Handling Procedures/Facilities
Solid, Nonhazardous Waste	Metal machine turnings & other nonhazardous metal scrap (stainless steel (SS), titanium (Ti), tantalum (Ta), vanadium (Va), etc.)	MACH, SF	3 drums/yr	Treat as low-radiation contaminated metallic waste and send to Y-12 Salvage Yard to be stored in 8 ft x 8 ft x 20 ft waste storage boxes
Liquid Aqueous Wastes	LLW machine coolant (Trimsol)	MACH	2 drums/yr	Treated at Y-12 West End Treatment Facility
Aqueous Wastes	Be-contaminated nitric acid solutions	DECAN	<500 gal/yr	Send to Y-12 West End Treatment Facility
Solid, Non-RCRA Hazardous Waste	Be-contaminated HEPA filters & prefilters	9201-5 3rd floor exhaust system	Est. 60 filters/yr (240 ft^3/yr uncompacted)	Convert to BeO and dispose of in Y-12 landfill or Declare "no radiation added" and ship to offsite secure landfill
Solid Nonhazardous	Be-contaminated Oil/coolant filters	MACH	Variable <1 drum/yr	Long term storage as RCRA in the Containerized Waste Storage Area. Keep as "no radiation added"
Solid, Non-RCRA Hazardous	Be-contaminated graphite	VIM, GA	<200 lb/yr	Convert to BeO and dispose of in Y-12 landfill or For noncleanable metals, prove "no radiation added" and ship to offsite secure landfill or Bag and store onsite in 4 ft x 6ft x 4ft waste storage boxes

E4 3758-2

[a] Abbreviations used for generation points are as follows:
BRAZ = brazing; DECAN = can dissolution; GA = gas atomization; HIP = hot isostatic pressing; HT = post machining heat treat; IG = impact grinding; MACH = machining operations; NNS = near net shape forming process; PH = powder handling (NNS step); SF = spinforming; UC = ultrasonic cleaning; VIM = vacuum induction melting;.

Source: Y-12 DOE, 1992b.

B.5 SANDIA NATIONAL LABORATORIES, NEW MEXICO (SECTION 3.3.5) WASTE MANAGEMENT

As shown in table B5-1, neutron generators, thermal batteries, and cap assemblies operations at Pinellas and milliwatt heat source surveillance from Mound are proposed for transfer to Sandia National Laboratories, New Mexico (SNL). Table B5-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and liquid and solid mixed wastes associated with the relocated functions.

Neutron Generators. Additional waste would be generated at SNL as a result of the relocation of the neutron generator manufacturing capability. Effluent wastewaters in the form of liquid sanitary sewage, industrial wastewater, and tritium-contaminated waste consisting of solids and water would result from the operation of the neutron generator function. Various neutron generator fabrication steps produce hydrogen waste. Metal machining and forming operations during neutron tube assembly generate a contaminated coolant stream. Chemical cleaning is a small batch-type operation utilizing degreasers, cleansers, solvents, and acids that become contaminated with metals that generate a liquid chemical waste stream. Metallizing, involving airbrush screen painting and hand-painting, generates paint waste. Plating and firing operations occasionally generate a spent plating solution waste stream.

TABLE B5–1.—*Operations Transferring to Sandia National Laboratories, New Mexico*

Mound
Milliwatt Heat Source Surveillance
Pinellas
Neutron Generators
Thermal Batteries
Cap Assemblies

E4 3759

Thermal Batteries. Additional effluent wastewaters in the form of liquid sanitary sewage and process wastewater would result from the operation of the thermal battery facility.

Cap Assemblies. Additional effluent wastewaters in the form of liquid sanitary sewage and process and industrial wastewater would result from the operation of the cap assemblies facility.

Milliwatt Heat Source Surveillance. Additional waste would be generated at SNL as a result of the relocation of milliwatt heat source surveillance activities. These activities involve thermal aging, pressure-vent testing, and evaluation of heat source container samples. Liquid and solid hazardous waste and nonhazardous wastes would be generated.

B.5.1 Management of Radioactive Waste Streams

Low-level Waste. The neutron generator function could generate up to 100 gallons annually of LLW tritiated wastewater. The tritium-contaminated water would be collected in drums at the source. This water would be treated by solidification or an approved alternate technology, and disposed of at an approved site.

The neutron generator function may generate 294 ft^3/year of solid LLW in the tritium management area due to wiping tritium-contaminated surfaces with wipes and solvents. Solid LLW would be taken to the Radioactive and Mixed Waste Management Facility (Building 6920). If necessary, to meet transportation or disposal site requirements, the LLW would be repackaged. It would then be shipped to an authorized offsite disposal site. The Radioactive and Mixed Waste Management Facility is expected to begin operation in 1996.

There are no radioactive wastes from thermal batteries production and milliwatt heat source surveillance.

TABLE B5–2.—*SNL: Estimated Additional Wastes Associated With Relocated Functions*

Product	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
Cap Assemblies	250 gal	216,000 gal	None	None
	3 ft^3	800 ft^3	None	0.005 ft^3
Neutron Generators	1,000 gal	3,000,000 gal	100 gal	None
	150 ft^3	8,500 ft^3	294 ft^3	None
Thermal Batteries	None	None	None	None
	44 ft^3	None	None	None
Milliwatt Heat Source Surveillance	2 gal	None	None	None
	12 ft^3	40 ft^3	None	None
Total **Liquid**	1,252 gal	3,216,000 gal	100 gal	None
Solid	209 ft^3	9,340 ft^3	294 ft^3	0.005 ft^3

E4 3760

Source: SN DOE, 1992d; SN FDI, 1992.

Mixed Waste. The only relocated function to generate any mixed waste is cap assemblies. Approximately 0.005 ft^3/yr of solid mixed wastes would be generated from this function.

B.5.2 Management of Hazardous/Toxic Waste Streams

The neutron generator function would generate 1,000 gallons annually of liquid hazardous wastes and 150 ft^3/yr of solid hazardous wastes. The hazardous wastes would be stored in local accumulation areas before transfer to the SNL hazardous waste storage area.

Thermal batteries function would generate 44 ft^3/yr of solid hazardous waste. Waste would be stored in local accumulation areas and then transferred to the SNL hazardous waste storage area.

The cap assemblies would generate approximately 250 gallons annually of additional liquid hazardous wastes and 3 ft^3/yr of solid hazardous wastes. Waste would be stored in local accumulation areas and then transferred to the SNL hazardous waste storage area.

Milliwatt heat source surveillance would generate 2 gallons annually of additional liquid hazardous waste and 12 ft^3/yr of additional solid hazardous waste. Waste would be stored in local accumulation areas and then transferred to the SNL hazardous waste storage area.

Acidic or basic wastes not disposed of through SNL's hazardous waste program would be neutralized at the Building 870 Chemical Wastewater Neutralization Facility.

B.5.3 Management of Nonhazardous Waste Streams

Neutron generator operations would generate 3 million gallons per year (MGY) of liquid sanitary wastewater effluent. Administrative offices and the cafeteria produce nonhazardous sanitary solid wastes and sanitary sewage. The medical department would produce nonhazardous sanitary sewage. Sanitary sewage would be sent directly to a Kirtland Air Force Base (KAFB) sanitary sewer system and then to the city of Albuquerque sanitary sewer system to be treated at the municipal wastewater treatment plant. The estimated sanitary sewage flow is 35,000 GPD (12.25 MGY based on 350 days per year).

Neutron generator operations would generate 8,500 ft^3/yr of nonhazardous solid wastes. These wastes would be disposed of in the onsite sanitary landfill.

The thermal batteries functions would result in no increase in sanitary sewage or chemical wastewater volume. Existing sanitary tie-ins and chemical drain system would be utilized.

Cap assemblies would generate 216,000 gallons annually of liquid sanitary wastewater effluent, and 800 ft^3/yr of solid nonhazardous waste. The solid wastes would be disposed of in the onsite sanitary landfill.

Milliwatt heat source surveillance would generate no additional liquid nonhazardous waste but would generate 40 ft^3/yr of additional solid nonhazardous waste. The solid wastes would be disposed of in the onsite sanitary landfill.

APPENDIX C

APPENDIX C: WASTE MANAGEMENT CONSOLIDATION ALTERNATIVES

This appendix discusses the waste management of the alternative consolidation sites of the Mound Plant (Mound), the Pinellas Plant (Pinellas), and the Rocky Flats Plant (RFP).

C.1 MOUND ALTERNATIVE (SECTION 3.4.1)

The additional consolidation wastes generated from the nonnuclear consolidation at Mound are low-level wastes (LLW), hazardous/toxic wastes, and nonhazardous wastes. No mixed waste generation is projected.

C.1.1 Radioactive Waste Management

The additional consolidation LLW volumes, based on 1991 as a representative year, are estimated at 15 ft^3/yr. The additional LLW includes: tritium exit signs, smoke detectors, irradiated components and analytical equipment sources that have been declared excess; static master brushes; gap tubes removed from electronic assemblies; and small amounts of contaminated clean-up towels, disposable gloves, and packing materials.

All liquid LLW would be solidified in concrete or plaster of paris prior to being temporarily stored in an indoor, limited-access storage area. LLW would be transferred offsite for final disposal.

Mixed waste could be potentially generated from equipment sources in leaded shielding or cleanup debris. The mixed wastes would be stored in the same area as LLW in a *Resource Conservation and Recovery Act* (RCRA)-permitted facility.

C.1.2 Hazardous/Toxic Waste Management

All existing hazardous/toxic wastes generated at Mound are currently shipped offsite for treatment or disposal. Prior to offsite shipment, all hazardous/toxic waste is packaged in Department of Transportation (DOT)-approved containers, usually 55-gallon drums. Plating bath waste and other corrosive wastes are packaged in polyethylene-lined steel drums or other chemically-compatible containers. Small quantity lab chemical wastes are sorted by hazard class and placed in 55-gallon drums for offsite landfill disposal or incineration.

Onsite storage facilities include a building and storage tanks constructed and equipped to comply with Environmental Protection Agency (EPA) hazardous waste storage requirements. The building is divided into three storage areas to maintain segregation of incompatible materials. These are: liquid waste, solid waste, and miscellaneous laboratory waste areas. The liquid waste area contains all liquid drummed wastes, which include waste epoxy resin, waste methylene chloride/resin, and chemical waste streams awaiting disposal approval, including laboratory packs. The solid waste area stores solidified process solutions, batteries, solid debris, and off-specification materials. The miscellaneous laboratory waste area stores miscellaneous laboratory chemicals until properly identified and classified for packaging, shipping, and disposal.

All bulk liquid waste streams are stored in above-ground, concrete-diked storage tanks with the exception of nonhazardous petroleum-based oils, which are held in a storage tank. Chemicals stored in separate tanks include flammable liquids,

halogenated hydrocarbons, waste polychlorinated biphenyls (PCB), caustic and acid solutions, and nonhazardous metal cutting coolant. Hazardous/toxic wastes generated at the plant site are shipped to commercial treatment facilities or to offsite disposal facilities.

Table C1-1 summarizes the increase of the hazardous/toxic wastes and the disposal method. The additional liquid hazardous wastes and solid hazardous/toxic wastes are shown in table C1-2 and C1-3 for the nonnuclear consolidation at Mound.

TABLE C1–1.—*Mound Alternative: Waste Management of Additional Hazardous/Toxic Waste*

Waste Stream	Disposal Method	Volume (ft^3/yr)[a]			
		Kansas City	Rocky Flats	Pinellas	Total [c]
Acid Liquid Bulk	Incineration/ Recovery	380	40	b	420
Alkaline	Incineration/ Recovery	970	b	b	970
Oil/Coolants	Incineration	750	1,060	b	1,810
Halogenated & Nonhalogenated Solvent	Incineration	1,510	20	20	1,550
Resin, Paint, Curing Agent, Adhesive & Rubber	Incineration	1,510	b	b	1,510
Toluene Diisocyanate	Incineration	70	b	b	70
Cyanide, Liquid	Cyanide Destruction	40	b	b	40
Cyanide Salts	Recovery	10	b	b	10
Mercury Contaminated Debris	Landfilled	20	b	b	20
F006, F009 Sludge	Landfilled	4,200	b	b	4,200
Batteries (others)	Recovery/ Landfilled	100	b	b	100
Classified Hazardous	Declassified/ Landfilled	10	b	b	10
Acid/Chromate Contaminated Debris	Incineration	160	b	b	160
Cyanide/Alkaline Contaminated Debris	Incineration	100	b	b	100
Miscellaneous Lab Reagent/Off Spec. Product	Incineration/ Landfilled	70	b	b	70
Non-Empty Aerosol Cans	Incineration	590	b	b	590
Solvent/Oil Contaminated Debris & Miscellaneous	Incineration	6,830	80	50	6,960
Compressed Gas Cylinders	Destruction/ Incineration	30	b	b	30
Total		17,350	1200	70	18,620

E4 4108

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

TABLE C1–2.—*Mound Alternative: Additional Liquid Hazardous/Toxic Wastes (ft^3/yr)*[a]

Waste Stream	Kansas City	Rocky Flats	Pinellas	Total[c]
Acid Liquid, Bulk	380	40	b	420
Alkaline Liquid	970	b	b	970
Oil/Coolants	750	1,060	b	1,810
Halogenated & Nonhalogenated Solvent	1,510	20	20	1,550
Resin, Paint, Curing Agent, Adhesive & Rubber	1,510	b	b	1,510
Toluene Diisocyanate	70	b	b	70
Cyanide, Liquid	40	b	b	40
Total	5,230	1,120	20	6,370

E4 4107

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft^3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

TABLE C1–3.—*Mound Alternative: Additional Solid Hazardous/Toxic Wastes (ft^3/yr)*[a]

Waste Stream	Kansas City	Rocky Flats	Pinellas	Total[c]
Cyanide Salts	10	b	b	10
Mercury Contaminated Debris	20	b	b	20
F006, F0019 Sludge	4,200	b	b	4,200
Batteries (Others)	100	b	b	100
Classified Hazardous	10	b	b	10
Acid/Chromate Contaminated Debris	160	b	b	160
Cyanide/Alkaline Contaminated Debris	100	b	b	100
Misc. Lab Reagent/Off Spec. Product	70	b	b	70
Non-Empty Aerosol Cans	590	b	b	590
Solvent/Oil Contaminated Debris & Misc.	6,830	80	50	6,960
Compressed Gas Cylinders	30	b	b	30
Total	12,120	80	50	12,250

E4 4113

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft^3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

C.1.3 Nonhazardous Waste Management

Mound currently has an activated sludge process to treat the sanitary waste generated throughout the site. The sewage treatment plant provides secondary treatment of sanitary waste using biologically extended aeration with disinfection. The treatment consists of primary settling, aeration, sludge digestion, clarification, and chlorination. After processing, the sanitary sludge is sent to a belt dryer, mixed with flyash and sorbond, and packaged for offsite disposal. The sanitary effluent is discharged through a pipe to the Great Miami River. The quantity of the sanitary effluent is monitored continuously to document compliance with the Mound National Pollutant Discharge Elimination

System (NPDES) permit. The sewage treatment plant has a capacity of approximately 47.4 million gallons per year (MGY). The additional wastewater to be handled due to consolidation at Mound is 132 MGY.

The additional solid nonhazardous wastes for the nonnuclear consolidation at Mound is estimated at approximately 359,000 ft^3/yr.

C.2 PINELLAS ALTERNATIVE (SECTION 3.4.2)

The additional wastes generated from the nonnuclear consolidation at Pinellas are LLW, hazardous/toxic wastes, and nonhazardous wastes. No mixed waste generation is projected.

C.2.1 Radioactive Waste Management

See section C.1.1 for discussion of radioactive waste management associated with nonnuclear consolidation for the alternative sites.

C.2.2 Hazardous/Toxic Waste Management

The additional required hazardous waste management facilities include onsite storage and offsite disposal facilities. Onsite storage facilities include a building and storage tanks constructed and equipped to comply with EPA hazardous waste storage requirements. The building is divided into three storage areas to maintain segregation of incompatible materials. These are: liquid waste, solid waste, and miscellaneous laboratory waste areas. The liquid waste area contains all liquid drummed wastes which include waste epoxy resin, waste methylene chloride/resin, and chemical waste streams awaiting disposal approval, including laboratory packs. The solid waste area stores solidified process solutions, batteries, solid debris, and off-specification materials. The miscellaneous laboratory waste area stores miscellaneous laboratory chemicals until properly identified and classified for packaging, shipping, and disposal.

All bulk liquid waste streams are stored in above-ground, concrete-diked storage tanks with the exception of nonhazardous petroleum-based oils, which are held in a storage tank. Chemicals stored in separate tanks include flammable liquids, halogenated hydrocarbons, caustic and acid solutions, and nonhazardous metal cutting coolant. Hazardous/toxic wastes generated at the plant site are shipped to commercial treatment facilities or to offsite disposal facilities.

Table C2-1 summarizes the increase of the hazardous/toxic wastes and the disposal method. The additional liquid hazardous/toxic wastes and solid hazardous/toxic wastes are shown in table C2-2 and C2-3 for the nonnuclear consolidation at Pinellas.

C.2.3 Nonhazardous Waste Management

Pinellas is currently treating industrial wastewater by equalization/neutralization onsite, then mixing it with site-generated sanitary waste. This combined waste is then discharged to the municipal wastewater treatment facility. The existing Pinellas discharge rates for the industrial wastes and sanitary wastes are approximately 43 MGY and 29 MGY, respectively. The existing combined discharge rate is 72 MGY. The additional wastewater discharge rates due to the consolidation is approximately 153 MGY. The existing sanitary sewage treatment system has a capacity of approximately 110 MGY.

The additional solid nonhazardous wastes for the nonnuclear consolidation at Pinellas is estimated at approximately 473,000 ft^3/yr.

TABLE C2–1.—*Pinellas Alternative: Waste Management of Additional Hazardous/Toxic Waste*

Waste Stream	Disposal Method	Volume (ft^3/yr)[a]			
		Kansas City	Mound	Rocky Flats	Total[c]
Acid Liquid Bulk	Incineration/ Recovery	380	40	40	460
Alkaline	Incineration/ Recovery	970	30	b	1,000
Oil/Coolants	Incineration	750	400	1,060	2,210
Halogenated & Nonhalogenated Solvent	Incineration	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	Incineration	1,510	b	b	1,510
Toluene Diisocyanate	Incineration	70	b	b	70
Cyanide, Liquid	Cyanide Destruction	40	b	b	40
Cyanide Salts	Recovery	10	b	b	10
Mercury Contaminated Debris	Landfilled	20	b	b	20
F006, F009 Sludge	Landfilled	4,200	b	b	4,200
Batteries (others)	Recovery/ Landfilled	100	b	b	100
Classified Hazardous	Declassified/ Landfilled	10	b	b	10
Acid/Chromate Contaminated Debris	Incineration	160	b	b	160
Cyanide/Alkaline Contaminated Debris	Incineration	100	b	b	100
Miscellaneous Lab Reagent/Off Spec. Product	Incineration/ Landfilled	70	b	b	70
Non-Empty Aerosol Cans	Incineration	590	b	b	590
Solvent/Oil Contaminated Debris & Miscellaneous	Incineration	6,830	110	80	7,020
Compressed Gas Cylinders	Destruction/ Incineration	30	b	b	30
Total		17,350	650	1,200	19,200

E4 4114

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

TABLE C2–2.—*Pinellas Alternative: Additional Liquid Hazardous/Toxic Wastes (ft^3/yr)*[a]

Waste Stream	Kansas City	Mound	Rocky Flats	Total [c]
Acid Liquid, Bulk	380	40	40	460
Alkaline Liquid	970	30	b	1,000
Oil/Coolants	750	400	1,060	2,210
Halogenated & Nonhalogenated Solvent	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	1,510	b	b	1,510
Toluene Diisocyanate	70	b	b	70
Cyanide, Liquid	40	b	b	40
Total	5,230	540	1,120	6,890

E4 4110

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

TABLE C2–3.—*Pinellas Alternative: Additional Solid Hazardous/Toxic Wastes (ft^3/yr)*[a]

Waste Stream	Kansas City	Mound	Rocky Flats	Total [c]
Cyanide Salts	10	b	b	10
Mercury Contaminated Debris	20	b	b	20
F006, F0019 Sludge	4,200	b	b	4,200
Batteries (Others)	100	b	b	100
Classified Hazardous	10	b	b	10
Acid/Chromate Contaminated Debris	160	b	b	160
Cyanide/Alkaline Contaminated Debris	100	b	b	100
Misc. Lab Reagent/Off Spec. Product	70	b	b	70
Non-Empty Aerosol Cans	590	b	b	590
Solvent/Oil Contaminated Debris & Misc.	6,830	110	80	7,020
Compressed Gas Cylinders	30	b	b	30
Total	12,120	110	80	12,310

E4 4112

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

C.3 ROCKY FLATS ALTERNATIVE (SECTION 3.4.3)

The additional wastes generated from the nonnuclear consolidation at RFP are LLW, hazardous/toxic wastes, and nonhazardous wastes. No mixed waste generation is projected.

C.3.1 Radioactive Waste Management

See section C.1.1 for discussion of radioactive waste management associated with nonnuclear consolidation for the alternative sites.

C.3.2 Hazardous/Toxic Waste Management

All existing hazardous/toxic wastes generated at RFP are currently shipped offsite for treatment or disposal. The additional required hazardous waste management facilities include onsite storage and offsite disposal facilities.

Onsite storage facilities include a building and storage tanks constructed and equipped to comply with EPA hazardous waste storage requirements. The building is divided into three storage areas to maintain segregation of incompatible materials. These are: liquid waste, solid waste, and miscellaneous laboratory waste areas. The liquid waste area contains all liquid drummed wastes, which include waste epoxy resin, waste methylene chloride/resin, and chemical waste streams awaiting disposal approval, including laboratory packs. The solid waste area stores solidified process solutions, batteries, solid debris, and off-specification materials. The miscellaneous laboratory waste area stores miscellaneous laboratory chemicals until properly identified and classified for packaging, shipping, and disposal requirements.

All bulk liquid waste streams are stored in above-ground, concrete-diked, storage tanks with the exception of nonhazardous petroleum-based oils, which are held in a storage tank. Chemicals stored in separate tanks include flammable liquids, halogenated hydrocarbons, waste PCBs, caustic and acid solutions, and nonhazardous metal cutting coolant. Hazardous/toxic wastes generated at the plant site are shipped to commercial treatment facilities or to offsite disposal facilities.

Table C3-1 summarizes the increase of the hazardous/toxic wastes and the disposal method. The additional liquid hazardous wastes and solid hazardous wastes are shown in tables C3-2 and C3-3, respectively, for the nonnuclear consolidation at RFP.

C.3.3 Nonhazardous Waste Management

RFP currently has an activated sludge process to treat the sanitary waste generated throughout the site. The sewage treatment plant provides secondary treatment of sanitary waste using biologically extended aeration with disinfection. The treatment consists of primary settling, aeration, sludge digestion, clarification, and chlorination. After processing, the sanitary sludge is digested and then dried before being sent to the RFP landfill, which is located within the buffer zone. The sanitary effluent is discharged to Pond 3 for recycling or is used for irrigation.

Due to consolidation, the additional wastewater to be handled at RFP is 148 MGY. The overall sanitary sewage treatment plant capacity is 150 MGY.

The additional amount of nonhazardous solid wastes for the nonnuclear consolidation at RFP is estimated at approximately 430,000 ft^3/yr.

TABLE C3–1.—*Rocky Flats Alternative: Waste Management of Additional Hazardous/Toxic Waste*

Waste Stream	Disposal Method	Volume (ft^3/yr) [a]			
		Kansas City	Mound	Pinellas	Total [c]
Acid Liquid Bulk	Incineration/ Recovery	380	40	b	420
Alkaline	Incineration/ Recovery	970	30	b	1,000
Oil/Coolants	Incineration	750	400	b	1,150
Halogenated & Nonhalogenated Solvent	Incineration	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	Incineration	1,510	b	b	1,510
Toluene Diisocyanate	Incineration	70	b	b	70
Cyanide, Liquid	Cyanide Destruction	40	b	b	40
Cyanide Salts	Recovery	10	b	b	10
Mercury Contaminated Debris	Landfilled	20	b	b	20
F006, F009 Sludge	Landfilled	4,200	b	b	4,200
Batteries (others)	Recovery/ Landfilled	100	b	b	100
Classified Hazardous	Declassified/ Landfilled	10	b	b	10
Acid/Chromate Contaminated Debris	Incineration	160	b	b	160
Cyanide/Alkaline Contaminated Debris	Incineration	100	b	b	100
Miscellaneous Lab Reagent/Off Spec. Product	Incineration/ Landfilled	70	b	b	70
Non-Empty Aerosol Cans	Incineration	590	b	b	590
Solvent/Oil Contaminated Debris & Miscellaneous	Incineration	6,830	110	50	6,990
Compressed Gas Cylinders	Destruction/ Incineration	30	b	b	30
Total		17,350	650	70	18,070

E4 4115

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

TABLE C3–2.—*Rocky Flats Alternative: Additional Liquid Hazardous/Toxic Wastes (ft^3/yr)*[a]

Waste Stream	Kansas City	Mound	Pinellas	Total [c]
Acid Liquid, Bulk	380	40	b	420
Alkaline Liquid	970	30	b	1,000
Oil/Coolants	750	400	b	1,150
Halogenated & Nonhalogenated Solvent	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	1,510	b	b	1,510
Toluene Diisocyanate	70	b	b	70
Cyanide, Liquid	40	b	b	40
Total	5,230	540	20	5,790

E4 4109

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

TABLE C3–3.—*Rocky Flats Alternative: Additional Solid Hazardous/Toxic Wastes (ft^3/yr)*[a]

Waste Stream	Kansas City	Mound	Pinellas	Total [c]
Cyanide Salts	10	b	b	10
Mercury Contaminated Debris	20	b	b	20
F006, F0019 Sludge	4,200	b	b	4,200
Batteries (Others)	100	b	b	100
Classified Hazardous	10	b	b	160
Acid/Chromate Contaminated Debris	160	b	b	100
Cyanide/Alkaline Contaminated Debris	100	b	b	100
Misc. Lab Reagent/Off Spec. Product	70	b	b	70
Non-Empty Aerosol Cans	590	b	b	590
Solvent/Oil Contaminated Debris & Misc.	6,830	110	50	6,990
Compressed Gas Cylinders	30	b	b	30
Total	12,120	110	50	12,280

E4 4111

[a] Projected for 1995 workload.
[b] Not significant quantities (less than 10 ft^3/yr).
[c] Total does not include quantities noted in b.

Source: FDI, 1993.

APPENDIX D

APPENDIX D: AIR QUALITY AND ACOUSTICS

D.1 METHODOLOGY

The methodology used to assess potential impacts to air resources is described in this appendix. Models used and associated assumptions are described.

D.1.1 Air Quality

The assessment of air quality at each site requires applicable input data, including ambient air quality monitoring data representative of background conditions and emissions inventories of criteria hazardous and toxic pollutants. Concentrations determined from the modeling of these emissions are then compared to applicable standards and guidelines.

The Industrial Source Complex-Short Term (ISCST) model (EPA, 1986a), recommended by the Environmental Protection Agency (EPA), was used to model emissions. The ISCST model estimates dispersion of emissions from stack (point), area, and volume sources. The model estimates the dispersion from stack and volume sources using a steady-state Gaussian plume equation and estimates dispersion from area sources using the equation for a continuous and finite crosswind line source.

Field data have been used to evaluate the performance of the ISCST model including its point source submodel (EPA, 1977; EPRI, 1983, 1985, and 1988) and its special features, such as the gravitational settling/dry deposition option (EPA, 1981 and 1982) and the building downwash option (EPA, 1981; Schulman, 1986). The validation studies for the point source model (CRSTER) indicate that the model acceptably predicts the upper percentile of the frequency distribution of 1-hour (hr) concentrations and of the corresponding distributions of 24-hr concentrations. Concentrations over the remainder of the frequency distributions are significantly underpredicted. The highest second-highest 1-hr concentrations were predicted within a factor of two at two-thirds of the field sampling sites for elevated power plant plumes. The highest second-highest 24-hr concentrations were underpredicted by the model, with the ratio of predicted concentration to measured concentration ranging from 0.2 to 2.7 at approximately 90 percent of the sampling sites (EPA, 1977).

In other validation studies for the point source model, the CRSTER model predicted peak short-term (1-, 3-, and 24-hr) concentration values within 30-70 percent at a level, unobstructed site (EPRI, 1983). The CRSTER model predicted peak 1-hr concentrations within 2 percent and underpredicted peak 3-hr concentrations by approximately 30 percent at a moderately complex terrain site (EPRI, 1985). The ISCST model overpredicted 1-hr concentrations by approximately 60 percent, with better predictions for longer time periods at an urban site (EPRI, 1988). The gravitational settling/dry deposition and building downwash options improve the model's performance significantly over that of the model without such features (EPA, 1981 and 1982; Schulman, 1986).

The ISCST modeling was performed according to EPA's guideline on air quality modeling (EPA, 1986b). The model input data included the emissions inventories, source characteristics (stack height, stack diameter, exit velocity, and exit temperature), and one full year of hourly meteorological data and twice daily mixing height data. Emissions inventories and source characteristics were generally provided by each DOE site.

To achieve a conservative estimate, the "highest-high" concentration was selected for comparison to applicable standards and guidelines, instead of the "highest second-highest" concentration as recommended by the EPA (EPA, 1986b). This concentration was the maximum occurring at or beyond the site boundary.

Terrain data for the ISCST model were inputted for the sites considered to be other than "flat." The sites with terrain considered in the modeling were as follows: Kansas City Plant (KCP), the Mound Plant (Mound), Oak Ridge Reservation Y-12 Plant (Y-12), Los Alamos National Laboratory (LANL), and Rocky Flats Plant (RFP). The terrain data were based on information contained on U.S. Geological Survey topographical maps.

Required input data for the model were provided by each of the sites. The input parameters include emissions inventories (release rates) and source characteristics (stack height, stack diameter, and effluent velocity), meteorological data, source locations, and distances to the site boundary and critical receptors. Modeling was performed for all compounds that had projected emission rates greater then 100 lb/yr. However, modeling was performed for compounds at emission rates less than 100 lb/yr if emissions at these rates could cause an exceedance of Federal or state air quality standards or guidelines. This was accomplished by obtaining the maximum concentration at or beyond the site boundary for a compound emitted at 100 lb/yr. Since this concentration would be the same for any compound emitted at 100 lb/yr, the concentration was compared to applicable air quality standards for all other regulated compounds. If the air quality standard of a regulated compound could be exceeded by emissions below 100 lb/yr, then information on emission rates for the compound were requested from the appropriate DOE field office or from the architect/engineer (A&E). The concentration of the compound was then calculated and compared to applicable air quality standards. All exceedances of quality standards are discussed.

The emission rates for each pollutant were those provided by each site or by the Architect/Engineer who provided the design information. For most sources, data were provided on an annual emission rate basis in units of pounds per year or tons per year. The ISCST model requires units in pounds per hour. The data provided were converted to pounds per hour assuming that the source was operated for the entire year, or 8,760 hours (the number of hours in a year). Data generally were not available to determine actual operating hours.

Not all characteristics were provided for each emission source. In those cases, characteristics were assumed based on similar source configurations at the particular site, or from other sites with similar processes.

It was also assumed that the emissions for each site originated from a single point source located in the approximate center of each site. This assumption resulted in higher concentrations than would actually occur, since emission sources are generally geographically separated from one another.

Meteorological data were either provided by the site or obtained from representative offsite sources. These were generally collected at National Weather Service (NWS) stations, considered representative of onsite meteorology. Use of NWS data for modeling purposes is in accordance with EPA guidance (EPA, 1986b).

D.1.2 Acoustics

This section describes the analyses performed to assess noise impacts from the Proposed Action and each alternative. In-depth noise impact analyses of construction and operation for each site were not performed because the detailed information on the construction and design of these facilities necessary for such an analysis has not been developed. Analyses of traffic noise impacts have been performed for each site based on baseline traffic volumes and the maximum projected construction

and operation employment for each alternative. For those sites where more detailed analysis of employee distribution was performed, that information was incorporated in the traffic noise analysis.

To estimate the noise levels resulting from highway traffic for existing conditions and for each alternative, a computerized version of the Federal Highway Administration's Traffic Noise Prediction Model, Version OFA (FHWA, 1978) was used. The model calculations take into account the traffic volume and vehicle mix (i.e., automobiles, medium-duty trucks, and heavy-duty trucks), as well as the speed of traffic flow, number of lanes, and slope of the road. The modeling assumed that areas next to the roads were covered with vegetation and that there were no barriers along the roads. The model assumes standard day meteorological conditions (59 °F (15 °C), 70 percent relative humidity). Equivalent sound levels (L_{eq}) were estimated for the peak traffic hour. Noise level increases from highway traffic were estimated at a distance of 50 ft (15 meters) from the centerline of the nearest lane.

The criterion used to evaluate the degree of impact caused by intermittent traffic noise is based on the fact that noise levels, both in time and space, can fluctuate by as much as 5 decibels (dB). Previous experience shows that a change in noise level of less than 5 dB would not produce a significant change in community reaction to the noise (Stevens, 1955).

The performance of the Federal Highway Administration model has been verified with actual noise measurements (FHWA, 1978). The overall correlation coefficient for linear least-squares regression of 66 predicted values versus measured values at distances of 50, 100, and 200 feet (15, 30, and 60 meters) from the centerline of the nearest lane of the roadway was greater than 0.9. The correlation coefficient was higher (0.93) at 50 feet, but lower (0.86) at 200 feet. No measured value exceeded the predicted value by more than 3 dB, although the predicted value was sometimes as much as 5 dB greater than the measured value. The model overpredicts the higher end of noise levels at a given distance from the roadway centerline.

D.2 Affected Environment

This section provides supporting information related to the baseline environment for air quality and acoustics for each of the eight reconfiguration sites. Data are presented on applicable standards, background monitoring results, and relevant emissions inventories.

D.2.1 Air Quality

D.2.1.1 *Kansas City Plant*

KCP is located in Jackson County, MO, within the Metropolitan Kansas City Intrastate Air Quality Control Region (AQCR). This AQCR is designated as attainment for all criteria pollutants (40 CFR 81.326). An attainment area is any area that meets the national primary or secondary ambient air quality standard for the pollutant. The criteria pollutants are those for which national ambient air quality standards exist, defined in 40 CFR 50. These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2) or nitrogen oxides (NO_x), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}). The National Ambient Air Quality Standards (NAAQS) and Missouri ambient air quality standards are listed in table D2.1.1-1.

Ambient air quality within and near KCP is monitored at three site perimeter locations for each of the criteria pollutants. The data from each of these monitoring stations for 1990 are presented in table D2.1.1-2. With the exception of the ozone (1-hr) standard, the ambient air quality in the Bannister Federal Complex area does not exceed applicable guidelines or regulations. The ozone standard is exceeded primarily due to chemical reactions that involve vehicle emissions.

TABLE D2.1.1–1.—*Ambient Air Quality Standards ($\mu g/m^3$)* [Page 1 of 2]

Pollutant	Averaging Time	Primary NAAQS[a]	Secondary NAAQS[a]	Florida Standards	Colorado Standards[c]	Missouri Standards	South Carolina and Georgia Standards[d]	New Mexico Standards[c]	Tennessee Standards
Asbestos	30-day	b	b	b	b	b	b	0.01	b
Beryllium	24-hour	b	b	0.01	b	b	b	b	b
	30-day	0.01[1]	b	b	0.01	b	b	0.01	0.01
Carbon Monoxide (CO)	8-hour	10,000	b	10,000	10,000	10,000	10,000	9,667	10,000
	1-hour	40,000	b	40,000	40,000	40,000	40,000	14,971	40,000
Heavy Metals	30-day	b	b				b		b
Hydrogen Fluoride (HF)	30-day	b	b	b	b	b	0.8	b	1.2
	7-day	b	b	b	b	b	1.6	b	1.6
	24-hour	b	b	b	b	b	2.9	b	2.9
	12-hour	b	b	b	b	b	3.7	b	3.7
Hydrogen Sulfide (H_2S)	5-day	b	b	b	b	42[h]	b	b	b
	1-hour	b	b	b	142	b	b	112	b
	1/2 -hour	b	b	b	b	70[g]	b	b	b
Lead (Pb)	Calendar Quarter	1.5	1.5	1.5	b	1.5	1.5	1.5	1.5
	30-day	b	b	b	1.5	b	b	b	b
Nitrogen Dioxide (NO_2)	Annual	100	100	100	100	100	100	100	100
	24-hour	b	b	b	b	b	b	472	b
Nonmethane Hydrocarbons	3-hour	b	b	b	b	b	b	600[f]	b
Ozone (O_3)	1-hour	235	235	235	160	235	235	117.8	235
Particulate Matter (PM_{10})	Annual	50	50	50	50	50	50	b	50
	24-hour	150	150	150	150	150	150	b	150

Footnotes at end of table.

E4-4063-1

TABLE D2.1.1–1.—*Ambient Air Quality Standards ($\mu g/m^3$)*—Continued [Page 2 of 2]

Pollutant	Averaging Time	Primary NAAQS[a]	Secondary NAAQS[a]	Florida Standards	Colorado Standards[c]	Missouri Standards	South Carolina and Georgia Standards[d]	New Mexico Standards[c]	Tennessee Standards
Sulfur Dioxide (SO_2)	Annual	80	b	60	80	80	80	52	80
	24-hour	365	b	260	365	365	365	262	365
	3-hour	b	1,300	1,300	700	1,300	1,300	1,300	1,300
Total Reduced Sulfur (S)	1-hour	b	b	b	b	b	b	3.9	b
Total Suspended Particulates (TSP)	Annual[e]	b	b	b	b	b	75	60	60[k]
	30-day	b	b	b	b	b	b	90	b
	7-day	b	b	b	b	b	b	110	b
	24-hour	b	b	b	b	b	b	150	150[k]
Sulfuric Acid (H_2SO_4)	24-hour	b	b	b	b	10[i]	b	b	b
	1-hour	b	b	b	b	30[j]	b	b	b

E4 4063-2

a Ohio state standards are the same as the NAAQS. The NAAQS, other than those for O_3, PM_{10}, and those based on annual averages, are not to be exceeded more than once per year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is less than or equal to one. The 24-hour PM_{10} standard is attained when the expected number of days with a 24-hour average concentration above the standard is less than or equal to one. The annual arithmetic mean PM_{10} standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard.

b There is no standard.

c The Colorado and New Mexico annual standards are never to be exceeded; short-term standards are not to be exceeded more than once per year, unless otherwise noted.

d The Federal TSP standards have been replaced by the PM_{10} standards, but the annual TSP standard is retained in South Carolina.

e Geometric mean; all other means are arithmetic.

f Assumed to be benzene.

g 1/2-hour average not to be exceeded more than 2 times per year.

h 1/2-hour average not to be exceeded more than 2 times per year in any 5 consecutive days.

i 24-hour average not to be exceeded more than once in any 90 consecutive days.

j 1-hour average not to be exceeded more than once in any 2 consecutive days.

k TSP standards listed are secondary standards. Primary standards are 75 and 260 $\mu g/m^3$, respectively.

l NESHAP for beryllium. Beryllium emissions also limited to 10 grams over a 24-hour period.

Source: 40 CFR 50; FL DER, 1992; CO DOH, 1989; MO DNR, 1992; SC DHEC, 1989; LANL, 1990b; TN DH&E, 1991a.

TABLE D2.1.1–2.—*Existing Ambient Air Quality Data for Kansas City Plant*

Monitoring Station	Ambient Concentration ($\mu g/m^3$)											
	Sulfur Dioxide			Carbon Monoxide		Nitrogen Dioxide	TSP[b]		PM_{10}[c]		Lead	Ozone
	Annual	Max. 24-hour	Max. 3-hour	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Annual	Max. 24-hour	Max. Calendar Quarter	Max. 1-hour
KCP #1	3.4	13.0	35.8	40.0[a]	68.7	22.7	47.8	95.1	25.0	54.7	<0.1	263.1
KCP #2	3.8	16.2	42.7	3.0[a]	73.3	24.9	48.6	105.5	27.8	53.0	<0.1	243.4
KCP #3	2.9	18.8	63.7	5.2[a]	81.3	23.3	50.8	135.4	25.6	48.3	<0.1	261.1

E4 3702

[a] Indicates running average, the average of 8-hour periods beginning at each hour of the year.
[b] Total suspended particulate. Missouri has no TSP standard to compare with these data.
[c] Particulate matter less than 10 microns in diameter.

Source: KC ASAC, 1991e.

The principal sources of criteria air pollutants are from the four boilers serving the entire Bannister Federal Complex. Table D2.1.1-3 presents the emissions inventory from these sources.

Federal standards for Prevention of Significant Deterioration (PSD) were promulgated to regulations (40 CFR 52.21) in 1977. PSD is defined such that if increases in concentrations of SO_2, NO_2, and total suspended particulates (TSP) are above certain limits, those increases constitute "significant deterioration." The magnitude of the allowable increment depends upon the classification of the area affected, with a Class I area (National Parks, wilderness areas) having the smallest increment. Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at KCP.

Table D2.1.1-5 presents 1991 estimated and 1995 projected emission rates and maximum ground level concentrations of hazardous/toxic air pollutants from KCP. With the exception of hydrogen chloride, phosphoric acid, and sulfuric acid, concentrations are low in comparison to the proposed standards. Note that projected 1995 emission rates for 1,1,1-trichloroethane (TCA), dichlorodifluoromethane, trichloroethylene (TCE), and trichlorotrifluoroethane are significantly lower than estimated 1991 rates.

TABLE D2.1.1–3.—*Source Emissions Inventory for Kansas City Plant–Criteria Pollutants*

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	Boiler 1	2.01
	Boiler 2	5.40
	Boiler 3	0.02
	Boiler 4	3.54
Nitrogen Dioxide (NO_2)	Boiler 1	1.77
	Boiler 2	1.81
	Boiler 3	2.07
	Boiler 4	3.36
Sulfur Dioxide (SO_2)	Boiler 1	0.74
	Boiler 2	0.94
	Boiler 3	1.90
	Boiler 4	1.17
Total Suspended Particulates (TSP)	Boiler 1	0.02
	Boiler 2	0.005
	Boiler 3	0.06
	Boiler 4	0.03

E4 3703

Source: KC ASAC, 1991e.

Missouri has standards for the pollutants regulated by the National Emission Standards for Hazardous Air Pollutants (NESHAP). In May 1992, the Missouri Department of Natural Resources published guidance levels of hazardous air pollutants (HAP) and toxics. These include the 189 HAPs specified in the 1990 *Clean Air Act* Amendments (CAA).

TABLE D2.1.1–4.—*Maximum Allowable Prevention of Significant Deterioration Concentration Increments (all sites)*

Pollutant	Averaging Time	PSD Increment ($\mu g/m^3$)[a]		
		Class I	Class II	Class III
Nitrogen Dioxide (NO_2)	Annual	2.5	25	50
Sulfur Dioxide (SO_2)	Annual	2	20	40
	24-hour	5	91	182
	3-hour	25	512	700
Total Suspended Particulates (TSP)	Annual	5	19	37
	24-hour	10	37	75

E4 3568

[a] Short-term increments are not to be exceeded more than once per year.

Source: 40 CFR 52.21.

TABLE D2.1.1–5—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Kansas City Plant*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr) [a]		Maximum Concentration ($\mu g/m^3$)		Missouri State Standards and Guidelines ($\mu g/m^3$)
	Current [e]	Projected [f]	Current [e]	Projected [f]	
1,4-Dioxane	0.03	0.03	0.6	0.6	24.5[d]
1,1,1-Trichloroethane	1.18	0.01	20.3	0.2	1,040[d]
Acetic Acid	0.02	0.02	0.7	0.7	b
Acetone	0.37	0.37	6.3	6.3	161[d]
Chlorodifluoroethane	0.02	0.02	0.7	0.7	b
Chlorodifluoromethane	0.01	0.01	0.2	0.2	b
D'Limonene	0.00	0.06	0.0	1.8	b
Dichlorodifluoromethane	0.28	0.01	9.0	0.2	b
Dimethyl Formamide	0.01	0.01	0.2	0.2	8.13[d]
Ethanol	0.01	a	0.4	a	118[d]
Ethylbenzene	0.02	0.02	0.4	0.4	118[d]
Fluorine End-Capped Homopolymers	0.19	0.19	6.1	6.1	b
Fluorboric Acid	0.02	0.02	0.7	0.7	b
Fluoroaliphatic Polymeric Esters	0.01	0.01	0.4	0.4	b
Fluorobenzene	0.14	0.14	4.3	4.3	b
Fluorotelomer	0.01	0.01	0.4	0.4	b
Glycol Ethers	0.82	1.20	26.0	37.8	b
Hexane	0.03	0.03	1.1	1.1	2,400[c]
Hydrochloric Acid	0.15	0.15	2.6	2.6	2.03[d]
Isopropanol	0.70	0.70	22.0	22.0	13,066.7[c]
Methanol	0.01	0.01	0.2	0.2	7.13[d]
Methyl Ethyl Ketone	0.03	0.03	0.6	0.6	32.1[d]
Methyl Isobutyl Ketone	0.07	0.07	1.2	1.2	55.7[d]
Methylene Chloride	0.18	0.01	5.8	0.4	b
Naphtha (mineral spirits)	0.17	0.17	5.4	5.4	b
Nitric Acid	0.43	0.43	13.7	13.7	66.67[c]
Phosphoric Acid	0.03	0.03	0.6	0.6	0.27[d]
Sulfuric Acid	0.27	0.27	4.7	4.7	2.72[d]
Tetrachloroethylene	0.02	0.02	0.4	0.4	922[d]
Toluene (methylbenzene)	0.19	0.19	3.3	3.3	10.2[d]
Trichloroethylene	2.03	0.22	34.9	3.7	36.5[d]
Trichlorotrifluoroethane	1.29	0.01	40.9	0.2	101,333[c]
Xylene (dimethylbenzene)	0.13	0.13	4.0	4.0	5,800[c]

E4 4064

a. Only those emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.
b. No state standard.
c. 8 hour average standard.
d. 24 hour average standard.
e. Estimated for 1991 (KC ASAC, 1993b).
f. Projected for 1995 (FDI, 1993).

D.2.1.2 *Mound Plant*

Mound is located in Montgomery County, OH, within the Metropolitan Dayton Intrastate AQCR. In addition to Montgomery County, this AQCR includes Clark, Darke, Greene, Miami, and Preble counties. The region is under the authority of the Regional Air Pollution Control Agency (RAPCA), which monitors ambient levels of criteria pollutants. This AQCR is designated as attainment with respect to SO_2, NO_2, and CO (40 CFR 81.336). However, several counties within the AQCR, including Montgomery County, have been classified as non-attainment for TSP and O_3. The NAAQS and Ohio state ambient air quality standards are listed in table D2.1.1-1.

Table D2.1.2-1 shows the maximum ambient air quality concentrations data measured from the RAPCA regional monitoring program and that of the Southwestern Ohio Air Pollution Control Agency for sites near Mound (MD RAPCA, 1987, 1988, 1989, 1990, 1991).

The principal sources of criteria air pollutants at Mound are the two boilers associated with the steam plant and the Keystone heat exchanger. Other sources include fugitive particulate emissions from process emissions, and emissions from laboratory operations and vehicles. Predominant hazardous/toxic air pollutant emissions from Mound include acetone, TCA, isopropyl alcohol, and nitric acid. The emissions inventory is presented in table D2.1.2-2.

Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at Mound.

The Ohio EPA has standards for the pollutants (asbestos, beryllium, mercury, benzene, vinyl chloride, and radionuclides) regulated by NESHAP. As of July 1991, the Ohio EPA has not promulgated standards for the additional 189 HAPs specified in the 1990 CAA. However, Ohio EPA uses the American Conference of Governmental Industrial Hygienists list of pollutants threshold limit values (TLV). Maximum 1-hr ground-level concentrations cannot exceed the TLV time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists, divided by a "safety conversion factor" of 42 (Ohio EPA, 1991). Table D2.1.2-3 presents the emission rates and maximum ground-level concentrations of hazardous/toxic air pollutants from Mound.

TABLE D2.1.2–1.—*Existing Ambient Air Quality Data for Mound Plant*

Monitoring Station	Ambient Concentration ($\mu g/m^3$)											
	Sulfur Dioxide			Carbon Monoxide		Nitrogen Dioxide	TSP[b]		PM_{10}[c]		Lead	Ozone
	Annual	Max. 24-hour	Max. 3-hour	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Annual	Max. 24-hour	Max. Calendar Quarter	Max. 1-hour
McEwen	a	a	a	a	a	a	a	a	22	75	a	a
E. Monument	a	a	a	a	a	a	a	a	29	89	a	a
Timberlane	a	a	a	a	a	a	36	104	a	a	0.1	233.5
W. Third St.	15.7	57.6	112.7	a	a	a	a	a	a	a	a	a
E. Fourth St.	a	a	a	4,466	13,969	a	a	a	a	a	a	a
W. Fairview Ave.	a	a	a	3,664	6,985	a	a	a	a	a	a	a

E4 3561

[a] Not measured.
[b] Total suspended particulates.
[c] Particulate matter less than 10 microns in diameter.

Source: MD DOE, 1991a.

TABLE D2.1.2–2.—*Source Emission Inventory for Mound Plant–Criteria Pollutants*

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	Boiler 1	0.241
	Boiler 2	0.936
	Keystone 14-M	1.321
Nitrogen Dioxide (NO_2)	Boiler 1	0.960
	Boiler 2	3.743
	Keystone 14-M	5.284
Particulate Matter (PM_{10})	Boiler 1	0.021
	Boiler 2	0.080
	Keystone 14-M	0.113
	37–EF–01	0.010
	49–CHF–01	0.011
	COS–EF–01	0.003
	DS–EF–13	0.100
	DS–EF–27	0.231
	W–EF–B	0.421
Sulfur Dioxide (SO_2)	Boiler 1	0.004
	Boiler 2	0.016
	Keystone 14-M	0.023

E4 3571

Source: MD EG&G, 1991a.

TABLE D2.1.2–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Mound Plant*

Hazardous/Toxic Air Pollutant	Emission Rate[a] (lb/hr)	Maximum 1-hour Source Contribution at Site Boundary (μg/m³)	Ohio State Standards[a] (μg/m³)
1,1,1-Trichloroethane	1.03	42.5	1,310
Acetone	1.37	56.6	42,380
Ammonia	0.63	25.9	405
Hydrogen Chloride	0.40	16.5	179
Isopropyl Alcohol	0.50	20.9	23,405
Tricholorotrifluoroethane	0.42	17.5	182,619

E4 3573

[a] American Conference of Governmental Industrial Hygienists TLVs divided by a safety conversion factor of 42.

Source: MD EG&G, 1991a.

D.2.1.3 *Pinellas Plant*

Pinellas is located in Pinellas County, FL, within the West Central Florida Intrastate AQCR. This AQCR is designated as attainment for all criteria pollutants with the exception of O_3 (40 CFR 81.310). The NAAQS and Florida state ambient air quality standards (which are the same as the NAAQS) are listed in table D2.1.1-1.

Ambient air quality within and near Pinellas is monitored by the state for each criteria pollutant. The ambient air quality data for SO_2, CO, TSP, and O_3 collected at these stations during 1990 are presented in table D2.1.3-1.

The principal sources of criteria air pollutants at Pinellas are the boilers and diesel generators in Building 500. Building 100 is a source of solvent, acid, and particulate emissions and Buildings 700 and 1040 are sources of emissions from solvent use or storage and other particulate sources (PI DOE, 1992d). Other sources include vehicular emissions (PI DOE, 1989). The emissions inventory used in the analysis is included in table D2.1.3-2.

Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at Pinellas.

The Florida Department of Environmental Regulation has standards for the hazardous pollutants regulated by NESHAP. In addition, the Florida Department of Environmental Regulation maintains a working list of toxics, which is used in regulatory and air permitting analyses of sources for HAPs. This list, published in January 1992, is the Draft Florida Air Hazardous Permitting Strategy Guidelines (FL DER, 1992), and covers 751 compounds including all 189 HAPs listed under Title III of the 1990 CAA. HAPs/toxics from the plant include acids, resin compounds, and common industrial solvents. Sources include laboratories, coating and plating operations, production and test facilities, and various manufacturing operations. Table D2.1.3-3 presents the potential emission rates and resulting ground-level concentrations for HAPs/toxics from Pinellas used in the assessment. As shown in the table, the Florida Department of Environmental Regulation Air Toxic Working List annual guidelines are not exceeded at the Pinellas boundary for any pollutant.

TABLE D2.1.3–1.—*Existing Ambient Air Quality Data for the Pinellas Plant*

Monitoring Station	Ambient Concentration (μg/m³)							
	Sulfur Dioxide			Carbon Monoxide		TSP[b]		Ozone
	Annual	Max. 24-hour	Max. 3-hour	Max. 8-hour	Max. 1-hour	Annual	Max. 24-hour	Max. 1-hour
Clearwater	a	a	a	a	a	33	56	a
Sheriff Dept	a	a	a	a	a	41	236	a
19th St. N., St. Petersburg	a	a	a	a	a	54	155	a
Azalea Park	a	a	a	a	a	36	61	a
Derby Lane	23	118	526	a	a	40	89	a
Anclote Road, Tarpon Springs	5	30	114	a	a	45	97	a
Coast Guard Station, Tampa	a	a	a	3,435	5,725	a	a	243.4
Tampa Stadium	a	a	a	6,870	9,160	a	a	a
Seminole Hts. School	a	a	a	8,016	13,742	a	a	a
Madison Avenue, Tampa	a	a	a	5,725	10,305	a	a	a
Pinellas Park	12	80	503	a	a	a	a	a
Brooker Creek Park	9	56	198	a	a	a	a	a
Simons Park	a	a	a	a	a	a	a	231.5

E4 3569

[a] No data available.
[b] Total suspended particulates.

Source: PI DOE, 1991d.

TABLE D2.1.3–2.—*Source Emission Inventory for Pinellas Plant–Criteria Pollutants*

Pollutant	Source Number	Emission Rate (lb/hr)
Lead (Pb)	1 through 10	0.0014[a]
Sulfur Dioxide (SO_2)	1	0.637

E4 3574

[a] Emission rate for each source.
Source: PI DOE, 1991d.

TABLE D2.1.3–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Pinellas Plant*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)[a]	Maximum Source Contribution at Site Boundary (μg/m³)			FDER Air Toxic Working List Guidelines (μg/m³)		
		Annual	24-hour	8-hour	Annual	24-hour	8-hour
1,4 Dioxane	0.06	0.02	16.0	30.0	b	216	900
1,1,1-Trichloroethane	2.28	NA	26.0	40.0	b	9,168	38,200
Acetic Acid	0.21	3.06	12.22	21.39	b	60.0	250.0
Acetone	3.33	48.69	194.74	340.8	b	8,544	35,600
Ammonia	0.04	0.62	2.48	4.34	100.0	40.8	170.0
Chlorodifluoromethane	0.21	2.99	11.98	20.96	b	16,992	70,800
Dichlorodifluoromethane	0.16	2.39	9.57	16.79	200.0	23,760	99,000
Hexane	0.01	0.16	0.63	1.1	b	422.4	1,760
Hydrochloric Acid	0.84	1.07	5.0	11.0	7.0	18.0	75.0
Isopropyl Alcohol	0.84	12.25	48.99	85.73	b	2,359.2	9,830
Lead	0.01	0.01	0.07	0.1	0.09	0.12	0.5
Methyl Alcohol	0.69	10.1	40.4	70.7	b	628.8	2,620
Methyl Ethyl Ketone	0.02	0.27	1.07	1.87	80.0	1,416	5,900
Methylene Chloride	7.45	2.0	30.0	60.0	2.10	417.6	1,740
Naptha	0.06	0.81	3.23	5.65	80.0	1,041.6	4,340
Nickel	0.03	0.01	0.10	0.3	b	0.24	1.0
Nitric Acid	0.91	NA	3.0	5.0	b	12.48	52.0
Phosphoric Acid	0.19	NA	0.9	2.5	b	2.4	10.0
Tetrachloroethylene	0.23	0.08	0.3	0.53	b	813.6	3,390
Toluene	0.45	6.57	26.28	45.98	300	898	3,770
Trichloroethylene	1.66	NA	8.0	14.0	b	645.6	2,690
Trichlorotrifluoroethane	11.0	16.06	624.3	1124.1	b	36,816	153,400

E4 3575

[a] Only those Hazardous/Toxic Air Pollutants emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.
[b] No standard.

Source: PI DOE, 1992c.

D.2.1.4 *Rocky Flats Plant*

RFP is located in Jefferson County, in the Metropolitan Denver Intrastate AQCR. As of 1991, the areas within this AQCR were designated as non-attainment with respect to the NAAQS for PM_{10}, TSP, O_3, and CO, and listed as attainment for SO_2 and NO_2 (40 CFR 81.306); that is, listed as "does not meet primary standards" for PM_{10}, TSP, O_3, and CO, and "cannot be classified" or "better than national standards" for SO_2 and NO_2. The NAAQS and Colorado state ambient air quality standards are listed in table D2.1.1-1.

Ambient air monitoring data provide an indication of the background air quality unaffected by the site. Ambient air quality data used in the analyses have been obtained from monitoring programs conducted near the east entrance to the plant (RF Rockwell, 1986b, 1987, 1988, 1989 and RF EG&G, 1990a, 1991e). Monitoring data collected at this station include TSP, PM_{10}, Pb, CO, O_3, SO_2, and NO_2. The ambient air quality data collected at this station are presented in table D2.1.4-1.

The principal sources of criteria pollutants at RFP are the steam plant boilers. Minor combustion sources include various small boilers and diesel generators. Other sources include fugitive particulate emissions from construction processes, roads, and vehicular emissions. The emissions inventory for the sources used in the analysis is presented in table D2.1.4-2 .

PSD regulations (40 CFR 52.21) limit the maximum allowable incremental increases in ambient concentrations of SO_2, NO_2, and TSP above established baseline conditions. The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modifications to existing sources. The maximum allowable increments are listed in table D2.1.1-4. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at RFP.

The Colorado Department of Health has standards for the hazardous pollutants regulated by NESHAP. The Colorado Department of Health has not promulgated HAPs regulations for new sources. Emission estimates and predicted concentrations for the HAPs/toxics used in the analysis are presented in table D2.1.4-3. It is expected that concentrations of carbon tetrachloride (CCl_4) will be substantially reduced with the replacement of CCl_4 over the next 2 to 3 years. CCl_4 is associated predominantly with nuclear activities.

TABLE D2.1.4–1.—*Existing Ambient Air Quality Data for Rocky Flats Plant*

Monitoring Station	Ambient Concentration (μg/m³)											
	Sulfur Dioxide			Carbon Monoxide		Nitrogen Oxides	TSP[b]		PM_{10}[c]		Lead	Ozone
	Annual	Max. 24-hour	Max. 3-hour	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Annual	Max. 24-hour	Max. Calendar Quarter	Max. 1-hour
RFP East Entrance	13.1[d]	86.4[d]	120.4[d]	4,437[d]	11,108[d]	20.7[d]	47.7[e]	156.4[e]	20.9[f]	42.5[f]	0.119[d]	561.5[d]
Collocated duplicate	a	a	a	a	a	a	51.7[e]	145.5[e]	21.2[g]	43.4[g]	a	a

E4 3524

[a] Not monitored.
[b] Total suspended particulates.
[c] Particulate matter less than 10 microns in diameter.
[d] 1985 - 1988 data.
[e] 1985 - 1990 data.
[f] 1989 - 1990 data.
[g] 1985, 1989, and 1990 data.

Source: RF Rockwell, 1986b, 1987, 1988, 1989; RF EG&G, 1990a, 1991e.

TABLE D2.1.4–2.—*Source Emission Inventory for Rocky Flats Plant–Criteria Pollutants*

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	Bldg. 443-44-86	24.0
	Bldg. 440-D. GEN.	24.0
Nitrogen Dioxide (NO_2)	Bldg. 44-44-86	3.01
	Bldg. 440-D. GEN.	0.25
	Bldg. 776-73	0.46
	Bldg. 776-74	0.46
	Bldg. 776-112	0.46
	Bldg. 776-117	0.46
	Bldg. 771-86	0.46
Particulate Matter (PM_{10})	Bldg. 333-18	0.34
	Bldg. 334-13	0.21
	Bldg. 776-24	0.29
	Bldg. 776-32	0.11
	Bldg. 451-201	0.71
	Bldg. 443-44-86	1.28
	Bldg. 440-G5	0.37
	Bldg. 444- 106	5.25
	Bldg. 444-122	0.43
	Bldg. 44-200	0.39
	Bldg. 776-32	0.41
	Bldg. 374-3	1.62
Sulfur Dioxide (SO_2)	Bldg. 44315	0.62
	Bldg. 443-44-86	10.82

E4 3579

Source: RF EG&G, 1990a, 1991e.

TABLE D2.1.4–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Rocky Flats Plant*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)[a]	Maximum Annual Average Concentration ($\mu g/m^3$)	Colorado State Standard or Guideline ($\mu g/m^3$)
1,1,1-Trichloroethane	4.70	0.42	b
Acetone	0.03	0.003	b
Ammonia	1.87	0.2	b
Carbon Tetrachloride	8.45	0.76	b
Cyclohexane	0.02	0.002	b
Dioctyl Phthalate	0.05	0.004	b
Ethyl Alcohol	0.02	0.003	b
Ethylene Glycol	0.07	0.005	b
Hydrogen Chloride	0.46	0.04	b
Hydrogen Fluoride	1.29	0.12	b
Isopropyl Alcohol	0.03	0.003	b
Lead	0.05	0.004	b
Methylene Chloride	0.81	0.07	b
Nitric Acid	0.56	0.05	b
Trichlorotrifluoroethane	4.82	0.43	b

E4 3526

[a] Only those emitted at rates greater than or equal to approximately 100 lb/yr (0.01 lb/hr) are listed.
[b] No state standard.

Source RF DOE, 1992a.

D.2.1.5 *Savannah River Site*

The Savannah River Site (SRS) is located in Aiken, Barnwell, and Allendale counties, SC, in the Augusta-Aiken Interstate AQCR. As of 1991, the area within this AQCR was designated as attainment with respect to the NAAQS (40 CFR 81.341). The basis for assessing the air quality of a given location is by comparison to applicable Federal and state ambient air quality standards. The applicable Federal standards are the NAAQS (40 CFR 50), and the applicable state standards are those adopted by the South Carolina Department of Health. Table D2.1.1-1 presents these standards for the criteria air pollutants (SO_2, NO_2, PM_{10}, TSP, CO, and Pb). South Carolina also has standards for gaseous fluorides. These are also presented in the table.

Currently, ambient air quality within the SRS site boundary is monitored at five locations. The ambient air quality data, as summarized in table D2.1.5-1, are small percentages of the limits set in applicable ambient standards.

The emissions inventory for the criteria pollutants used in the analysis is presented in table D2.1.5-2. The principal sources of criteria air pollutants at SRS are: the nine coal-burning and four fuel-oil burning boilers for producing steam and electricity (A-, D-, H-, K-, and P-Areas); and fuel and target fabrication (M-Area) and processing facilities (F- and H-Areas). Other emissions include fugitive particulate emissions from coal piles and coal processing facilities, vehicular emissions, and temporary emissions from various construction-related activities.

Since the adoption of PSD regulations, PSD permits have not been required for any of the new SRS emission sources or modifications to existing sources. In South Carolina, the only source in the Augusta-Aiken Interstate AQCR that has been issued a PSD permit is located near Orangeburg, about 40 miles northeast of the nearest SRS boundary. Four sources in the Georgia portion of the AQCR have been issued PSD permits. The closest of these is approximately 10 miles west of the nearest SRS boundary (DOE, 1991c). Because of the substantial distances between these sources and the SRS boundary, the PSD concentration increments used at the SRS boundary by these sources are expected to be negligible (see table D2.1.1-4 for the maximum allowable PSD increments).

The annual emission rates of HAPs/toxics from existing SRS facilities during 1990 and the estimated maximum 24-hr average ground-level concentrations at the SRS boundary are listed in table D2.1.5-3. These are compared to the applicable HAPs/toxics concentration limits adopted by the South Carolina Department of Health (SC DHEC, 1991).

TABLE D2.1.5–1.—*Existing Ambient Air Quality Data for Savannah River Site* ($\mu g/m^3$)

Monitoring Station	Time Period	Sulfur Dioxide			Nitrogen Dioxide	PM_{10}[a]		TSP[b]
		Annual	Max. 24-hour	Max. 3-hour	Annual	Annual	Max. 24-hour	Annual
36 G, 38 G, 39 G, 40 G, and 41 G	1985	5	34	48	6	27	47	27

E4 3515

[a] Particulate matter less than 10 microns in diameter.
[b] Total suspended particulates.

Source: DOE, 1991c.

TABLE D2.1.5–2.—*Source Emission Inventory for Savannah River Site–Criteria Pollutants*
[Page 1 of 3]

Pollutant	Source	Emission Rate Stack (lb/hr)	Emission Rate Area (lb/hr/ft^2)
Carbon Monoxide (CO)	784-A Boiler 1	14.0	
	784-A Boiler 2	14.0	
	484-D Boiler 1	9.6	
	484-D Boiler 2	9.6	
	484-D Boiler 3	9.6	
	484-D Boiler 4	9.6	
	284-H Boiler 1	14.0	
	284-H Boiler 2	14.0	
	284-H Boiler 3	14.0	
	184-K Boiler 1	37.9	
	184-K Boiler 2	37.9	
	184-P Boiler 1	37.9	
	184-P Boiler 2	37.9	
	H Diesel Gen(2)	0.794	
	F Diesel Gen(2)	0.714	
	K Diesel Gen(2)	0.873	
	L Diesel Gen(2)	0.873	
	P Diesel Gen(2)	0.873	
	CIF	0.033	
	K Source		1.0×10^{-6}
	L Source		1.0×10^{-6}
	P Source		1.0×10^{-6}
	S Source		1.0×10^{-6}
	Z Source		1.0×10^{-5}
	B source		1.0×10^{-6}
	TNX Source		4.0×10^{-6}
	C Source		1.0×10^{-6}
	CS Source		1.0×10^{-6}
Nitrogen Dioxide (NO_2)	784-A Boiler 1	39.13	
	784-A Boiler 2	39.13	
	484-D Boiler 1	544.9	
	484-D Boiler 2	544.9	
	484-D Boiler 3	544.9	
	383-D Boiler 4	544.9	
	284-H Boiler 1	39.13	
	284-H Boiler 2	39.13	
	284-H Boiler 3	39.13	
	184-K Boiler 1	106.4	
	184-K Boiler 2	106.4	
	184-P Boiler 1	106.4	
	184-P Boiler 2	106.4	
	H Diesel Gen(2)	12.3	
	F Diesel Gen(2)	9.603	
	K Diesel Gen(2)	13.49	
	L Diesel Gen(2)	13.49	

E4 3517-1

Footnotes at end of table.

TABLE D2.1.5–2.—*Source Emission Inventory for Savannah River Site–Criteria Pollutants* —Continued [Page 2 of 3]

Pollutant	Source	Emission Rate Stack (lb/hr)	Emission Rate Area (lb/hr/ft^2)
Nitrogen Dioxide (NO_2) (continued)	P Diesel Gen(2)	13.49	
	CIF	8.651	
	A Source		7.0×10^{-6}
	D Source		9.0×10^{-6}
	H Source		7.0×10^{-6}
	F Source		7.0×10^{-6}
	K Source		1.4×10^{-5}
	L Source		1.5×10^{-5}
	P Source		1.5×10^{-5}
	S Source		2.9×10^{-5}
	Z Source		2.4×10^{-4}
	B source		2.6×10^{-5}
	TNX Source		8.8×10^{-5}
	C Source		1.3×10^{-5}
	CS Source		1.3×10^{-5}
	F Pu Separation	137.0	
	H H3 Separation	6.826	
	M Air Stripper	2.302	
	DWPF Nitrate PR	8.413	
Particulate Matter (PM_{10})	784-A Boiler 1	10.16	
	784-A Boiler 2	10.16	
	484-D Boiler 1	21.67	
	484-D Boiler 2	21.67	
	484-D Boiler 3	21.67	
	484-D Boiler 4	21.67	
	284-H Boiler 1	10.16	
	284-H Boiler 2	10.16	
	284-H Boiler 3	10.16	
	184-K Boiler 1	27.78	
	184-K Boiler 2	27.78	
	184-P Boiler 1	27.78	
	184-P Boiler 2	27.78	
	H Diesel Gen(2)	0.794	
	F Diesel Gen(2)	0.714	
	K Diesel Gen(2)	0.873	
	L Diesel Gen(2)	0.873	
	P Diesel Gen(2)	0.873	
	CIF	5.0×10^{-4}	
	K Source		1.0×10^{-6}
	L Source		1.0×10^{-6}
	P Source		1.0×10^{-6}
	S Source		1.0×10^{-6}
	Z Source		7.0×10^{-6}
	B Source		1.0×10^{-6}
	TNX Source		3.0×10^{-6}

E4 3517-2

Footnotes at end of table.

TABLE D2.1.5–2.—*Source Emission Inventory for Savannah River Site–Criteria Pollutants* —Continued [Page 3 of 3]

Pollutant	Source	Emission Rate	
		Stack (lb/hr)	Area (lb/hr/ft^2)
Particulate Matter (PM_{10}) (continued)	C Source		1.0×10^{-6}
	S Concrete Batch	45.40	
	D Coal Pile Top		1.0×10^{-6}
	D Coal Pile Bottom		4.0×10^{-6}
	P Coal Pile		1.0×10^{-6}
	K Coal Pile		2.0×10^{-6}
	F Coal Pile		1.0×10^{-6}
	H Coal Pile		1.0×10^{-6}
	A Coal Pile		3.0×10^{-6}
	D Area Coal Crush		8.7×10^{-4}
Sulfur Dioxide (SO_2)	784-A Boiler 1	106.8	
	784-A Boiler 2	106.8	
	484-D Boiler 1	743.0	
	484-D Boiler 2	743.0	
	484-D Boiler 3	743.0	
	383-D Boiler 4	743.0	
	284-H Boiler 1	106.8	
	284-H Boiler 2	106.8	
	284-H Boiler 3	106.8	
	184-K Boiler 1	289.7	
	184-K Boiler 2	289.7	
	184-P Boiler 1	289.7	
	184-P Boiler 2	289.7	
	H Diesel Gen(2)	0.794	
	F Diesel Gen(2)	0.714	
	K Diesel Gen(2)	0.873	
	L Diesel Gen(2)	0.873	
	P Diesel Gen(2)	0.873	
	CIF	0.079	
	A Source		1.0×10^{-6}
	D Source		3.0×10^{-6}
	H Source		2.0×10^{-6}
	F Source		1.0×10^{-6}
	K Source		4.0×10^{-6}
	L Source		4.0×10^{-6}
	P Source		4.0×10^{-6}
	S Source		9.0×10^{-6}
	Z Source		7.2×10^{-5}
	B source		7.0×10^{-6}
	TNX Source		2.7×10^{-6}
	C Source		$4.x10^{-6}$
	CS Source		4.0×10^{-6}

Source: SR DOE, 1991a.

E4 3517-3

TABLE D2.1.5–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Savannah River Site*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)[c]	Maximum 24-hour Source Contributions at Site Boundary (μg/m³)	South Carolina State Standard (μg/m³)[a]
1,1,1-Trichloroethane	2.44	1.3	9,550
Nitric Acid	2.17	1.1	125
Trichlorotrifluoroethane	1.26	23.3	b

E4 3514

[a] 24-hour average concentration.
[b] No standard.
[c] Only those emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.

Source: DOE 1991c; SC DHEC, 1991.

D.2.1.6 *Los Alamos National Laboratory*

LANL is located in Los Alamos County, NM, within the New Mexico Intrastate AQCR (AQCR 157). All of the areas within LANL and its surrounding counties are designated as attainment areas with respect to the NAAQS (40 CFR 81.332). The nearest non-attainment area for CO and TSP is in Bernalillo County, about 40 miles south. The applicable NAAQS and New Mexico ambient air quality standards are given in table D2.1.1-1.

PSD regulations (40 CFR 52.21) limit the maximum allowable incremental increases in ambient concentrations of SO_2, NO_2, and TSP above established baseline conditions. The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modifications to existing sources. One PSD Class I area, the Bandelier National Monument's Wilderness Area, borders LANL to the south. The maximum allowable PSD increases are listed in table D2.1.1-4. Since the promulgation of the PSD regulations (40 CFR 52.21) in 1977, no PSD permits have been required for any source at LANL (LANL, 1990a).

Ambient air quality within and near the LANL site boundary is currently monitored for TSP (LANL, 1990a). The ambient air quality data are summarized in table D2.1.6-1.

The principal sources of criteria air pollutants at LANL (LANL, 1990a) are: the steam plants and power plant; beryllium operations including machining in shop 4 at area TA-3-39 and in shop 13 at area TA-3-102, the beryllium shop at area TA-35-213, and the beryllium processing facility at area TA-3-141; the asphalt plant; burning of high-explosive (HE) wastes and experimental detonation of conventional explosives at the TA-16 burnground; and the lead pouring facility for casting lead at area TA-3-38. Other emissions include fugitive particulate emissions from waste-burial activities and coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction activities. Emission estimates for the sources used in the analyses are presented in table D2.1.6-2.

Ambient concentration limits have been adopted by New Mexico for HAPs/toxics. Applicants for new sources must meet emission limits or ambient concentration limits at or beyond the site boundary. For new sources, the concentrations cannot exceed a factor of one one-hundredth of the occupational exposure limit (OEL) contained in New Mexico Environmental Improvement Board regulation 702,

appendix A (NM EIB, 1991a). Existing sources must demonstrate that the ambient concentrations are less than the OEL as contained in New Mexico Environmental Improvement Board regulation 752, appendix A (NM EIB, 1991a). The emission rates of HAPs/toxics from existing LANL facilities during 1989 and estimates of their maximum 8-hr average ground-level concentrations at the boundary are listed in table D2.1.6-3. For a conservative estimate of existing sources, one one-hundredth of the OEL is presented in the table for these sources.

TABLE D2.1.6–1.—*Existing Ambient Air Quality Data for LANL* (μg/m³)

Monitoring Station	Time Period	Ozone Max 1-hour	TSP [b] Annual	TSP [b] 24-hour
Los Alamos	1985 - 1989	a	26.6	150.8
White Rock	1985 - 1989	a	29.7	92.6
Bandelier	Jan- Jun 1986	149	a	a

E4 3544

[a] Not measured.
[b] Total suspended particulates.

Source: LANL, 1986, 1987a, 1988a, 1989b, 1990b.

TABLE D2.1.6–2.—*Source Emission Inventory for LANL–Criteria Pollutants*

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	TA–3 Boiler	22.88
	TA–16 Boiler	1.49
	TA–21 Boiler	1.49
	West Area Boiler	1.575
	NG–Burning	1.133
	LPG–Burning	0.005
	Diesel–Burning	1.806
Nitrogen Dioxide (NO_2)	TA–3 Boiler	14.1
	TA–16 Boiler	5.95
	TA–21 Boiler	5.95
	West Area Boiler	6.3
	NG–Burning	5.67
	LPG–Burning	0.023
	Diesel–Burning	8.306
Particulate Matter (PM_{10})	TA–3 Boiler	1.62
	TA–16 Boiler	0.13
	TA–21 Boiler	0.13
	West Area Boiler	0.135
	NG–Burning	0.17
	Diesel–Burning	0.59

E4 3572

Source: LA DOE, 1991a.

TABLE D2.1.6–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at LANL*

Hazardous/Toxic Air Pollutant	Emission Rate[a] (lb/hr)	Maximum 8-hour Average Concentration (μg/m³)	New Mexico State Standard[b] (μg/m³)
2-Butoxyethanol	0.11	2.5	1,200
Acetic Acid	0.01	0.23	250
Acetone	1.23	26.3	5,900
Acetonitrile	0.03	0.54	340
Ammonia	0.43	9.2	180
Dioxane	0.01	0.29	36
Fluoride Compounds	0.01	0.29	25
Hexane (N-hexane)	0.05	1.05	1,800
Hydrogen Chloride	0.21	4.4	70
Isopropyl Alcohol	0.09	2.0	9,800
Methyl Acetate	0.17	3.6	6,100
Methyl Alcohol	0.50	10.7	2,600
Methyl Ethyl Ketone	0.37	7.7	5,900
Methylene Chloride (dichloromethane)	0.08	1.7	2,610
N-butyl Acetate	0.01	0.24	7,100
Nitric Acid	0.19	4.1	50
Nitric Oxide	0.12	2.5	300
Nitrogen Oxide	0.12	2.5	300
Nitrous Oxide	0.05	1.09	449
sec-Butyl Alcohol	0.01	0.26	3,050
Stoddard Solvent	0.11	2.3	5,250
Sulfuric Acid	0.01	0.29	10
Tetrahydrofuran	0.02	0.47	5,900
Toluene (methylbenzene)	0.03	0.65	3,750
Trichloroethylene	0.14	3.0	250
Trichloromethane	0.05	1.07	97.5
Turpentine	0.07	1.4	5,600
VM&P Naphtha	0.25	5.2	13,500
Xylene (dimethylbenzene)	0.15	3.3	4,350

E4 3540

a Only those emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.
b One one-hundredth of the OEL.

Source: LANL, 1990b.

D.2.1.7 *Y-12 Plant*

Y-12 is located within the Oak Ridge Reservation (ORR). ORR is located in Anderson and Roane counties in the Eastern Tennessee-Southwestern Virginia Interstate AQCR. As of 1990, the areas within this AQCR were designated as attainment with respect to any of the NAAQS (40 CFR 81.343); that is, listed as "cannot be classified" or "better than national standards" for TSP, SO_2, O_3, CO, and NO_2. Table D2.1.1-1 presents the NAAQS and Tennessee standards for the criteria air pollutants.

Ambient air monitoring data provide an indication of the background air quality unaffected by the site. Ambient air quality within Y-12 is monitored at two locations. The data from these monitoring stations for 1989 and 1990 are presented in table D2.1.7-1. The maximum background concentrations were used in the analysis.

The principal source of criteria air pollutants at Y-12 is the ORR steam plant. Other sources include fugitive particulate emissions from coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction processes (Y-12 MMES, 1987). Table D2.1.7-2 presents criteria pollutants emissions from ORR by source group.

PSD regulations (40 CFR 52.21) limit the maximum allowable incremental increases in ambient concentrations of SO_2, NO_2, and TSP above established baseline conditions. The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modifications to existing sources.

Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at ORR.

The Tennessee Department of Health and Environment (TN DH&E, 1991b) uses the list of HAPs promulgated by Title III of the 1990 CAA. The acceptable ambient concentration is defined as 10 percent of the TLV or permissible exposure limit (PEL), whichever is the most restrictive. For those "high-risk pollutants," the acceptable ambient air concentration is defined as 1 percent of the TLV or PEL, whichever is the most restrictive.

Table D2.1.7-3 presents the estimated emissions and predicted concentrations of HAPs/toxics from the Y-12 Plant.

TABLE D2.1.7–1.—*Existing Ambient Air Quality Data for the Oak Ridge Reservation*

Monitoring Station	Time Period	Ambient Concentration ($\mu g/m^3$)						
		Sulfur Dioxide			TSP[a]		Hydrogen Fluoride	
		Annual	Max. 24-hour	Max. 3-hour	Annual	Max. 24-hour	Max. 30-day	Max. 7-day
Y-12 East	1989 - 1990	35.1	165.6	322.0	45.0	129.2	b	b
Y-12 West	1989 - 1990	18.6	110.5	253.8	76.0	385.6	b	b
Y-12 #4	1989 - 1990	b	b	b	b	b	0.16	0.28

E4 3546

a Total suspended particulates.
b Not measured.

Source: Y-12 MMES, 1990, 1991b.

TABLE D2.1.7–2.—*Source Emission Inventory for the Oak Ridge Reservation–Criteria Pollutants*

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	Y–9401 West Stk	24
	Y–9401 East Stk	24
Nitrogen Dioxide (NO_2)	Y–9401 West Stk	782
	Y–9401 East Stk	782
Particulate Matter (PM_{10})	Y–9401 West Stk	103
	Y–9401 East Stk	103
Sulfur Dioxide (SO_2)	Y–9401 West Stk	2,420
	Y–9401 East Stk	2,420

E4 3547

Source: LA DOE, 1991a.

TABLE D2.1.7–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at the Oak Ridge Reservation*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)[a]	Maximum 8-hour Average Concentration ($\mu g/m^3$)	Tennessee Department of Health and Environment Standard ($\mu g/m^3$)
1,1,1–Trichloroethane	3.49	92.6	19,000
Acetonitrile	0.30	7.9	6,700
Chlorine	0.07	2.1	150
Hydrogen Chloride	2.35	62.6	700
Methyl Alcohol	10.05	266.8	26,000
Nitric Acid	6.62	175.8	500
Tetrachloroethylene	1.87	49.9	17,000
Trichlorotrifluoroethane	6.58	174.9	562,000

E4 3548

[a] Only those emitted at rates greater than or equal to approximately 100 lb/yr (0.01 lb/hr) are listed.

Source: Y-12 DOE, 1991a; TN DH&E, 1991b.

D.2.1.8 *Sandia National Laboratories, New Mexico*

Sandia National Laboratories, New Mexico (SNL) is located in Bernalillo County, NM, within the Albuquerque Mid-Rio Grande New Mexico Intrastate AQCR. This AQCR is designated as nonattainment for CO and TSP (40 CFR 81.332) and attainment for the other criteria pollutants. The applicable NAAQS and New Mexico ambient air quality standards are given in table D2.1.1-1.

Ambient air quality is currently monitored by the state at various locations throughout Albuquerque for NO_2, PM_{10}, O_3, and CO. Ambient air data collected at these monitoring stations are summarized in table D2.1.8-1.

The principal sources of criteria air pollutants at SNL (SNL, 1988) are: the steam plant at Area I; the paint shops, hazardous material machine shop, process development laboratory, and emergency diesel generator plant located at Area I; and the explosive testing at Area II. Other emissions include fugitive particulate emissions from waste-burial activities, other process emissions, vehicular emissions, and temporary emissions from various construction activities. Emission estimates for these sources are presented in table D2.1.8-2.

Since the promulgation of the PSD regulations in 1977, no PSD permits have been required for any source at SNL. Table D2.1.1-4 presents the maximum allowable PSD increments. One PSD Class I area, the Bandelier National Monument's Wilderness Area, is approximately 60 miles north of SNL.

Ambient concentration limits have been adopted by New Mexico for HAPs/toxics. Applicants for new sources must meet emission limits or ambient concentration limits at or beyond the site boundary for HAPs/toxics. For new sources, the concentrations cannot exceed one one-hundredth of the OEL contained in New Mexico Environmental Improvement Board regulation 702, appendix A (NM EIB, 1991a). Existing sources must demonstrate that the ambient concentrations are less than the OEL as contained in New Mexico Environmental Improvement Board regulation 752, appendix A (NM EIB, 1991a). The emission rates of HAPs/toxics from existing SNL facilities during 1991 and estimates of their maximum 8-hr average ground-level concentrations at the SNL boundary are listed in table D2.1.8-3. For a conservative estimate of existing sources, one one-hundredth of the OEL is presented in the table.

TABLE D2.1.8–1.—*Existing Ambient Air Quality Data for SNL*[e]

Monitoring Station[d]	Ambient Concentration (μg/m³)					
	Carbon Monoxide		Nitrogen Dioxide	PM_{10}[b]		Ozone
	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Max. 1-hour
2G	a	a	a	21.3[c]	48	a
2R	5,153	10,305	a	31.3[c]	63	174.6
2ZE	6,527	10,305	a	17.0[c]	31	170.7
2ZF	a	a	a	a	a	192.3
2ZH	a	a	a	35.8[c]	104	186.4
2ZK	7,537	13,740	a	21.2[c]	36	a
2ZL	2,045	8,015	a	18.8[c]	39	a
2ZM	5,954	13,740	159.9[c]	19.2[c]	45	160.9
2ZN	a	a	a	18.9[c]	53	a
2ZO	a	a	a	29.4[c]	56	a

E4 3567

[a] Not monitored.
[b] Particulate matter less than 10 microns in diameter.
[c] Indicates that less than 75 percent of readings were present for calculation.
[d] Monitoring Station Information:
- 2G: City Yards 5501 Pino Road N.E., Albuquerque, Bernalillo
- 2R: 4100 Isleta S.W., Albuquerque, Bernalillo
- 2ZE: Charles Well #1 2421 Mesilla N.E., Albuquerque, Bernalillo
- 2ZF: Well 1 mi. west of Tramway & Tramway, Albuquerque, Bernalillo
- 2ZH: Alameda Fire Station - 9819 2nd N.W., Albuquerque, Bernalillo
- 2ZK: LE CO #2621 San Mateo N.E., Albuquerque, "Micro CO," Bernalillo
- 2ZL: 10155 Coors Road N.W., Albuquerque, Bernalillo
- 2ZM: 4700-A San Mateo N.E., Albuquerque, Bernalillo
- 2ZN: N.S.E., Albuquerque, Bernalillo
- 2ZO: 1500 Broadway N.E., Albuquerque, Bernalillo

[e] Data provided are for city of Albuquerque monitoring stations only; ambient air quality monitoring is not performed at SNL/NM.

Source: SN DOE, 1991b.

TABLE D2.1.8–2.—*Source Emission Inventory for SNL–Criteria Pollutants*

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	Boiler 1	0.667
	Boiler 2	0.429
	Boiler 3	0.511
	Boiler 5	0.269
	Boiler 6	1.123
	Diesel Generator	0.034
Hydrocarbons (HC)	Boiler 1	0.053
	Boiler 2	0.034
	Boiler 3	0.041
	Boiler 5	0.009
	Boiler 6	0.039
Nitrogen Dioxide (NO_2)	Boiler 1	2.670
	Boiler 2	1.710
	Boiler 3	2.050
	Boiler 5	3.700
	Boiler 6	15.46
	Diesel Generator	0.297
Sulfur Dioxide (SO_2)	Boiler 1	0.011
	Boiler 2	0.007
	Boiler 3	0.009
	Boiler 5	0.005
	Boiler 6	0.016
Total Suspended Particulates (TSP)	Boiler 1	0.096
	Boiler 2	0.062
	Boiler 3	0.073
	Boiler 5	0.034
	Boiler 6	0.142

E4 3562A

Source: SN DOE, 1991b.

TABLE D2.1.8–3.—*Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at SNL*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)[b]	Maximum 8-hour Average Concentration (μg/m³)	New Mexico State Standard (ug/m³)[a]
1,1,1-Trichloroethane	0.18	0.73	c
Acetone	0.07	0.27	5,900
Hydrogen Chloride	0.01	0.04	70
Isopropyl Alcohol	0.03	0.12	9,800
Methyl Alcohol	0.03	0.12	2600
Methylene Chloride	0.01	0.04	2610
Toluene	0.14	0.57	3,750
Trichloroethylene	0.03	0.11	250
Trichlorotrifluoroethane	0.02	0.09	c
Xylene	0.15	0.61	4,350

E4 3522

[a] One one-hundredth of the OEL.
[b] Only those emitted rates greater than or equal to approximately 100 lb/yr (0.01 lb/hr) are listed.
[c] No standard.

Source: SN DOE, 1991b.

D.2.2 Acoustics

D.2.2.1 *Kansas City Plant*

Kansas City noise control regulations specify an L_{eq} at a residential property boundary of 60 decibels A-weighted (dBA) during the daytime (7 a.m. to 10 p.m.) and 55 dBA during nighttime (10 p.m. to 7 a.m.), and 80 dBA at a property boundary with a commercial/light industrial district (Kansas City, 1982).

D.2.2.2 *Mound Plant*

The city of Miamisburg noise ordinance (Miamisburg, 1981) specifies a maximum sound level at a residential property boundary of 60 dBA during the hours 7 a.m. to 9 p.m. and 50 dBA during the hours 9 p.m. to 7 a.m.. Sound levels at a commercial property boundary are limited to 65 dBA and at an industrial property boundary to 70 dBA.

D.2.2.3 *Pinellas Plant*

The Pinellas County Ordinance (Pinellas County, 1974) specifies a maximum noise level at the property boundary of an industrial source of 72 dBA at an adjoining commercial zone, 66 dBA at an adjoining residential zone between 7 a.m. to 6 p.m., Monday through Saturday, and 55 dBA at a residential property all other times. An exception is provided for established industrial or commercial businesses when development has encroached upon such facilities.

D.2.2.4 *Rocky Flats Plant*

There are no state or local regulations applicable to RFP that specify environmental noise levels.

D.2.2.5 *Savannah River Site*

Ambient sound level data collected at SRS in 1989 and 1990 were summarized in a 1990 report (SR

NUS, 1990b). The States of Georgia and South Carolina, and the counties in which SRS is located, have not yet established any noise regulations that specify acceptable community noise levels except for a provision of the Aiken County Nuisance Ordinance which limits daytime and nighttime noise by frequency band (table D2.2.5-1).

D.2.2.6 *Los Alamos National Laboratory*

Los Alamos County has adopted a noise ordinance that specifies maximum sound levels in residential areas (Los Alamos County, 1983). Sound levels at a residential property line are limited to 65 dBA during the hours 7 a.m. to 9 p.m., and to 53 dBA during the hours 9 p.m. to 7 a.m. The 65 dBA limit may be exceeded by up to 10 dB for up to 10 minutes of any hour between 7 a.m. and 9 p.m.

D.2.2.7 *Y-12 Plant*

Maximum allowable noise limits for the city of Oak Ridge are presented in table D2.2.7-1. The limits range from 50 to 75 dBA for residential districts to major streets, respectively.

D.2.2.8 *Sandia National Laboratories, New Mexico*

The city of Albuquerque has adopted a noise ordinance that specifies a maximum sound level in residential areas (Albuquerque, 1984). Sound levels at a residential property line are limited to 50 dBA during nighttime hours, or 10 dB above the ambient sound level.

TABLE D2.2.5–1.—*Aiken County Maximum Allowable Noise Levels*[a]

Frequency Band (Hz)	Nighttime (9:00 p.m. - 7:00 a.m.) Sound Pressure Levels (dB)	
	At Non-residential Lot Line	At Residential Lot Line
20 - 75	69	65
75 - 150	60	50
150 - 300	56	43
300 - 600	51	38
600 - 1,200	42	33
1,200 - 2,400	40	30
2,400 - 4,800	38	28
4,800 - 10,000	35	20
Daytime (7:00 a.m. - 9:00 p.m.) Sound Pressure Levels: Apply only one of the following corrections to the nighttime levels above.		
Type of Operation in Character of Noise		**Correction (dB)**
Daytime operation only		plus 5
Noise source operates less than 20% of any one-hour period		plus 5
Noise source operates less than 5% of any one-hour period		plus 10
Noise source operates less than 1% of any one-hour period		plus 15
Noise of impulsive character (hammering, etc.)		minus 5
Noise of periodic character (hum, speech, etc.)		minus 5

E4 3578

[a] Noise from construction between 7:00 a.m. and 9:00 p.m. is exempt from these limits.

Source: Aiken County, 1991.

TABLE D2.2.7–1.—*City of Oak Ridge Maximum Allowable Noise Limits Applicable to ORR*

Adjacent Uses	Where Measured	Maximum Sound Level (dBA)
All Residential Districts	Common Lot Line	50
Neighborhood Business District	Common Lot Line	55
General Business District	Common Lot Line	60
Industrial District	Common Lot Line	65
Major Street	Street Lot Line	75
Secondary Residential Street	Street Lot Line	60

E4 3551

Source: Oak Ridge, 1985.

D.3 ENVIRONMENTAL CONSEQUENCES

This section provides additional information in support of the conclusions on environmental consequences related to ambient air quality and acoustics.

D.3.1 Air Quality

Major sources of air pollutant emissions and the associated environmental consequences for the Proposed Action at each site are described in section 4.1. An emissions inventory associated with each action is presented in these sections.

D.3.1.1 *Proposed Actions*

Table D3.1.1-1 presents the emissions inventory related to activities of consolidation of the electrical/mechanical functions at KCP (KC ASAC, 1993b). Consolidation activities are not expected to create additional criteria pollutants at KCP. Consolidation activities would take place in existing facilities without significant change in heating and electrical requirements that are currently supplied by the four Bannister Federal Complex boilerhouses, the source of criteria pollutants at KCP.

Table D3.1.1-2 presents the emissions inventory associated with the transfer of nonnuclear functions to SNL (SN FDI, 1992).

The emissions related to relocating nonnuclear functions to LANL, SRS, and Y-12 are expected to be negligible (LA DOE, 1992; WSRC, 1992a-c; and Y-12 MMES, 1992b).

D.3.1.2 *Other Alternatives*

Tables D3.1.2-1 through D3.1.2-3 present the emissions inventories for other alternatives; i.e., consolidating functions to Mound, Pinellas, or Rocky Flats, respectively (FDI, 1993). The potential changes to air quality for each of these alternatives are presented in section 4.2.

TABLE D3.1.1–1.—*Potential Emission Rates of Air Pollutants from Proposed Actions at KCP (lb/hr)*[a]

Pollutant	Mound	Rocky Flats	Pinellas	Total[c]
Hazardous Air Pollutants and Other Toxic Compounds				
Acetone	b	b	0.02	0.02
D'Limonene	0.03	b	b	0.03
Ethyl Alcohol	0.01	b	b	0.01
Glycol Ethers	0.09	b	0.01	0.10
Isopropyl Alcohol	0.01	0.08	0.06	0.15
Mineral Spirits/Naptha	b	0.03	b	0.03

E4 3566

a Projected for 1995 workload.
b Projected emissions are less than 100 lb/yr (0.01 lb/hr).
c Total does not include quantities noted by b.

TABLE D3.1.1–2.—*Potential Emission Rates of Hazardous/Toxic Air Pollutants from Proposed Actions at SNL*

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)[a]
1,1,1-Trichloroethane	0.12
Acetone	0.10
Amyl Acetate	0.10
Isopropyl Acetate	0.05
Methylene Chloride	0.24
Toluene (methylbenzene)	0.13
Trichloroethylene	0.13
Trichlorotrifluoroethane	0.14

E4 3591

a Only those emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.

Source: FDI, 1993.

TABLE D3.1.2–1.—*Potential Emission Rates of Air Pollutants for Alternative Consolidation at Mound (lb/hr)*

Pollutant	Kansas City	Rocky Flats	Pinellas	Total[b]
Criteria Pollutants				
Carbon Monoxide (CO)				3.00
Nitrogen Dioxide (NO_2)				6.39
Sulfur Dioxide (SO_2)				0.01
Total Suspended Particulates (TSP)				0.38
Hazardous Air Pollutants and Other Toxic Compounds				
1,4-Dioxane	0.03	a	a	0.03
1,1,1-Trichloroethane	0.01	a	a	0.01
Acetic Acid	0.02	a	a	0.02
Acetone	0.37	a	0.02	0.39
Chlorodifluoroethane	0.02	a	a	0.02
Chlorodifluoromethane	0.01	a	a	0.01
D'Limonene	0.06	a	a	0.06
Dichlorodifluoromethane	0.01	a	a	0.01
Dimethyl Formamide	0.01	a	a	0.01
Ethylbenzene	0.02	a	a	0.02
Fluoboric Acid	0.02	a	a	0.02
Fluorine End-Capped Homopolymers	0.19	a	a	0.19
Fluoroaliphatic Polymeric Esters	0.01	a	a	0.01
Fluorobenzene	0.14	a	a	0.14
Fluorotelomer	0.01	a	a	0.01
Glycol Ethers	1.20	a	0.01	1.21
Hexane	0.03	a	a	0.03
Hydrochloric Acid	0.15	a	a	0.15
Isopropyl Alcohol	0.70	0.08	0.06	0.83
Methyl Alcohol	0.01	a	a	0.01
Methyl Ethyl Ketone	0.03	a	a	0.03
Methyl Isobutyl Ketone	0.07	a	a	0.07
Methylene Chloride (dichloromethane)	0.01	a	a	0.01
Mineral Spirits/Naptha	0.17	0.03	a	0.21
Nitric Acid	0.43	a	a	0.43
Phosphoric Acid	0.03	a	a	0.03
Sulfuric Acid	0.27	a	a	0.27
Tetrachloroethylene	0.02	a	a	0.02
Toluene (methylbenzene)	0.19	a	a	0.19
Trichloroethylene	0.22	a	a	0.22
Trichlorotrifluoroethane	0.01	a	a	0.01
Xylene (dimethylbenzene)	0.13	a	a	0.13

E4 3592

[a] If emitted at all, compound would be released at a rate of less than 100 lb/yr (0.01 lb/hr).
[b] The individual values may not add up to the total because of rounding.

Source: FDI, 1993.

TABLE D3.1.2–2.—*Potential Emission Rates of Air Pollutants for Alternative Consolidation at Pinellas (lb/hr)*

Pollutant	Kansas City	Mound	Rocky Flats	Total[b]
Criteria Pollutants				
Carbon Monoxide (CO)				4.62
Nitrogen Dioxide (NO_2)				9.87
Sulfur Dioxide (SO_2)				0.02
Total Suspended Particulates (TSP)				0.58
Hazardous Air Pollutants and Other Toxic Compounds				
1,4-Dioxane	0.03	a	a	0.03
1,1,1-Trichloroethane	0.01	a	a	0.01
Acetic Acid	0.02	a	a	0.02
Acetone	0.37	a	a	0.37
Chlorodifluoroethane	0.02	a	a	0.02
Chlorodifluoromethane	0.01	a	a	0.01
Dichlorodifluoromethane	0.01	a	a	0.01
D'Limonene	0.06	0.03	a	0.09
Dimethyl Formamide	0.01	a	a	0.01
Ethyl Alcohol	a	0.01	a	0.01
Ethylbenzene	0.02	a	a	0.02
Fluoboric Acid	0.02	a	a	0.02
Fluorine End-Capped Homopolymers	0.19	a	a	0.19
Fluoroaliphatic Polymeric Esters	0.01	a	a	0.01
Fluorobenzene	0.14	a	a	0.14
Fluorotelomer	0.01	a	a	0.01
Glycol Ethers	1.20	0.09	a	1.29
Hexane	0.03	a	a	0.03
Hydrochloric Acid	0.15	a	a	0.15
Isopropyl Alcohol	0.70	0.01	0.08	0.79
Methyl Alcohol	0.01	a	a	0.01
Methyl Ethyl Ketone	0.03	a	a	0.03
Methyl Isobutyl Ketone	0.07	a	a	0.07
Methylene Chloride (dichloromethane)	0.01	a	a	0.01
Mineral Spirits/Naptha	0.17	a	0.03	0.21
Nitric Acid	0.43	a	a	0.43
Phosphoric Acid	0.03	a	a	0.03
Sulfuric Acid	0.27	a	a	0.27
Tetrachloroethylene	0.02	a	a	0.02
Toluene (methylbenzene)	0.19	a	a	0.19
Trichloroethylene	0.22	a	a	0.22
Trichlorotrifluoroethane	0.01	a	a	0.01
Xylene (dimethylbenzene)	0.13	a	a	0.13

E4 3593

[a] If emitted at all, compound would be released at a rate of less than 100 lb/yr (0.01 lb/hr).
[b] The individual values may not add up to the total because of rounding.

Source: FDI, 1993.

TABLE D3.1.2–3.—*Potential Emission Rates of Air Pollutants for Alternative Consolidation at Rocky Flats (lb/hr)*

Pollutant	Kansas City	Pinellas	Mound	Total[b]
Criteria Pollutants				
Carbon Monoxide (CO)				4.99
Nitrogen Dioxide (NO_2)				10.61
Sulfur Dioxide (SO_2)				0.02
Total Suspended Particulates (TSP)				0.63
Hazardous Air Pollutants and Other Toxic Compounds				
1,4-Dioxane	0.03	a	a	0.03
1,1,1-Trichloroethane	0.01	a	a	0.01
Acetic Acid	0.02	a	a	0.02
Acetone	0.37	0.02	a	0.39
Chlorodifluoroethane	0.02	a	a	0.02
Chlorodifluoromethane	0.01	a	a	0.01
D'Limonene	0.06	a	0.03	0.09
Dichlorodifluoromethane	0.01	a	a	0.01
Dimethyl Formamide	0.01	a	a	0.01
Ethyl Alcohol	a	a	0.01	0.01
Ethylbenzene	0.02	a	a	0.02
Flouboric Acid	0.02	a	a	0.02
Fluorine End-Capped Homopolymers	0.19	a	a	0.19
Fluoroaliphatic Polymeric Esters	0.01	a	a	0.01
Fluorobenzene	0.14	a	a	0.14
Fluorotelomer	0.01	a	a	0.01
Glycol Ethers	1.20	0.01	0.09	1.30
Hexane	0.03	a	a	0.03
Hydrochloric Acid	0.15	a	a	0.15
Isopropyl Alcohol	0.70	0.06	0.01	0.76
Methyl Alcohol	0.01	a	a	0.01
Methyl Ethyl Ketone	0.03	a	a	0.03
Methyl Isobutyl Ketone	0.07	a	a	0.07
Methylene Chloride (dichloromethane)	0.01	a	a	0.01
Mineral Spirits/Naptha	0.17	a	a	0.17
Nitric Acid	0.43	a	a	0.43
Phosphoric Acid	0.03	a	a	0.03
Sulfuric Acid	0.27	a	a	0.27
Tetrachloroethylene	0.02	a	a	0.02
Toluene (methylbenzene)	0.19	a	a	0.19
Trichloroethylene	0.22	a	a	0.22
Trichlorotrifluoroethane	0.01	a	a	0.01
Xylene (dimethylbenzene)	0.13	a	a	0.13

E4 3594

[a] If emitted at all, compound would be released at a rate of less than 100 lb/yr (0.01 lb/hr).

[b] The individual values may not add up to the total because of rounding.

Source: FDI, 1993.

D.3.2 Acoustics

Sections D3.2.1 through D3.2.8 describe the results of traffic noise analyses performed for each site.

D.3.2.1 *Kansas City Plant*

The change in peak hourly traffic noise levels along the major roads leading to KCP were estimated for the Proposed Action for the peak construction year (1995) and for operation (2000). Estimated change in peak hourly traffic noise levels along the major roads leading to KCP are small based on the anticipated increase in employment and operation for the Proposed Action.

The estimated maximum noise level increase during construction or operation along Troost Avenue and Bannister Road is less than 2 dBA. No change in community reaction to traffic noise is expected.

D.3.2.2 *Mound Plant*

Estimated peak hourly traffic volumes and associated noise levels along the major roadways leading to Mound are listed in table D3.2.2-1 for baseline years, and for the relocation to Mound alternative. The estimated maximum noise level increase of 5 dBA along Mound Road during operation may result in some increase in community reaction to traffic noise. The increase in traffic and the resulting increase in noise levels along Mound Road could be mitigated by providing access to the new facilities from Benner Road. Increases in traffic noise along the other roads during construction and operation are less than 3 dBA. No increase in community reaction to traffic noise along these roads is expected.

The phaseout of Mound under the Proposed Action would be expected to result in a decrease in traffic noise levels along the Mound Road and other roads leading to Mound.

D.3.2.3 *Pinellas Plant*

Estimated peak hourly traffic volumes and associated noise levels along the major roadways leading to Pinellas are listed in table D3.2.3-1 for baseline years, and for relocation to Pinellas alternative. The estimated maximum noise level increase of 1 dBA along Belcher Road during operation is less than 5 dBA, the increase below which no significant change in community reaction is expected.

Increases in traffic noise along Belcher Road during construction and along other roads during construction and operation are expected to be less than 1 dBA. No increase in community reaction to traffic noise along these routes is expected.

The phaseout of Pinellas under the Proposed Action would result in a decrease in traffic noise levels along Belcher Road and other nearby roads.

D.3.2.4 *Rocky Flats Plant*

Estimated peak hourly traffic volumes and associated noise levels along the major roadways leading to RFP are listed in table D3.2.4-1 for baseline years and for relocation to RFP alternative. The estimated maximum noise level increase of 1 dBA along Highway 72, Highway 128, and Indiana Street is less than 5 dBA, the increase below which no significant change in community reaction is expected.

Increases in traffic noise along other roads during construction and operation are expected to be less than 2 dBA. No increase in community reaction to traffic noise along these routes is expected.

The phaseout of RFP under the Proposed Action would be expected to result in some decrease in traffic noise near RFP.

TABLE D3.2.2–1.—*Estimated Hourly Traffic Volumes and Traffic Noise Levels Along the Access Routes to Mound*

Route	Peak Hour Traffic Volume (veh/hr)		Noise Level in L_{eq} (1-hr) (dBA)[a]	
	Baseline	Relocate to Mound	Baseline	Relocate to Mound
Construction				
Mound Road	251	406	67	69
Benner Road	293	316	65	65
Main Street (north of Mound Avenue)	794	896	67	67
6th Street	139	170	58	59
Operation				
Mound Road	258	859	66	71
Benner Road	301	393	65	66
Main Street (north of Mound Avenue)	816	1,211	67	69
6th Street	143	264	58	61

E4 3925

[a] L_{eq}(1-hr) is the hourly L_{eq} in dBA, and is predicted for a receptor located 50 feet from the center line of nearest lanes.

TABLE D3.2.3–1.—*Estimated Hourly Traffic Volumes and Traffic Noise Levels Along the Access Routes to Pinellas*

Route	Peak Hour Traffic Volume (veh/hr)		Noise Level in L_{eq} (1-hr) (dBA)[a]	
	Baseline	Relocate to Pinellas	Baseline	Relocate to Pinellas
Construction				
Belcher Road	3,483	3,506	76	76
Bryan Dairy Road	3,557	3,678	76	76
Operation				
Belcher Road	4,191	4,295	76	77
Bryan Dairy Road	4,280	4,780	77	77

E4 3922

[a] L_{eq}(1-hr) is the hourly L_{eq} in dBA, and is predicted for a receptor located 50 feet from the center line of nearest lanes.

TABLE D3.2.4–1.—*Estimated Hourly Traffic Volumes and Traffic Noise Levels Along the Access Routes to Rocky Flats*

Route	Peak Hour Traffic Volume (veh/hr)		Noise Level in L_{eq} (1-hr) (dBA)[a]	
	Baseline	Relocate to Mound	Baseline	Relocate to Mound
Construction				
HWY 93	1,547	1,565	78	78
HWY 72	540	567	71	71
HWY 128	817	875	73	73
Indiana Street	1,036	1,095	74	74
Operation				
HWY 93	1,983	2,106	79	79
HWY 72	692	878	72	73
HWY 128	1,048	1,452	74	75
Indiana Street	1,329	1,735	75	76

E4 3924

[a] L_{eq}(1-hr) is the hourly L_{eq} in dBA, and is predicted for a receptor located 50 feet from the center line of nearest lanes.

D.3.2.5 *Savannah River Site*

The estimated changes in peak hourly traffic noise levels along the major roadways leading to SRS are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase along U.S. 125 and other routes is less than 1 dBA. No change in community reaction to traffic noise is expected.

D.3.2.6 *Los Alamos National Laboratory*

The estimated changes in peak hourly traffic noise levels along the major roadways leading to LANL are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase along Route 4 and other routes is less than 2 dBA. No significant change in community reaction to traffic noise is expected.

D.3.2.7 *Y-12 Plant*

The estimated changes in peak hourly traffic noise levels along the major roadways leading to ORR are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase of 1 dBA along TN 95 and other routes is less than 5 dBA, the increase below which no significant change in community reaction is expected.

D.3.2.8 *Sandia National Laboratories, New Mexico*

The estimated changes in peak hourly traffic noise levels along the major roadways leading to SNL are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase along Eubank Boulevard is less than 1 dBA. No significant change in community reaction to traffic noise is expected.

APPENDIX E

APPENDIX E: SOCIOECONOMICS AND COMMUNITY SERVICES

E.1 INTRODUCTION

This appendix includes the methodologies, models, assumptions, and supporting data used for assessing the potential impacts on each of the resources in the Socioeconomics and Community Services sections. Section E.2 presents the methods and assumptions used to evaluate the potential socioeconomic effects of the proposed consolidation of nonnuclear manufacturing functions of the Nuclear Weapons Complex (Complex). The socioeconomic analysis for this environmental assessment (EA) involved two major steps: (1) the characterization and projection of existing social, economic, and infrastructure conditions surrounding each of the selected consolidation sites (i.e., the Affected Environment); and, (2) the evaluation of potential changes in socioeconomic conditions that could result from the construction and operation of nonnuclear manufacturing functions in the eight regions involved in the consolidation program (i.e., the Environmental Consequences). Supporting data for the Affected Environment and Environmental Consequences sections are contained in section E.3.

E.2 METHODOLOGIES AND MODELS

E.2.1 Population and Employment

The description of socioeconomic conditions includes indicators such as population, labor force, employment, earnings, and income that provide a basis for comparison of regional socioeconomic conditions among the sites both with and without the Proposed Action and alternatives. The No Action alternative was considered equivalent to future baseline conditions without consolidation activities. The baseline for the No Action alternative was established from the total employment projected for each of the sites at the end of Fiscal Year 1994. These proposed Fiscal Year 1994 budget and employment estimates are believed to best reflect the staffing levels needed as a result of recent stockpile requirement reductions. (DOE, 1993c).

Region-of-Influence. The primary factor in determining the region-of-influence (ROI) was the distribution of residences for current Department of Energy (DOE) and contractor personnel working at each of the eight proposed sites. The ROIs were determined to be those areas in which approximately 90 percent of the current DOE and contractor employees reside. This residential distribution reflects existing commuting patterns and attractiveness of area communities for people employed at each site, and was used to estimate the future distribution of direct workers associated with the proposed consolidation.

As an example, table E3.6-1a displays the residential distribution by city and county for all personnel employed at Mound. Data on residential location for a large portion of facility employees were obtained from Mound personnel offices. Similar data were provided by the other locations in tables E3.1-1a through E3.8-1a.

Existing and Future Baseline. Historical and existing population, labor force, employment, and income data were obtained from the U.S. Bureau of Economic Analysis Regional Economic Information Systems (DOC, 1991). Historical personal income and per capita income values were converted to constant 1992 dollars using the current Department of Commerce National Income deflator index. Employment by place of work was converted to

employment by place of residence on the basis of ratios derived from Bureau of Census, Bureau of Labor Statistics, and Bureau of Economic Analysis data.

Growth projections for population, labor force, employment, and income were based on Bureau of Economic Analysis Regional Projections to 2040 (DOC, 1990a and b) for Bureau of Economic Analysis economic regions and metropolitan statistical areas. Bureau of Economic Analysis projections are for multi-county economic regions or whole metropolitan statistical areas; therefore, projections for individual counties were made by applying the appropriate growth rates for each Bureau of Economic Analysis data series (population, employment, etc.) to each county in the identified ROI for each site. Data series forecasts for counties within a metropolitan statistical area were based on the higher Bureau of Economic Analysis growth rates projected for metropolitan areas, while forecasts for other counties in the ROI were based on generally lower regional growth projections.

Potential Project Effects. Total output multipliers for each region were obtained from the U.S. Department of Commerce, Bureau of Economic Analysis Regional Inter-industry Multiplier System, and utilized in an economic model developed for evaluation of socioeconomic impacts of large-scale government programs.

The model includes four major components for the analysis:

- A regional inter-industry component that produced a regional input-output table and output multipliers for each specified sector of the economy for each ROI.

- A direct effects component that produced a matrix of final demands (estimated changes in industry and household spending due to project activities) on the basis of direct employment and procurement associated with the project.

- An employment impact component that calculated region-wide indirect output, earnings, and employment estimates.

- A macroeconomic impact component that calculated regional population impacts on the basis of assumptions concerning possible changes in unemployment, the share of the labor force with the necessary skills to take direct project jobs, and the portion of the direct employment that would in-migrate to the ROI.

These inter-industry multipliers were estimated using the U.S. input-output table in combination with the most recent region-specific information describing the relationship of the regional economy to the national economy.

The same methodology was used to develop quantitative projections of economic activity for No Action conditions, the Proposed Action, and the alternatives. Project-related changes in regional demand in each local industrial and household sector were first estimated as follows:

- Construction-phase demands were based on construction labor and cost data provided by Fluor-Daniel, Inc., engineers, and the DOE sites affected by the proposal from parameters developed in support of the description of Proposed Action and alternatives development.

- Operations-phase demands were estimated from DOE operations employment estimates, and procurement requirements from existing DOE facilities that provide similar manufacturing activities.

The direct effects component uses the construction and operations demand to determine the procurement in the specific industries and the personal consumption expenditures (household spending) due to the project activities, taking into consideration the disposable income of each type of direct employment category.

These primary or direct effects were then multiplied, using Regional Inter-industry Multiplier System coefficients specific to the regional economy, to provide estimated total spending associated with the Proposed Action and the alternatives. Input-output sectors were selected to reflect the anticipated spending profile associated with the Proposed Action and alternatives in order to capture the economic characteristics of each scenario within the ROI. The employment impact component thus estimates the indirect employment, earnings, and personal income due to the Proposed Action and alternatives. Table E2.1 presents the assumptions for direct and indirect employment that were used for the regional socioeconomic analysis.

The macroeconomic impact component uses the information regarding the direct and indirect employment from the direct effects and employment impact components, as well as the baseline information, to estimate the direct and indirect employment that would in-migrate into the region. Numbers of in-migrant workers associated with the Proposed Action and each alternative were estimated according to a set of assumptions concerning the availability of required labor skill levels within each regional labor force and the recognition that competitive bidding for both construction and operations activities would bring in a certain number of workers regardless of available labor. Since the labor demands for nonnuclear consolidation construction and operations activities are generally small in comparison to regional labor availability, in-migrant workers were primarily associated with contract award relocation assumptions. In addition to analyzing the population changes due to in-migrant workers, population changes due to out-migrations of workers from sites that would have work force reductions as a result of the Proposed Action or other alternatives were examined. These population projections are conservative because they are estimated under the assumption that all the jobs lost will occur in the single year 2000.

Average household sizes for in-migrant workers were assumed to correspond, for most categories, with the average size of state-to-state migrating families between 1980 and 1990.

The intra-regional allocation analysis accounts for the distribution of direct and indirect workers and their families among the various residential areas within each region. The direct portion of the effect allocation process accounts for the two main factors affecting the distribution of in-migrant direct workers: (1) the number of workers anticipated to be directly involved with each alternative; and, (2) the locations and relative attractiveness of residential opportunities within the region. Similar to the analysis for assessing the population increases due to in-migration of direct and indirect workers and their families, out-migration of direct and indirect workers and their families are measured.

Population changes associated with the Proposed Action and the alternatives are an important determinant of other socioeconomic and environmental impacts. These population changes have three key components: (1) baseline growth; (2) relocation of workers and their dependents; and, (3) natural increase of population (births minus deaths) over the long term. To evaluate anticipated population effects, potential future changes associated with the Proposed Action and the alternatives were compared to projected baseline conditions.

The computer output of the macroeconomic impact component for the Mound alternative at the Mound Plant (Mound) is presented in table E2.2. The first page of the table presents the employment and population parameter values used for this analysis and baseline and project information. The second page presents direct and indirect project impacts and

TABLE E2.1.—*Assumptions for Regional Economic Analysis, Mound Plant Example*

Employment	Category								
	DSHARE[a]	DUR[a]	PRDEP	DURDEP[a]	HHS	FF	NLOC	IUR[a]	FUR[a]
Direct									
Construction									
Direct	0.75	0.45	0.238[b]	0.054	3.11[c]	0.589[c]	0.25		
Support	0.050	0.045	0.238[b]	0.054	2.93[c]	0.618[c]	0.75		
Operations									
DOE Operations	0.195	0.045	0.247[b]	0.054	3.17[d]	0.708[d]	0.50		
Indirect									
Personal Consumption					3.17[d]	0.708[d]		0.054	
Procurement					3.17[d]	0.708[d]		0.054	
Related Investment					3.17[d]	0.708[d]		0.054	
Other Parameters									0.045

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[a] This varies from site to site.
[b] OWRC, 1975.
[c] COE, 1981.
[d] DOC, 1991.

Notes:

DSHARE - Employable share of available resident labor force. This is the proportion of current unemployed labor force with the necessary skills. For Direct Construction Workforce it is 1.5 times construction workers as a proportion of the total employment for year 1989 as measured by Bureau of Economic Analysis. The factor 1.5 is historically used as the unemployment rate is higher for construction workers. This ratio is assumed to be 0.05 for Support/Design. For DOE Operations, this is the proportion of manufacturing related employment in 1989 as given by Bureau of Economic Analysis.

DUR - Unemployment rate, in-migrant workers (direct employment). This is assumed to be the same as the minimum unemployment rate.

DURDEP - Unemployment rate, dependents of in-migrant workers. This is assumed to be the unemployment rate at the start of the project.

FF - Fraction of workers accompanied by dependents.

HHS - Household size of workers accompanied by dependents.

IUR - Unemployment rate, in-migrant workers (indirect employment).

NLOC - Proportion of workers assumed to be non-local.

PRDEP - Labor force participation rate of the dependents of in-migrating workforce.

FUR - Floor value for minimum employment rate. The unemployment rate for any region cannot go lower than this value. This is determined as the lowest unemployment rate in the region for 1970-1990 period. Proportion of population that is working age: 0.643[e].

TABLE E2.2.—*Parameters Used By The Model Mound Plant Example* [Page 1 of 2]

Parameters Used By the Model

MSLF = .1000 FUR = .0450

Direct Employment Parameters:

Category	DSHARE	DUR	PRDEP	DURDEP	HHS	FF	DCIV	NLNDTR	NLRLOC	SHWCON
Construction-Direct	.075	.045	.238	.054	3.110	.589	1.000	.000	.250	.000
Construction-Support	.050	.045	.238	.054	2.930	.618	1.000	.000	.750	.000
DOE Operations	.195	.045	.247	.054	3.170	.708	1.000	.000	.500	.000

Indirect Employment Parameters:

Category	IUR	HHS	FF
Personal Consumption	.054	3.170	.708
Procurement	.054	3.170	.708
Related Investment	.054	3.170	.708

Logistic Labor Force Response Parameters:

Proportion of population that is of working age = 0.643

Beta parameter of effect of project jobs on labor force participation (0 = no effect) = 1.0500

Abbreviations Used:

DCIV - Fraction of direct employment which can be filled by civilians.
DSHARE - Employable share of available resident labor force.
DUR - Unemployment rate, in-migrant workers (Direct employment).
DURDEP - Unemployment rate, dependents of in-migrant workers.
FF - Fraction of workers accompanied by dependents.
FUR - Floor value for minimum unemployment rate.
HHS - Household size, workers accompanied by dependents.
IUR - Unemployment rate, in-migrant workers (indirect employment).
MSLF - Maximum share of baseline labor force employed with project - but unemployed without it.
NLNOTR - Share of employment assumed to be non-local, and not relocating from out of region.
NLRLOC - Share of employment assumed to be non-local, but relocating from out of region.
PRDEP - Labor force participation rate, dependents of in-migrant workers.
SHWCOM - Share of direct workers who are weekly commuters.

Year: 1993

Baseline Information

Population	988,026
Civilian Labor Force	493,321
Labor Force Participation Rate (w/o Proj.)	.4993
Employed Civilian Labor Force (w/o Proj.)	466,633
Unemployment Rate	.054
Total Employment (w/o Proj.)	466,646
Earnings ($1,000)	12,464,970
Personal Income ($1,000)	18,143,330
Per Capita Income (w/o Proj.)	18,363

Project Information:

Employment Category	Direct Employment	Earnings ($1,000)	Personal Income ($1,000)
Construction-Direct	252.0	7,292	7,292
Construction-Support	38.0	1,475	1,475
DOE Operations	0.0	0	0
Subtotal	**290.0**	**8,768**	**8,768**
Indirect Employment			
Personal Consumption	140.4	3,637	5,294
Procurement	641.0	20,421	29,724
Related Investment	0.0	0	0
Subtotal	**781.3**	**24,058**	**35,018**
Total-Place of Work	1,071.3	32,826	43,786
Weekly Commuting Adjustment			0
Total-Place of Residence			43,786

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TABLE E2.2.—*Parameters Used by the Model Mound Plant Example*—Continued [Page 2 of 2]

Direct and Indirect Project Impacts

Direct Employment Category:

Category	Available Residential Labor Force	Excess Demand	Labor Force Increase	Dependents	Population Impacts	Weekly Commuters	Accompanying Labor Force
Construction-Direct	336.87	63.00	65.97	81.99	147.95	.00	19.51
Construction-Support	224.58	28.50	29.84	35.59	65.44	.00	8.47
DOE Operations	875.87	.00	.00	.00	.00	.00	.00
Subtotal	**1,437.32**	**91.50**	**95.81**	**117.58**	**213.39**	**.00**	**27.98**

Indirect Employment Category:

Category	Demand Share of Avail. Res. Labor Force	Excess Demand	Labor Force Increase	Dependents	Population Impacts	Labor Force Share
Personal Consumption	548.66	.00	.00	.00	.00	.12
Procurement	2,505.65	.00	.00	.00	.00	.56
Related Investment	.00	.00	.00	.00	.00	.00
Subtotal	**3,054.32**	**.00**	**.00**	**.00**	**.00**	**.68**
Total	**4,491.64**	**91.50**	**95.81**	**117.58**	**213.39**	

Summary of Effects:

Employment-	Direct Employment (All Categories)	290
	Indirect Employment (All Categories)	781
	Total Project-Related Employment	1,071
	Project-Related Civilian Employment	1,071
	Civilian Labor Force Increase	124
	Civilian Labor Force (w/Project)	493,711
	Employed Civilian Labor Force (w/Project)	467,704
	Unemployment Rate (w/Project)	.053
	Total Employment (w/Project)	467,717
	Adjusted Baseline Labor Force Particpation Rate (w/Project)	.4996
	Labor Force Partic. Rate (w/Project)	.4996
	Maximum Employment of Accompanying Labor Force	26
Population-	Total Population Impact	213
	Total Population (w/Project)	988,239
	Direct Weekly Commuters	0
Income-	Direct Project-Related Earnings ($1,000)	8,768
	Direct Project-Related Resident Earnings ($1,000)	8,768
	Indirect Project-Related Earnings ($1,000)	24,058
	Earnings (w/Project $1,000)	12,497,790
	Personal Income Impact of Project ($1,000)	43,786
	Personal Income (w/Project $1,000)	18,187,110
	Per Capita Income (w/Project)	18,404

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a summary of effects for the year 1993. Similar output was created for all project years through 2000. Table E3.6-1b is a summary of the macroeconomic component results for Mound for selected years between 1970 and 2040. Population and economic data for all the sites are given in tables E3.1-1b through E3.8-1b.

E.2.2 Housing

Housing characteristics are presented in tables E3.1-2 through E3.8-2. Projected housing needs are based upon housing unit and population data obtained for 1990 for each ROI (Census, 1991b). Future housing units needed for cities and counties in each ROI were developed by estimating the household size from the current population and housing unit ratios. The household size-to-population ratios were then applied to the estimated future population trends to obtain the number of housing units needed to

accommodate the projected population for a No Action alternative future baseline.

Projected housing needs for the Proposed Action and the alternatives were developed in the same manner as the estimates for a No Action baseline. These estimates, however, include projected in-migrating workforces (and their families) from outside the ROI. Future housing needs for the in-migrating populations, resulting from employment created directly or indirectly by the project, were estimated from the national average household size (Census, 1991b). Conversely, estimates of additional housing unit vacancies created directly and indirectly by a project alternative as a result of out-migrations were developed from current population and household size ratios.

E.2.3 Utilities

The primary water supply and wastewater treatment systems providing service to the counties and municipalities in each ROI were identified through available written information or through telephone interviews. Information was collected on current capacities, average demands, and, where available, peak demands, population served, and ongoing system modifications. These data are presented in tables E3.1-3 through E3.8-3.

All future demand projections were based upon the population estimates for those counties and municipalities established for a No Action alternative baseline in each ROI. However, water and wastewater system service areas are not usually defined by county or municipal boundaries. Large municipal systems often serve the municipality in which they are located, as well as other parts of the region. County systems often serve a portion of the population in the unincorporated areas of the county and may also provide service to municipalities within the county. Systems not operated by a municipality or county may also provide service in a region. Populations in rural areas often utilize wells and septic tanks or very small municipal systems.

Where several systems were identified in an ROI, only the systems that provided the majority of the service in the region were evaluated. Where a system, or a combination of systems, was found to serve only a portion of an area's total population, the percentage of that total population represented by that system's service population was estimated. Future projections were based on the general assumption that the future service population would remain a consistent percentage of the total future population in that area. If no service population information was available for a system, the service population was estimated from current average demands. Values of 200 gallons per capita day for water consumption and 100 gallons per capita day for wastewater generation were used as conservative estimates for all future demand projections.

E.2.4 Education

Education characteristics for each ROI are presented in tables E3.1-4 through E3.8-4. Statistics on kindergarten through 12th grade public school enrollments, school facility capacities, and the numbers of teachers were collected for all school districts in each ROI from state education departments and telephone interviews for the 1989-1990 school year. For the No Action alternative, future enrollment projections for counties in each ROI were developed by calculating the appropriate state percentage of school age children from the population (Census, 1991b) and then applying this percentage to future baseline population trends. Enrollment projections for in-migrating future populations under the Proposed Action and alternatives were developed using the national percentage of school-age children (Census, 1991b).

Estimates of additional teachers needed for the No Action alternative, the Proposed Action, and the other alternatives were based upon the 1989-1990 pupil-to-teacher ratios. Under the assumption that the current pupil-to-teacher ratios represent each community's standard for level of service (LOS), these standard ratios were applied to the projected

student enrollments to obtain the number of additional teachers needed in the future to maintain the current LOS.

E.2.5 Health Care

The number of physicians, hospitals, hospital bed capacities, and occupancy rates were obtained for counties in each ROI for 1990 from the American Medical Association, the American Hospital Association, and telephone interviews. Future population estimates for the No Action alternative, the Proposed Action, and the other alternatives were applied to current hospital occupancy rates and capacities to determine the number of additional hospital beds in excess of capacity that would be needed to accommodate the projected population.

Under the assumption that the current ratio of doctors per 1,000 persons represented the counties' current LOS, population trends were applied to future population scenarios for the different alternatives to obtain the number of additional physicians that would be needed to maintain the counties' current LOS.

E.2.6 Public Safety

Statistics on sworn police officers and volunteer and professional firefighters for 1990 were obtained from the U.S. Department of Justice, American Fire Services, and telephone interviews for each of the ROI cities and counties. It was assumed that the current sworn police officer and firefighter per 1,000 persons ratios represented the communities' standards for LOS. Under this assumption, population trends were applied to future population scenarios for the Proposed Action and alternatives to derive the number of additional police officers and firefighters that would be needed to maintain current LOS.

E.2.7 Local Transportation

The ROI road segments for each site were selected for analysis based upon employee residence distribution. Traffic data for interstate, U.S., and state highway routes were provided by each state's transportation department. Traffic data for local roads were provided by city, county, or regional highway and planning departments. Accident data for each ROI county were provided by either state highway or police departments. Truck traffic information associated with commercial deliveries at each site were provided by each respective DOE facility. Impacts to local transportation were assessed using traffic level changes, incremental vehicle accidents, and fatalities in the ROI of each site. Modeling of consequences was conducted for the ROIs where the Proposed Action or alternatives could result in substantial workforce or population growth. Baseline estimates and project impacts were assessed for specific road segments within the ROI. Baseline traffic data are provided in tables E3.1-5 through E3.8-5.

The baseline analysis focuses on projected population changes in the study area. Projected ROI traffic conditions (average daily traffic, ADT) were derived by applying an average of trips generated by residential townhouses, condominiums, and single family detached housing units. Data represent trips per day per person and were obtained from the Institute of Transportation Engineer's Trip Generation Report (ITE, 1991), to the estimated changes in total population. Projected trips were distributed to the roadway network based on existing traffic conditions. These trips, when added to existing trips, were considered to be the baseline rate. Baseline analyses include 1995 (year of peak construction) and 2000 (typical year of operations).

Local transportation impacts of DOE facility consolidation were assessed in terms of the effects of direct and indirect employment changes on ADT and the LOS. Definitions and LOS ratings are provided in table E2.3. Direct employment trips were distributed on the roadway network based on

TABLE E2.3.—*Definitions of Level of Service Used for Transportation System Assessments*

Level of Service	Definition
A–Free flow	Operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway and driver preferences. Minor disruptions to flow are easily absorbed at this level without causing significant delays or queues.
B–Stable flow (upper speed limit)	Indicative of free flow, although the presence of other vehicles begins to be noticeable. Average travel speeds are generally over 53 mph on sections with 70 mph design speed. Minor disruptions are easily absorbed at this level, though local deterioration in the level of service will be more obvious.
C–Stable flow	A range where the influence of traffic density becomes marked. Ability to maneuver within the traffic stream and to select an operating speed is clearly influenced by the presence of other vehicles. Average travel speeds are reduced to about 50 mph on 70 mph design speed sections. Minor disruptions may be expected to cause serious local deterioration in service, and queues may form behind any significant travel disruptions. Severe or long term disruptions may result in deterioration of service to forced flow conditions.
D–Approaching unstable flow	Speeds and ability to maneuver are severely restricted because of traffic congestion. Average traffic speeds are approximately 40 mph on 70 mph design speed sections. Only the most minor disruptions can be absorbed without the formation of extensive queues and deterioration of levels of service to forced flow conditions.
E–Unstable flow	Operations at or near capacity. Disruptions cannot be dampened or dissipated and any disruption, however minor, will cause queues to form and the level of service to deteriorate to forced flow conditions. Average speeds at capacity are approximately 30 mph.
F–Forced flow[a]	Occurs at a point where vehicles arrive either at a rate greater than that at which they are discharged, or at a point in a planned facility where forecasted demand exceeds computed capacity. While operations at such points and on immediately downstream sections will appear to be at capacity or better, queues will form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing short spurts of movement followed by stoppages. Average travel speeds within the queues are generally below 30 mph.

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[a] Also called breakdown flow.
Source: TRB, 1985.

existing employment trip distribution. Indirect employment trips were allocated to the roadway network based on existing ROI road segment traffic conditions. To determine the impacts of DOE consolidation activities, direct and indirect employment trips were added to the baseline and existing trips. Analyses for 1995 (year of peak construction) and for 2000 (typical year of operations) were presented to correspond with baseline analyses.

Incremental truck traffic associated with consolidation construction and operations activities was also assessed relative to baseline truck traffic at each DOE facility. In addition to ADT, peak hour volume (PHV) and roadway capacity were considered in deriving traffic impacts. Peak hour volumes are typically assumed to be 10 percent of the ADT. Segment capacity was calculated using standard definitions of roadway types, including non-interstate multi-lane roads, rural and urban

TABLE E3.1–1a.—*Distribution of Kansas City Plant Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
Missouri		
Cass County	761	14.0
Belton	237	4.4
Harrisonville	150	2.8
Jackson County	3,246	59.8
Grandview	305	5.6
Independence	311	5.7
Kansas City	1,499	27.6
Lee's Summit	609	11.2
Raytown	199	3.7
Kansas		
Johnson County	915	16.9
Olathe	188	3.5
Overland Park	376	6.9
Wyandotte County	135	2.5
Kansas City	126	2.3
ROI (County Total)	5,057	93.2

E4 3847

[a] Includes employees from AlliedSignal Aerospace Company which represent 96 percent of KCP total.

Source: KC ASAC, 1993b.

interstates, and two-lane roads. Volume estimates were assessed relative to the design capacity of the route in order to determine the associated LOS.

PHV to capacity ratios correspond to a specific LOS for each of the three roadway types. The ranges of volume-to-capacity ratio for each LOS were obtained from the Transportation Research Board's 1985 Highway Capacity Manual (TRB, 1985).

Accident and fatality rates were based upon 1990 statistics of the number of accidents and fatalities per person in the ROI. These rates are assumed to be constant and were multiplied by the projected populations for both baseline and consolidation activities to estimate the number of accidents and fatalities in future years.

E.3 SUPPORTING DATA

Data and analyses used to support the assessments made for the socioeconomics and community services sections are presented in the following tables. The tables are organized by sites and resource areas. For example, table E.3.1-1a is the first site KCP and the first table for the resource area of population and employment.

TABLE E3.1–1b.—*Indicators of Regional Growth at Kansas City Plant, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	471,743	575,360	670,954	751,591	767,937	740,450
Unemployment Rate (%)	3.4	6.4	5.0	6.0	6.0	5.9
Personal Income (thousand $)	4,759,582	12,271,703	23,160,096	32,080,918	40,374,573	48,005,367
Per Capita Income ($/person)	4,319	10,912	19,076	24,034	27,410	31,764
Four-County Population						
Cass County, MO	39,448	51,029	63,808	66,926	73,855	75,775
Belton	9,783	12,708	18,150	19,037	21,008	21,554
Harrisonville	5,052	6,372	7,683	8,058	8,893	9,124
Jackson County, MO	654,558	629,266	633,232	702,723	775,476	795,638
Grandview	17,456	24,502	24,967	27,707	30,575	31,370
Independence	111,630	111,806	112,301	124,625	137,527	141,103
Kansas City	507,330	448,159	341,179	378,620	417,819	428,682
Lee's Summit	16,230	28,741	45,985	51,031	56,315	57,779
Raytown	33,306	31,759	30,601	33,959	37,475	38,449
Johnson County, KS	217,662	270,269	355,054	376,813	415,824	426,636
Olathe	17,917	37,258	63,352	67,234	74,195	76,124
Overland Park	79,034	81,784	111,790	118,641	130,924	134,328
Wyandotte County, KS	186,845	172,335	161,993	188,352	207,852	213,256
Kansas City	168,213	161,087	149,767	174,137	192,165	197,161
ROI (County Total)	1,098,513	1,122,899	1,214,087	1,334,814	1,473,007	1,511,305

E4 3993

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991a; KS DHR, 1991; MO DES, 1991.

TABLE E3.1–2.—*Kansas City Plant ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
Missouri						
Cass County	13,122	8,339	2	3,738	8	1,121
Jackson County	241,919	137,019	2	87,350	1	2,411
Kansas City	272,212	157,186	1	96,519	11	2,782
Lee's Summit	5,625	3,420	1	1,688	3	5
Kansas						
Johnson County	67,482	48,806	1	16,128	9	340
Overland Park	23,022	16,165	1	5,896	10	23
Wyandotte County	63,484	40,802	1	19,496	8	1,049
ROI (County Total)	386,007	234,966	1	126,712	4	4,921
1980						
Missouri						
Cass County	19,129	13,306	9	4,117	9	1,642
Jackson County	262,356	149,608	6	92,477	10	2,667
Kansas City	191,904	101,481	7	73,746	11	1,821
Lee's Summit	11,923	6,944	5	4,208	8	9
Kansas						
Johnson County	102,827	71,583	5	25,344	7	958
Overland Park	31,244	20,718	5	8,928	6	23
Wyandotte County	68,506	41,490	6	21,902	10	1,890
ROI (County Total)	452,818	275,987	6	143,840	9	7,157
1990						
Missouri						
Cass County	24,337	17,486	2	5,408	9	2,859
Jackson County	280,729	154,859	2	97,723	13	5,467
Kansas City	161,763	77,287	3	63,603	15	2,749
Lee's Summit	18,608	11,479	2	6,009	10	118
Kansas						
Johnson County	144,155	94,661	2	41,772	9	1,747
Overland Park	48,043	28,959	2	15,977	9	263
Wyandotte County	69,102	38,714	3	22,800	16	3,109
ROI (County Total)	518,323	305,720	2	167,703	12	13,182

E4 3991

Source: Census, 1972, 1982, 1991b.

TABLE E3.1–3.—*Primary Municipal Water and Wastewater Systems in the KCP ROI*

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Jackson County, MO			
Kansas City, MO Water Department	240.00	115.00	48
City of Independence Water Department[a]	36.00	23.00	64
Cass County, MO			
City of Harrisonville	2.20	1.47	67
Johnson County, KS			
Johnson County Water District #1[b]	105.00	44.60	42
City of Olathe[c,d]	10.50	10.00	95
Wyandotte County, KS			
Kansas City, KS Board of Public Utilities	60.00	30.00	50
Total	453.70	224.07	49
Wastewater Systems (1991)			
Jackson County, MO			
Kansas City, MO Publication-Owned Treatment Works	132.43	101.81	77
Little Blue Valley Sewer District	40.00	27.00	68
City of Independence	10.00	8.00	80
Cass County, MO			
City of Harrisonville	3.00	1.00	33
Johnson County, KS			
Johnson County Unified Wastewater District[e]	32.65	31.29	96
City of Olathe	5.20	3.20	62
Wyandotte County, KS			
Kansas City, KS Water Pollution Control Division	42.00	20.24	48
Total	265.28	192.54	73

E4 3926

[a] To expand system capacity to 42 million gallons per day (MGD) by summer 1992.
[b] To expand one of two current plants from 50 MGD to 75 MGD by 1995, total system capacity to 130 MGD.
[c] Approximately 1-1.5 MGD purchased from Johnson County in 1991.
[d] Water for city plants from Lake Olathe (plant #1, 4.0 MGD) and 11 wells at Kaw River (plant #2, 6.5 MGD).
[e] To replace 6 of 14 plants in (5 in Johnson Co., 1 in Lenexa) and increase overall system capacity by 4.1 MGD to 36.75 MGD by 1995.

Source: Sidleman, Kwan, Vest, Grey, Veal, Carter, Fain, Brunner, Turner, McQuerry, Lopez, Metzler, Celter, Gill, Patten, Smith, Creek, Vangordon, Woodring, Kirch.

TABLE E3.1–4.—*Kansas City Plant ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity [b]	Pupil-Teacher Ratio [a,c,d]	Per Pupil Expenditure [a,d]
Missouri				
Cass County	12,301	13,290	16.3	3,023.86
Belton #124	3,946	3,950	16.9	2,982.91
Cass County	454	650	13.8	3,072.91
Drexel	293	310	13.3	3,035.16
East Lynne	169	210	13.0	4,982.03
Harrisonville	2,061	2,195	14.9	3,343.07
Midway	584	600	15.4	2,976.57
Pleasant Hill	1,238	1,250	18.2	2,619.91
Raymore-Peculiar	2,696	3,000	17.2	2,906.19
Sherwood	750	1,000	15.6	2,799.96
Strasburg	110	125	15.7	4,478.86
Jackson County	96,502	105,128	15.8	4,586.84
Blue Springs	10,914	11,000	19.6	3,098.95
Center School #58	2,888	3,000	14.5	5,041.36
Fort Osage	5,203	5,600	19.4	3,102.86
Grain Valley	938	1,200	16.9	2,846.55
Grandview	4,461	5,500	15.8	4,261.08
Hickman Hills	7,505	12,425	15.6	4,135.86
Independence	11,020	10,300	18.0	3,329.52
Kansas City #33	34,640	35,297	13.6	6,356.29
Lee's Summit	8,826	8,826	18.3	3,467.39
Lone Jack	355	380	13.9	3,057.84
Oak Grove	1,523	1,600	18.5	2,880.10
Raytown	8,229	10,000	15.5	3,943.06
Kansas				
Johnson County	57,559	65,252	13.8	4,919.16
Blue Valley	8,572	10,002	14.1	5,572.85
DeSoto	1,786	1,971	14.3	4,332.14
Gardner, Edgerton, Antioch	1,698	1,772	14.5	5,147.52
Olathe	13,974	13,980	12.7	5,267.16
Shawnee-Mission	30,235	36,027	14.1	4,616.30
Spring Hill	1,294	1,500	16.0	4,417.70
Wyandotte County	29,715	32,389	14.6	4,400.23
Bonner Springs	2,134	2,149	16.9	4,276.34
Kansas City	22,543	25,000	14.4	4,447.70
Piper-Kansas City	1,054	1,040	16.5	4,606.64
Turner-Kansas City	3,984	4,200	14.3	4,143.39
ROI (County Total)	196,077	216,059	15.0	4,558.06

E4 3839

[a] KS DEd 1990; MO DEd, 1990a; Slaughter.

[b] Fields, Gordon, Moore, Sagaser, Akers, Hanna, Harris, Barnett, Collins, Hill, Manning, Briegel, Wiggins, Miller, Dean, Malicoat, Esselman, Williams, Walker, Carter, Foraker, Plummer, Braley, Jones, Bush, Cook, Marsh, Norris, Wisely, Shephard, Vielbig.

[c] Jones.

[d] MO DEd, 1990b; Watson.

TABLE E3.1–5.— *Baseline Traffic by Link, Kansas City Plant* [a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
Bannister Rd	Holmes Rd	I-435	29,589	2,959	B	31,579	3,158	B
Troost Ave	Bannister Rd	85th St	21,667	2,167	E	23,125	2,313	E
Troost Ave	85th St	47th St	27,026	2,703	E	28,844	2,884	F
95th St	Bannister Rd East	Blue River Rd	15,610	1,561	D	16,660	1,666	D
95th St	Blue River Rd	Bannister Rd West	14,678	1,468	D	15,665	1,567	D

E4 3902

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: Cunningham; KS DOT, 1991; MO Hwy, 1989, 1990; TRB, 1985.

TABLE E3.2–1a.—*Distribution of Savannah River Site Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
South Carolina		
Aiken County	9,978	51.9
Aiken	4,928	25.7
North Augusta	2,666	13.9
Allendale County	217	1.1
Bamberg County	329	1.7
Barnwell County	1,401	7.3
Edgefield County	288	1.5
Orangeburg County	305	1.6
Georgia		
Columbia County	2,036	10.6
Richmond County	3,358	17.5
Augusta	2,780	14.5
ROI (County Total)	17,912	93.3

E4 3848

[a] Includes DOE, Westinghouse, University of Georgia, U.S. Forest Service, and Wackenhut Services.

Source: Shedrow.

TABLE E3.2–1b.—*Indicators of Regional Growth at Savannah River Site, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	146,087	201,596	256,074	288,560	299,537	289,567
Unemployment Rate (%)	5.1	7.3	5.0	6.3	6.2	6.3
Personal Income (thousand $)	1,193,114	3,488,841	7,638,990	10,629,518	13,702,827	16,403,069
Per Capita Income ($/person)	2,959	7,310	14,446	18,246	21,551	25,292
Eight-County Population						
Aiken County, SC	91,023	105,625	120,940	133,076	144,345	146,943
Aiken	13,436	14,978	19,872	21,866	23,718	24,145
North Augusta	12,883	13,593	15,344	16,884	18,313	18,643
Allendale County, SC	9,692	10,700	11,722	11,543	12,521	12,746
Bamberg County, SC	15,950	18,118	16,902	19,166	20,789	21,164
Barnwell County, SC	17,176	19,868	20,293	22,869	24,806	25,252
Edgefield County, SC	15,692	17,528	18,375	20,473	22,207	22,607
Orangeburg County, SC	69,789	82,276	84,803	93,345	99,607	101,101
Columbia County, GA	22,327	40,118	66,031	69,438	76,694	78,458
Richmond County, GA	162,437	181,629	189,719	212,645	234,867	240,269
Augusta	59,864	47,532	44,639	50,033	55,262	56,533
ROI (County Total)	404,086	475,862	528,785	582,555	635,836	648,540

E4 3992

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, and 1991a; DOC, 1990a and b, 1991a; GA DOL, 1991; SC ESC, 1991.

TABLE E3.2–2.—*Savannah River Site ROI Housing Characteristics* [Page 1 of 2]

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
South Carolina						
Aiken County	29,400	19,951	3	7,022	12	1,656
Aiken	4,759	2,950	4	1,377	11	31
North Augusta	4,342	2,050	2	1,449	15	26
Allendale County	3,022	1,599	2	1,141	8	102
Bamberg County	4,852	2,658	2	1,607	10	247
Barnwell County	5,384	3,075	2	1,975	10	388
Edgefield County	4,552	2,733	1	1,481	6	388
Orangeburg County	20,857	11,861	2	6,987	7	1,123
Georgia						
Columbia County	6,740	4,419	2	1,806	7	1,381
Richmond County	47,751	26,116	2	18,340	9	2,031
Augusta	21,159	8,674	1	11,203	7	4
ROI (County Total)	122,558	72,412	2	40,359	9	7,316
1980						
South Carolina						
Aiken County	39,791	27,751	7	8,705	12	4,260
Aiken	6,173	3,623	6	2,134	7	40
North Augusta	5,470	3,549	4	1,488	16	18
Allendale County	3,939	2,346	13	1,102	12	340
Bamberg County	6,384	3,976	14	1,648	7	4,492
Barnwell County	7,282	4,622	12	1,849	8	793
Edgefield County	6,207	4,078	12	1 ,458	7	837
Orangeburg County	29,114	18,224	13	7,419	9	3,339
Georgia						
Columbia County	14,099	10,326	8	2,508	15	2,205
Richmond County	64,846	35,211	7	24,290	10	3,160
Augusta	20,825	8,173	9	10,935	8	5,365
ROI (County Total)	171,662	106,534	9	48,979	10	19,426

E4 3990-1

Footnotes at end of table.

TABLE E3.2–2.—*Savannah River Site ROI Housing Characteristics*—Continued
[Page 2 of 2]

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1990						
South Carolina						
Aiken County	49,266	33,491	2	11,392	11	10,083
Aiken	8,543	5,128	4	2,621	9	211
North Augusta	6,818	3,972	4	2,300	9	91
Allendale County	4,242	2,584	2	1,207	7	810
Bamberg County	6,408	4,052	2	1,535	9	1,396
Barnwell County	7,854	5,194	1	1,906	11	2,049
Edgefield County	7,290	4,904	2	1,520	7	1,807
Orangeburg County	32,340	21,165	1	7,744	10	8,368
Georgia						
Columbia County	23,745	17,322	2	4,519	8	3,697
Richmond County	77,288	38,762	2	29,913	10	7,205
Augusta	21,588	8,064	3	10,755	9	330
ROI (County Total)	208,433	127,474	2	59,736	10	35,415

E4 3990-2

Source: Census, 1972, 1982, 1991b.

TABLE E3.2–3.—*Primary Municipal Water and Wastewater Systems in the SRS ROI*

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1989)			
Aiken County, SC			
Aiken County	16.13	8.82	55
Aiken City	10.30	8.70	84
City of North Augusta	8.00	2.51	31
City of New Ellenton	1.54	0.51	33
City of Jackson	1.00	0.17	17
Allendale County, SC			
Allendale County	6.79	0.91	13
Bamberg County, SC			
Bamberg County	3.11	1.58	51
Barnwell County, SC			
Barnwell County	1.91	0.62	32
Barnwell City	4.75	0.70	15
Edgefield County, SC			
Edgefield County (1991)	4.40	2.51	57
Orangeburg County, SC			
Orangeburg County (1991)	11.00	5.96	54
Columbia County, GA			
Columbia County	16.72	6.73	40
Richmond County, GA			
Richmond County	22.00	12.00	55
City of Augusta	60.00	28.00	47
Total:	167.65	79.72	48
Wastewater Systems (1989)			
Aiken County, SC			
Aiken County Public Service Authority	20.00	9.00	45
Allendale County, SC			
Allendale County	1.30	0.80	62
Bamberg County, SC			
Bamberg County	4.00	0.50	13
Barnwell County, SC			
Barnwell County	0.33	0.27	82
Barnwell City	1.00	0.80	80
Edgefield County, SC			
Edgefield County (1991)	1.69	0.73	43
Orangeburg County, SC			
Orangeburg County (1991)	9.00	3.70	41
Columbia County, GA			
Columbia County	5.38	3.30	61
Richmond County, GA			
Richmond County	1.71	1.27	74
City of Augusta	46.10	29.00	63
Total:	90.51	49.37	55

E4 3952

Source: SR NUS, 1990a; Nichols, Montebello.

TABLE E3.2–4.—*Savannah River Site ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity[b]	Pupil-Teacher Ratio[a,c]	Per Pupil Expenditure[a]
South Carolina				
Aiken County	23,973	23,290	20.0	3,218.90
Allendale County	2,467	2,400	15.7	3,881.65
Bamberg County	3,405	3,756	17.3	3,722.60
Bamberg District #1	1,928	2,056	18.2	3,584.78
Bamberg District #2	1,477	1,700	16.1	3,902.50
Barnwell County	4,796	5,670	18.1	3,627.89
Barnwell District #19	1,271	1,300	18.7	3,589.91
Barnwell District #29	999	1,670	16.8	3,841.88
Barnwell District #45	2,526	2,700	18.2	3,562.38
Edgefield County	3,812	4,500	16.6	3,409.08
Orangeburg County	16,803	18,357	17.9	3,789.49
Orangeburg District #1	1,098	1,300	15.8	3,735.23
Orangeburg District #2	918	1,200	16.1	3,714.62
Orangeburg District #3	3,440	3,400	17.5	3,660.18
Orangeburg District #4	2,080	2,225	19.5	3,123.32
Orangeburg District #5	6,676	7,394	18.7	4,142.71
Orangeburg District #6	966	1,100	17.6	3,413.91
Orangeburg District #7	985	938	17.1	3,758.34
Orangeburg District #8	640	800	17.0	3,780.32
Georgia				
Columbia County	13,161	13,161	20.7	2,657.45
Richmond County	31,669	38,350	16.9	3,462.95
ROI (County Total)	100,086	109,484	18.2	3,378.40

E4 3840

[a] SC DEd, 1991.
[b] Clark, Gamele, Steadman, Wright, Huggins, Frederick, Williams, Christie, Williams, Rice, Middleton, Barr, Myers, Lynn, Hardwick, Ethridge, Price, Rovell.
[c] Hall.

TABLE E3.2–5.— *Baseline Traffic by Link at Savannah River Site* [a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
US 278	US 1/25/78 @ North Augusta	SCSR 39	4,473	447	A	5,185	519	B
SCSR 19	US 1/78 @ Aiken	US 278	20,259	2,026	E	23,483	2,348	E
SCSR 64	US 278	Snelling	2,193	219	A	2,541	254	A
SCSR 125	Silverton St @ Jackson	SCSR 3	2,061	206	A	2,389	239	A

E4 3905

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: Cunningham; GA DOT, 1991a; SC DHwy, 1990; TRB, 1985.

TABLE E3.3–1a.—*Distribution of Los Alamos National Laboratory Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
New Mexico		
Los Alamos County	4,697	48.3
Rio Arriba County	2,027	20.8
Española	944	9.7
Santa Fe County	1,851	19.0
Santa Fe	1,548	15.9
ROI (County Total)	8,575	88.2

E4 3849

[a] Includes employees from Los Alamos National Laboratory, BDM, Butler Services, Ewing Technical Design, Johnson Controls, Johnson Engineering Services, Kirk Mayer, Mason and Hanger, Ray Rashkin Lissac, and SAIC.

Source: Van Hecke.

TABLE E3.3–1b.—*Indicators of Regional Growth at Los Alamos National Laboratory, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	34,467	58,796	84,107	98,872	106,360	104,125
Unemployment Rate (%)	9.6	7.7	5.1	6.0	5.8	5.9
Personal Income (thousand $)	324,662	1,062,136	2,323,835	3,133,307	4,167,776	5,080,519
Per Capita Income ($/person)	3,396	8,642	15,348	18,578	21,807	25,736
Three-County Population						
Los Alamos County, NM	15,198	17,599	18,115	22,347	25,411	26,275
Rio Arriba County, NM	25,170	29,262	34,365	37,034	41,449	42,651
Española	4,528	6,803	8,389	6,692	7,490	7,707
Santa Fe County, NM	53,756	75,360	98,928	109,278	124,262	128,487
Santa Fe	41,167	48,953	55,859	61,703	70,164	72,549
ROI (County Total)	94,124	122,221	151,408	168,659	191,122	197,413

E4 3995

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM DES, 1991.

TABLE E3.3–2.—*Los Alamos National Laboratory ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
New Mexico						
Los Alamos County	4,706	3,210	1	1,251	13	126
Rio Arriba County	7,503	4,910	2	1,483	8	550
Española	1,362	799	1	430	5	122
Santa Fe County	16,135	10,321	1	4,979	5	785
Santa Fe	12,558	7,881	1	4,182	5	379
ROI (County Total)	28,344	18,441	1	7,713	7	1,461
1980						
New Mexico						
Los Alamos County	6,585	4,629	4	1,654	7	197
Rio Arriba County	11,107	7,086	20	1,992	11	2,372
Española	2,641	1,718	10	662	11	625
Santa Fe County	28,314	17,460	8	8,827	6	2,865
Santa Fe	19,028	10,932	7	6,919	4	548
ROI (County Total)	46,006	29,175	11	12,473	7	5,434
1990						
New Mexico						
Los Alamos County	7,565	5,367	1	1,846	5	411
Rio Arriba County	14,357	9,218	1	2,243	13	4,468
Española	2,461	1,548	2	669	14	846
Santa Fe County	41,464	25,621	1	12,219	7	7,234
Santa Fe	24,681	13,592	1	9,197	7	1,464
ROI (County Total)	63,386	40,206	1	16,308	8	12,113

E4 3736

Source: Census, 1972, 1982, 1991b.

TABLE E3.3–3.—*Primary Municipal Water and Wastewater Systems in the LANL ROI*

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Los Alamos County, NM			
LANL (DOE) (1988)[a]	4.92	4.10	83
Santa Fe County, NM			
City of Santa Fe	18.00	8.90	49
Rio Arriba County, NM			
City of Española	1.50	1.00	67
Total	24.42	13.99	57
Wastewater Systems (1991)			
Los Alamos County, NM			
Los Alamos County Utilities[b]	3.12	1.30	42
Santa Fe County, NM			
City of Santa Fe	6.50	6.00	92
Rio Arriba County, NM			
City of Española[c]	1.01	1.00	99
Total	10.63	8.30	78

E4 3928

[a] Capacity reflects current state water rights of 5,514.3 acre-feet per year.
[b] Currently closing one of three plants (cap. 0.87 MGD), to expand largest plant from 1.39 to about 1.9 MGD by 1996.
[c] Scheduled to complete expansion to 1.6 MGD capacity by 1993.

Source: LANL, 1989a; LANL, 1990a; Pizzoli, George, Stowe, Farmer.

TABLE E3.3–4.—*Los Alamos National Laboratory ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity[b]	Pupil-Teacher Ratio[a]	Per Pupil Expenditure[a]
New Mexico				
Los Alamos County	3,522	3,532	15.7	4,971.39
Los Alamos	3,522	3,532	15.7	4,971.39
Rio Arriba County	7,073	8,850	18.0	3,482.05
Chama Valley	582	1,250	15.8	4,407.43
Dulce	635	1,000	15.8	3,776.97
Española	5,363	6,000	18.8	3,212.13
Jemez Mountain	493	600	16.4	4,946.01
Santa Fe County	14,373	15,983	18.5	2,840.20
Pojoaque Valley	1,817	2,000	19.6	3,187.15
Santa Fe	12,556	13,983	18.4	2,789.99
ROI (County Total)	24,968	28,365	17.9	3,322.65

E4 3841

[a] NM DEd, 1990.
[b] Barck, Valdez, Martinez, Rodriquez, Gomez, Blea, Padilla.

TABLE E3.3–5.—*Baseline Traffic by Link at Los Alamos National Laboratory*[a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
NMSR 4	NMSR 126	NMSR 501 N at Los Alamos W Gate	723	72	A	790	79	A
NMSR 4	NMSR 501 N at Los Alamos W Gate	NMSR 502	3,013	301	A	3,294	329	A
NMSR 501	NMSR 4 East	NMSR 502 at Los Alamos	9,327	933	C	10,197	1,020	C
NMSR 502	NMSR 501 at Los Alamos	NMSR 4	8,941	894	C	9,776	978	C
NMSR 502	NMSR 4	NMSR 30	12,267	1,227	C	13,412	1,341	C

E4 3906

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: NM Hwy, 1990; NM Hwy, 1991d; TRB, 1985.

TABLE E3.4–1a.—*Distribution of Oak Ridge Reservation Employees by Place of Residence, 1990* [a]

County/City	Number of Employees	Percent of Site
Tennessee		
Anderson County	7,849	33.3
Clinton	1,744	7.4
Oak Ridge	4,861	20.6
Blount County	566	2.4
Knox County	8,464	35.9
Knoxville	7,452	31.6
Loudon County	1,331	5.6
Lenoir City	986	4.2
Roane County	3,900	16.5
Harriman	1,253	5.3
Kingston	1,561	6.6
ROI (County Total)	22,110	93.8

E4 3850

[a] Includes employees from Martin Marietta Energy Systems (Oak Ridge Reservation, Y-12 Departments 2000-2999, and Paducah Departments 5400-5499), U.S. Department of Energy, M.K. Ferguson of Oak Ridge Company, and Oak Ridge Associated Universities.

Source: Williams, Truex, Miller, Counties.

TABLE E3.4–1b.—*Indicators of Regional Growth at Oak Ridge Reservation, Y-12 Plant, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	195,220	237,820	277,630	319,419	330,165	321,394
Unemployment Rate (%)	3.3	6.7	4.6	7.0	7.1	7.0
Personal Income (thousand $)	1,501,397	4,628,061	9,033,962	12,862,302	16,534,511	19,899,624
Per Capita Income ($/person)	3,228	8,518	15,892	20,547	23,841	27,853
Five-County Population						
Anderson County, TN	60,300	67,346	68,250	78,265	86,858	89,550
Clinton	4,794	5,245	8,972	10,289	11,418	11,772
Oak Ridge	28,319	27,662	24,743	28,374	31,489	32,465
Blount County, TN	63,744	77,770	85,969	93,652	103,934	107,156
Knox County, TN	276,293	319,694	335,749	366,417	406,646	419,252
Knoxville	174,587	175,030	165,121	180,203	199,988	206,188
Loudon County, TN	24,266	28,553	31,255	33,852	37,108	38,036
Lenoir City	5,324	5,446	6,147	6,658	7,298	7,481
Roane County, TN	38,881	48,425	47,227	53,816	58,992	60,467
Harriman	8,734	8,303	7,119	8,112	8,892	9,115
Kingston	4,142	4,441	4,552	5,187	5,686	5,828
ROI (County Total)	463,484	541,788	568,450	626,002	693,538	714,461

E4 3994

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; TN DES, 1991.

TABLE E3.4–2.—*Oak Ridge Reservation ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
Tennessee						
Anderson County	20,451	13,536	1	5,595	9	790
Clinton	1,702	1,128	1	483	6	26
Oak Ridge	9,972	6,205	1	3,235	10	1
Blount County	21,835	15,300	2	5,041	7	1,242
Knox County	93,011	57,656	2	29,709	7	2,507
Knoxville	61,042	32,767	1	24,292	9	689
Loudon County	8,439	5,924	1	1,901	7	529
Roane County	13,189	9,188	1	2,985	8	687
ROI (County Total)	156,925	101,604	1	45,231	7	5,755
1980						
Tennessee						
Anderson County	25,849	17,667	4	6,949	6	2,077
Clinton	2,073	1,415	3	571	7	38
Oak Ridge	11,487	7,082	3	3,939	6	19
Blount County	30,836	21,112	9	7,065	8	2,473
Knox County	125,883	74,569	8	43,382	4	5,091
Knoxville	73,263	35,075	5	33,499	8	3,153
Loudon County	10,835	8,077	5	2,212	5	1,024
Roane County	18,732	13,229	8	3,849	11	1,821
ROI (County Total)	212,135	134,654	7	63,457	5	12,486
1990						
Tennessee						
Anderson County	29,323	19,401	1	7,983	9	3,260
Clinton	4,006	2,229	1	1,566	6	230
Oak Ridge	11,664	6,962	1	3,852	12	60
Blount County	26,947	25,072	2	8,552	8	4,548
Knox County	143,582	85,369	2	48,270	8	9,222
Knoxville	76,453	34,892	2	35,081	9	1,402
Loudon County	12,995	9,428	2	2,727	7	1,919
Roane County	20,334	14,102	1	4,351	10	3,041
ROI (County Total)	233,181	153,372	2	71,883	8	21,990

E4 3737

Source: Census, 1972, 1982, 1991b.

TABLE E3.4–3.—*Primary Municipal Water and Wastewater Systems in the Y-12 (Oak Ridge Reservation) ROI* [Page 1 of 2]

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Anderson County, TN			
Oak Ridge Reservation (DOE)	32.10	18.30	57
City of Clinton Utilities Board (1988)	2.25	1.46	65
Anderson County Utility Board	2.00	0.95	48
Blount County, TN			
City of Alcoa Utilities	24.00	7.50	31
City of Maryville	6.00	3.00	50
Knox County, TN			
City of Knoxville Utilities Board	63.60	33.09	52
First Utility District of Knox County	14.00	5.82	42
West Knox Utility District	8.50	3.98	47
Hallsdale Powell Utility District	6.29	4.00	64
Knox-Chapman Utility District	2.80	2.00	71
Northeast Knox Utility District (1988)	2.30	1.05	46
Loudon County, TN			
Loudon Utilities Board	8.70	4.90	56
Tellico Area Service System	3.50	1.31	37
Lenoir City Utility Board (1988)	3.00	0.97	32
Roane County, TN			
Rockwood Water System	6.00	1.65	28
City of Harriman Utility Board (1988)	3.00	1.64	55
City of Kingston Water System	2.00	0.41	20
Total	190.04	92.03	48

E4 3949-1

Footnotes at end of table.

TABLE E3.4–3.—*Primary Municipal Water and Wastewater Systems in the Y-12 (Oak Ridge Reservation) ROI*—Continued [Page 2 of 2]

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Wastewater Systems (1991)			
Anderson County, TN			
City of Oak Ridge	5.87	5.00	85
Clinton Utilities Board	2.05	0.70	34
Blount County, TN			
City of Maryville Utilities	10.00	6.20	62
Knox County, TN			
City of Knoxville Utilities Board	62.89	44.33	70
Hallsdale Powell Utility District	5.55	3.90	70
First Utility Dist. of Knox County[a]	5.00	4.70	94
West Knox Utility District	4.00	2.48	62
Loudon County, TN			
Loudon Utilities Board	7.60	5.08	67
Lenoir City Utilities Board	2.00	1.11	56
Roane County, TN			
City of Harriman Utilities Board	1.50	1.50	100
Rockwood Wastewater System	1.50	1.50	100
Kingston Water and Wastewater Department	1.00	0.08	8
Total	108.96	76.58	70

E4 3949-2

[a] Currently expanding to 10 MGD capacity.

Source: TN KCOC, 1990; Y-12 MMES, 1991c; TN DOC, 1992; Y-12 ETDD, 1992.

TABLE E3.4–4.—*Oak Ridge Reservation ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity[b]	Pupil-Teacher Ratio[a]	Per Pupil Expenditure[a]
Tennessee				
Anderson County	12,102	11,360	17.3	3,703.21
Anderson County	6,466	5,560	17.4	3,385.93
Clinton City Elementary	1,122	980	19.4	2,787.89
Oak Ridge	4,514	4,820	16.8	4,385.20
Blount County	14,139	12,440	19.6	3,038.21
Alcoa	1,380	1,520	16.7	4,191.19
Blount County	9,429	7,760	21.3	2,738.85
Maryville	3,330	3,160	17.0	3,408.07
Knox County	54,943	50,640	19.7	2,944.89
Loudon County	5,650	5,280	20.9	2,629.37
Lenoir City	1,831	1,860	23.0	2,447.94
Loudon County	3,819	3,420	20.0	2,716.35
Roane County	7,873	6,640	19.4	2,870.09
Harriman	1,915	1,940	17.7	2,932.66
Roane County	5,958	4,700	20.0	2,849.97
ROI (County Total)	94,707	86,360	19.4	3,030.68

E4 3842

a TN DEd, 1990.
b TN DEd, 1992.

TABLE E3.4–5.—*Baseline Traffic by Link at Oak Ridge Reservation, Y-12 Plant*[a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
TSR 58	TSR 95	I-40	11,216	1,122	C	11,985	1,199	C
TSR 61	US 25W in Clinton	TSR 62 E/O Oliver Springs	7,296	730	A	7,796	780	A
TSR 62	TSR 61 in Oliver Springs	TSR 95 in Oak Ridge	41,490	4,149	C	44,333	4,433	C
TSR 62	TSR 95 in Oak Ridge	TSR 170	26,680	2,668	E	28,508	2,851	F
TSR 95	TSR 61	TSR 62 in Oak Ridge	22,760	2,276	E	24,319	2,432	E
TSR 95	TSR 62 in Oak Ridge	TSR 58	15,790	1,579	D	16,872	1,687	D
TSR 95	TSR 58	I-40/US 321	8,058	806	C	8,611	861	C
TSR 170	US 25W	TSR 62	12,959	1,296	C	13,847	1,385	C
Bear Creek Valley Rd	TSR 62 in Oak Ridge	TSR 95	9,147	915	C	9,774	977	C

E4 3907

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: Bonine; TN DOT, 1991; TRB, 1985.

TABLE E3.5–1a.—*Distribution of Sandia National Laboratories, New Mexico, Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
New Mexico		
Bernalillo County	6,815	91.3
Albuquerque	6,429	86.1
Sandoval County	146	2.0
Valencia County	188	2.5
ROI (County Total)	7,149	95.8

E4 3851

[a] Includes all regular and part-time employees from Sandia National Laboratories, New Mexico.

Source: McMahon.

TABLE E3.5–1b.—*Indicators of Regional Growth at Sandia National Laboratories, New Mexico, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	133,798	239,672	310,252	379,866	407,837	400,068
Unemployment Rate (%)	6.9	7.9	5.3	6.0	5.9	5.9
Personal Income (thousand $)	1,295,347	4,558,795	9,421,284	14,078,925	18,980,452	23,252,742
Per Capita Income ($/person)	3,438	8,808	15,992	20,640	24,629	29,228
Three-County Population						
Bernalillo County, NM	315,774	420,164	480,577	568,051	642,992	664,211
Albuquerque	243,751	331,767	384,736	454,765	514,761	531,748
Sandoval County, NM	17,492	34,799	63,319	68,387	76,540	78,760
Valencia County, NM	40,539	61,115	45,235	45,667	51,112	52,594
ROI (County Total)	373,805	516,078	589,131	682,105	770,644	795,565

E4 3999

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM ESD, 1991.

TABLE E3.5–2.—*Sandia National Laboratories, New Mexico, ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
New Mexico	98,638	61,509	1	32,714	6	3,886
Bernalillo County	78,788	48,830	1	28,826	11	2,068
Albuquerque						
Sandoval County	4,785	3,323	1	818	7	239
Valencia County	11,554	7,574	2	2,761	12	1,388
ROI (County Total)	114,977	72,406	1	36,293	6	5,513
1980						
New Mexico	162,126	95,533	5	55,504	10	9,503
Bernalillo County	132,788	75,389	5	48,649	10	5,056
Albuquerque						
Sandoval County	12,286	8,711	15	1,753	14	1,300
Valencia County	22,353	15,503	2	3,610	17	5,495
ROI (County Total)	196,765	119,747	7	60,867	10	16,298
1990						
New Mexico	201,235	112,589	2	72,993	10	15,869
Bernalillo County	166,870	88,186	2	65,632	10	9,159
Albuquerque						
Sandoval County	23,667	17,268	2	3,599	8	2,746
Valencia County	16,781	12,650	3	2,520	15	5,664
ROI (County Total)	241,683	142,507	2	79,112	10	24,279

E4 3738

Source: Census, 1972, 1982, 1991b.

TABLE E3.5–3.—*Primary Municipal Water and Wastewater Systems in the Sandia National Laboratories, New Mexico, ROI*

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Bernalillo County, NM			
City of Albuquerque	280.00	117.00	42
Sandoval County, NM			
City of Rio Rancho	16.00	9.00	56
City of Bernalillo	1.94	1.36	70
Valencia County, NM			
City of Los Lunas	3.38	1.00	30
City of Belen	3.00	1.00	33
Total	304.33	129.36	43
Wastewater Systems (1991)			
Bernalillo County, NM			
City of Albuquerque[a]	61.00	53.00	87
Sandoval County, NM			
City of Rio Rancho	4.00	3.00	75
City of Bernalillo	0.80	0.45	56
Valencia County, NM			
City of Los Lunas	0.70	0.48	69
City of Belen	1.20	1.00	83
Total	67.70	57.93	86

E4 3946

[a] Wastewater system capacity to be expanded to approximately 72 MGD by 1993.

Source: SN USAF, 1990; Walsh, Barrett, Knott, Wortman, Brown, Mcdonnaugh, Gaterias, Tobey, Padilla, Sanchez.

TABLE E3.5–4.—*Sandia National Laboratories, New Mexico, ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity[b]	Pupil-Teacher Ratio[a]	Per Pupil Expenditure[a]
New Mexico				
Bernalillo County	86,653	86,716	17.9	3,194.07
Albuquerque	86,653	86,716	17.9	3,194.07
Sandoval County	4,322	5,392	17.0	3,695.78
Bernalillo	3,164	3,250	18.0	3,328.18
Cuba	644	725	15.5	5,109.87
Jemez Valley	514	1,417	14.0	4,186.83
Valencia County	9,600	10,563	20.3	2,945.34
Belen	4,189	4,574	20.1	3,084.37
Los Lunas	5,411	5,989	20.5	2,837.71
ROI (County Total)	100,575	102,671	18.1	3,191.89

E4 3843

[a] NM DEd, 1990.
[b] Adamo, Whitcamp, Spradling, Goodalay, Perry, Baca, Marcus.

TABLE E3.5–5.—*Baseline Traffic by Link at Sandia National Laboratories, New Mexico*[a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
Broadway Blvd	Gibson Blvd	NMSR 47	13,006[b]	1,301[b]	C	15,306[b]	1,531[b]	D
Eubank Blvd	I-40 in Albuquerque	Gibson Blvd	19,232[b]	1,923[b]	E	54,387[b]	5,439[b]	F
Gibson Blvd	I-25 in Albuquerque	Louisiana Blvd	46,213[b]	4,621[b]	F	39,406[b]	3,941[b]	F
Louisiana Blvd	Gibson Blvd	I-40 in Albuquerque	33,484[b]	3,348[b]	F	46,652[b]	4,665[b]	F
Wyoming Blvd	I-40 in Albuquerque	Kathryn Ave	39,641[b]	3,964[b]	F	22,634[b]	2,263[b]	E

E4 3908

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.
[b] Derived from average weekday traffic only.

Source: NM Hwy, 1990, 1991a, 1991b; TRB 1985.

TABLE E3.6–1a.—*Distribution of Mound Plant Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
Ohio		
Butler County	195	9.3
Middletown	122	5.8
Montgomery County	1,371	65.1
Centerville	212	10.1
Dayton	369	17.5
Germantown	97	4.6
Kettering	128	6.1
Miamisburg	320	15.2
West Carrollton	136	6.5
Warren County	289	13.7
Carlisle/Franklin	243	11.5
ROI (County Total)	1,855	88.1

E4 3852

[a] Mound Plant employee headcount totals, September 30, 1991.

Source: Hatfield.

TABLE E3.6–1b.—*Indicators of Regional Growth at Mound Plant, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	380,253	427,787	481,700	521,680	523,780	502,189
Unemployment Rate (%)	5.1	7.9	5.3	5.6	5.6	5.9
Personal Income (thousand $)	3,802,566	9,141,306	16,594,092	22,344,200	27,930,592	33,139,543
Per Capita Income ($/person)	4,132	9,821	16,947	22,146	25,772	30,048
Three-County Population						
Butler County, OH	226,207	258,787	291,479	296,762	322,832	329,934
Middletown	48,767	43,719	46,022	46,856	50,972	52,094
Montgomery County, OH	606,148	571,697	573,809	595,964	635,941	645,480
Centerville	10,333	18,886	21,082	21,896	23,365	23,715
Dayton	242,917	203,371	182,044	189,073	201,756	204,782
Germantown	4,088	5,015	4,916	5,106	5,448	5,530
Kettering	71,864	61,186	60,569	62,908	67,127	68,134
Miamisburg	14,797	15,304	17,834	18,523	19,765	20,062
West Carrollton	10,748	13,148	14,403	14,959	15,963	16,202
Warren County, OH	84,925	99,276	113,909	116,211	124,969	127,469
Carlisle	3,821	4,276	4,872	4,970	5,345	5,452
Franklin	10,075	10,711	11,026	11,249	12,097	12,339
ROI (County Total)	917,280	929,760	979,197	1,008,937	1,083,742	1,102,883

E4 3998

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; OH BES, 1991.

TABLE E3.6–2.—*Mound Plant ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
Ohio						
Butler County	69,284	46,512	0	20,598	6	1,760
Montgomery County	197,397	122,311	0	68,494	5	3,049
Centerville	2,984	2,244	0	647	6	n/a
Dayton	85,401	41,609	1	39,998	6	815
Miamisburg	4,837	3,116	0	1,611	4	94
Warren County	24,059	17,155	1	6,139	4	426
ROI (County Total)	290,740	185,978	1	95,231	5	5,235
1980						
Ohio						
Butler County	92,528	61,518	4	26,612	7	3,760
Montgomery County	227,582	136,729	6	75,128	9	3,026
Centerville	6,922	4,884	3	1,677	11	2
Dayton	86,789	39,265	12	38,387	10	767
Miamisburg	5,891	3,689	4	1,902	7	1
Warren County	33,292	23,849	4	7,776	8	624
ROI (County Total)	353,402	222,096	5	109,516	9	7,410
1990						
Ohio						
Butler County	110,353	72,365	2	32,170	8	5,783
Montgomery County	240,820	142,371	1	83,821	8	5,939
Centerville	8,801	5,297	2	2,401	9	802
Dayton	80,370	37,049	2	35,621	10	1,601
Miamisburg	6,844	4,364	1	2,272	4	51
Warren County	40,636	29,252	1	9,898	6	1,213
ROI (County Total)	391,809	243,988	1	125,889	8	12,935

E4 3739

Source: Census, 1972, 1982, 1991b.

TABLE E3.6–3.—***Primary Municipal Water and Wastewater Systems In the Mound ROI***

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Montgomery County, OH			
City of Dayton Water Supply and Treatment	192.00	87.00	45
Ohio Suburban Water Company (Huber Heights)	6.00	4.00	67
City of Miamisburg Water and Sewer	4.30	2.09	49
City of West Carrollton	3.60	1.37	38
City of Germantown	1.30	0.42	32
Warren County, OH			
City of Franklin Water Department	4.70	0.50	11
Warren County Water and Sewer Department	4.50	2.80	62
Butler County, OH			
City of Hamilton Utilities Department[a]	25.00	17.60	70
City of Middletown Department of Public Works	20.00	11.00	55
City of Fairfield Department of Public Works	6.00	4.50	75
Total	267.40	131.27	49
Wastewater Systems (1991)			
Montgomery County, OH			
City of Dayton Wastewater	72.00	55.00	76
Montgomery County Utilities	33.00	20.00	61
Miami Conservancy District (North Regional)	11.20	6.50	58
City of West Carrollton	4.27	1.50	35
City of Miamisburg Water and Sewer	3.00	2.00	67
Warren County, OH			
Miami Conservancy District (Franklin Regional)	4.50	3.00	67
Warren County Water and Sewer Department	3.64	2.40	66
Butler County, OH			
City of Hamilton Utilities Department	32.00	22.00	69
City of Middletown Department of Public Works	26.00	21.00	81
Butler County Water and Sewer Department[b]	10.00	8.10	81
City of Fairfield Department of Public Works	10.00	4.85	49
Total	209.61	146.35	70

E4 3940

[a] South Plant (17 MGD) capacity to be expanded to 34 MGD by 1997.
[b] Upper Mill Creek Plant (4 MGD) capacity to be expanded to 8 MGD by 1994.

Source: Ohio EPA, 1992; Schwendeman, Nelson, Cook, Hickey, Smallwood, Dursch, Westerfield, Alvey, Gupta, Patrick, Baynes, Savage, Burkhardt, Bunger, Hill, Thrower.

TABLE E3.6–4.—*Mound Plant ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity [b]	Pupil-Teacher Ratio[a,c]	Per Pupil Expenditure [a,d]
Ohio				
Butler County	48,049	55,058	19.2	3,493.83
Madison	1,565	2,000	19.2	3,297.16
Edgewood City	2,481	2,450	18.4	3,477.87
Fairfield	7,883	7,910	20.9	3,486.67
Lakota	8,712	10,100	20.2	3,371.75
Hamilton	10,553	11,088	18.7	3,422.21
Middletown	9,749	12,675	17.7	3,747.41
New Miami	1,073	1,735	17.3	3,401.19
Ross	2,624	2,875	21.3	3,160.55
Talawanda	3,409	4,225	19.5	3,706.52
Montgomery County	85,832	99,503	17.5	4,353.78
Brookville	1,527	1,725	18.9	3,245.58
Centerville	6,730	8,050	17.9	4,214.22
Dayton	27,662	27,661	16.0	5,373.03
Huber Heights	7,855	7,800	21.0	3,293.17
Jefferson	1,126	1,750	15.4	4,213.83
Kettering	7,520	9,881	16.3	4,625.94
Mad River	4,303	5,400	17.3	4,049.70
Miamisburg	4,254	6,011	19.4	3,477.85
New Lebanon	1,342	2,000	18.8	3,151.19
Northmont	6,116	7,520	20.8	3,308.03
Northridge	2,315	3,600	17.8	4,368.22
Oakwood	1,362	1,835	14.0	5,477.83
Trotwood-Madison	4,228	4,500	17.6	4,052.87
Valley View	1,892	1,970	19.4	3,321.88
Vandalia-Butler	3,412	4,000	18.1	3,859.41
West Carollton City	4,188	5,800	19.3	3,701.91
Warren County	19,236	23,307	19.4	3,331.70
Carlisle	2,025	2,800	19.4	3,619.25
Clearcreek (Springboro)	2,209	2,400	20.2	3,330.60
Franklin	3,304	4,300	19.3	3,487.97
Kings	2,643	3,675	20.1	3,206.09
Lebanon	3,245	3,432	20.8	2,928.11
Little Miami	2,165	2,700	18.8	3,360.92
Mason	2,572	2,500	18.6	3,432.59
Wayne	1,073	1,500	16.5	3,539.18
ROI (County Total)	153,117	177,868	18.3	3,955.52

E4 3844

[a] OH DEd, 1990a.

[b] Pieratt, Cash, Grady, Glass, Citizen, DiStuala, Surface, Robinson, Purdue, Williams, DePalma, Keith, Franklin, Barry, Elms, Lauter, McCabe, Tipton, Blessing, Jarbo, Public Information Office, Dayton School District, Montgomery County, OH. Laman, Bowman, Karn, Cornn, Keebah, Mummal, Draffen, Oldfield, Gogole, Porter, Groth, Rogers, Wallace, DeRosa, Williams.

[c] OH DEd, 1990c.

[d] OH DEd, 1990b.

TABLE E3.6–5.—*Baseline Traffic by Link at Mound Plant*[a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
Benner Rd	Main St	Mound Rd	2,926[b]	293[b]	A	3,006[b]	301[b]	A
Main St	Central Ave	Mound Rd	7,943[c]	794[c]	C	8,160[c]	816[c]	C
Main St	Mound Rd	Benner Rd	1,812	181	A	1,861	186	A
Mound Rd	Main St	Benner Rd	2,508	251	A	2,577	258	A
6th St	Central Ave	Mound Rd	1,394	139	A	1,431	143	A

E4 3909

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.
[b] Derived from 1991 data.
[c] Derived from 1989 data.

Source: Brown; OH DOT, 1990; TRB, 1985.

TABLE E3.7–1a.—*Distribution of Pinellas Plant Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
Florida		
Hillsborough County	75	4.4
Pasco County	61	3.6
Pinellas County	1,545	91.5
Clearwater	387	22.9
Largo	300	17.8
Pinellas Park/Seminole	353	20.9
St. Petersburg	505	29.9
ROI (County Total)	1,681	99.6

E4 3853

[a] Includes 100 percent Pinellas Plant employees.

Source: Kikel.

TABLE E3.7–1b.—*Indicators of Regional Growth at Pinellas Plant, 1970-2040*

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	378,426	648,159	979,201	1,188,649	1,299,759	1,289,236
Unemployment Rate (%)	3.7	5.1	5.1	5.4	5.4	5.4
Personal Income (thousand $)	4,122,288	14,866,918	35,503,010	51,496,890	70,394,909	87,852,847
Per Capita Income ($/person)	3,749	9,404	18,051	22,837	26,183	30,424
Three-County Population						
Hillsborough County, FL	490,265	646,960	834,054	966,709	1,152,626	1,237,920
Pasco County, FL	75,955	193,661	281,131	314,527	375,017	402,768
Pinellas County, FL	522,329	728,531	851,659	973,706	1,160,969	1,246,881
Clearwater	52,074	85,528	98,784	112,940	134,661	144,626
Largo	22,031	58,977	65,674	75,085	89,526	96,151
Pinellas Park	22,287	32,811	43,426	49,649	59,198	63,578
Seminole	1,000	4,586	9,251	10,577	12,611	13,544
St. Petersburg	216,232	238,647	238,629	272,826	325,296	349,367
ROI (County Total)	1,088,549	1,569,152	1,966,844	2,254,942	2,688,612	2,887,569

E4 3997

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1973, 1977, 1983, and 1991a; DOC, 1990a and b, 1991; FL DOL, 1991.

TABLE E3.7-2.—*Pinellas Plant ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
Florida						
Hillsborough County	168,555	115,857	2	42,893	10	11,380
Pasco County	34,816	26,000	3	4,360	15	5,807
Pinellas County	228,771	159,881	2	51,420	12	22,042
Clearwater	23,333	14,470	2	6,746	12	1,976
Largo	9,244	6,970	2	1,743	11	1,283
St. Petersburg	97,116	62,743	2	26,159	11	2,906
ROI (County Total)	432,142	301,738	2	98,673	11	39,229
1980						
Florida						
Hillsborough County	263,619	159,104	10	78,139	9	15,562
Pasco County	100,846	69,317	20	12,029	15	19,621
Pinellas County	377,052	229,769	17	89,758	11	34,106
Clearwater	44,183	23,786	17	13,574	13	2,354
Largo	31,366	18,237	17	8,671	8	5,638
St. Petersburg	119,486	68,159	14	35,935	11	3,297
ROI (County Total)	741,517	458,190	15	179,926	10	69,289
1990						
Florida						
Hillsborough County	367,740	204,966	4	119,906	14	45,459
Pasco County	148,965	98,384	4	23,290	15	41,445
Pinellas County	458,341	263,388	4	117,247	14	57,149
Clearwater	53,833	27,267	4	16,871	16	4,457
Largo	38,711	21,012	4	10,909	12	11,914
St. Petersburg	125,452	66,577	4	39,126	14	6,747
ROI (County Total)	975,046	566,738	4	260,443	14	144,053

Source: Census, 1972, 1982, 1991b.

E4 3740

TABLE E3.7–3.—*Primary Municipal Water and Wastewater Systems in the Pinellas ROI*

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems			
Pinellas County, FL (1988)			
Pinellas County Water System[a,b]	101.70	76.10	75
St. Petersburg Water Supply System[a]	68.00	42.90	63
City of Clearwater Water Division[b,c]	6.00	4.90	82
Hillsborough County, FL (1988)			
Hillsborough County Northwest Service Area[d]	8.80	8.80	100
Hillsborough County South-Central Service Area[e]	24.10	21.90	91
City of Tampa Water Department	130.00	69.00	53
City of Temple Terrace Water Department (1991)	5.00	3.31	66
Pasco County, FL (1991)			
Pasco County Utilities Department	35.00	11.25	32
City of New Port Richey	10.00	4.50	45
Total	388.60	242.66	62
Wastewater Systems			
Pinellas County, FL (1988)			
Pinellas County Sewer System (1990)	45.26	29.07	64
City of St. Petersburg	68.40	50.90	74
City of Clearwater	23.20	15.14	65
City of Largo	15.00	10.20	68
City of Tarpon Springs (1990)	4.00	2.70	68
City of Dunedin	5.00	3.70	74
City of Oldsmar	2.25	1.00	44
Town of Belleair	0.90	0.70	78
Hillsborough County, FL (1988)			
Hillsborough County	24.73	16.53	67
City of Tampa	212.10	61.40	29
Pasco County, FL (1991)			
Pasco County Utilities Department	15.00	12.00	80
City of New Port Richey[f]	4.50	3.50	78
Total	420.34	206.84	49

E4 3941

a Supplemented by West Coast Regional Water Supply Authority.
b Also supplies water to Pasco County.
c Approximately 10.2 MGD additional purchased from Pinellas County.
d Supplemented by City of St. Petersburg, City of Tampa, and West Coast Regional Water Supply Authority.
e Supplemented by City of Tampa and West Coast Regional Water Supply Authority.
f Expansion of capacity to 7.5 MGD by 1993.

Source: Pinellas County, 1991b; Hillsborough County, 1989a and b; Williams, Finley, Bungard, Soltau, Stentz, McKinnan.

TABLE E3.7–4.—*Pinellas Plant ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity[b]	Pupil-Teacher Ratio[a]	Per Pupil Expenditure [c]
Florida				
Hillsborough County	120,364	128,734	21.5	4,626.62
Pasco County	32,626	41,206	22.8	3,698.04
Pinellas County	92,490	106,012	21.5	3,983.37
ROI (County Total)	245,480	275,952	21.7	4,260.84

E4 3845

[a] FL DEd, 1990.
[b] Wooten.
[c] FL DEd, 1991.

TABLE E3.7–5.—*Baseline Traffic by Link at Pinellas Plant*[a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
Belcher Rd	Ulmerton Rd	Bryan Dairy Rd	39,271[b]	3,927[b]	F	47,263[b]	4,726[b]	F
Belcher Rd	Bryan Dairy Rd	Park Blvd	34,825[b]	3,483[b]	F	41,912[b]	4,191[b]	F
Bryan Dairy Rd	Starkey Rd	Belcher Rd	35,566[c]	3,557[c]	F	42,804[c]	4,280[c]	F
Bryan Dairy Rd	Belcher Rd	66th St	35,751[b]	3,575[b]	F	43,027[b]	4,303[b]	F

E4 3912

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.
[b] Derived from 1991 data.
[c] Derived from 1989 data.

Source: FL DOT, 1988a and b, 1990; Pinellas County, 1992; TRB, 1985.

TABLE E3.8–1a.—*Distribution of Rocky Flats Plant Employees by Place of Residence, 1991*[a]

County/City	Number of Employees	Percent of Site
Colorado		
Adams County	1,415	17.8
Broomfield	159	2.0
Thornton	341	4.3
Westminster	327	4.1
Arapahoe County	407	5.1
Boulder County	1,889	23.7
Boulder	488	6.1
Broomfield	372	4.7
Longmont	428	5.4
Denver County	669	8.4
Denver	669	8.4
Jefferson County	2,985	37.5
Arvada	1,239	15.6
Broomfield	106	1.3
Golden	420	5.3
Lakewood	259	3.3
Westminster	657	8.2
ROI (County Total)	7,365	92.5

E4 3854

[a] Includes employees from EG&G Rocky Flats, U.S. Department of Energy, and Wackenhut Services.

Source: Powell, Duffy, West.

TABLE E.3.8–1b.—*Indicators of Regional Growth at Rocky Flats Plant, 1970-2040*

Local Region of Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	511,935	870,145	1,009,650	1,205,374	1,283,093	1,262,184
Unemployment Rate (%)	3.7	5.2	4.5	5.6	5.6	5.6
Personal Income (thousand $)	5,572,132	18,754,878	35,768,813	51,753,781	67,743,112	81,833,679
Per Capita Income ($/person)	4,503	11,690	20,006	24,644	28,343	33,192
Five-County Population						
Adams County	185,789	245,944	265,038	325,679	370,664	382,526
Thornton	13,326	40,343	55,031	67,622	73,963	79,425
Arapahoe County	162,142	293,621	391,511	453,401	516,028	532,541
Boulder County	131,889	189,625	225,339	251,892	286,676	294,703
Boulder	66,870	76,685	83,312	93,017	105,862	108,826
Broomfield	7,261	20,730	24,638	27,541	31,344	32,222
Longmont	23,209	42,942	51,555	57,630	65,588	67,425
Denver County	514,678	492,365	467,610	570,460	649,256	670,032
Jefferson County	233,033	371,753	438,430	498,602	567,473	585,632
Arvada	46,814	84,576	86,888	98,813	112,462	116,060
Golden	9,817	12,237	13,116	14,973	17,041	17,586
Lakewood	92,787	112,860	126,481	143,840	163,708	168,947
Westminster	19,432	50,211	74,625	84,867	96,589	99,680
Total	1,227,531	1,593,308	1,787,928	2,100,034	2,230,097	2,465,434

E4 3996

Total employment includes only civilian employment. Personal Income and Per Capita Income are current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source: Derived from Census, 1972, 1977, 1983, 1991a; DOC, 1990b; CO DOL, 1991.

TABLE E3.8–2.—*Rocky Flats Plant ROI Housing Characteristics*

County/City	Total Units	Owner-occupied Units		Renter-occupied Units		Mobile Homes
		Number of Units	Percent Vacant	Number of Units	Percent Vacant	
1970						
Colorado						
Adams County	51,457	37,603	1	12,421	5	3,506
Arapahoe County	48,919	34,481	1	13,048	3	1,708
Boulder County	44,307	25,012	1	15,842	5	1,963
Boulder	21,632	10,718	1	8,131	4	557
Denver County	193,754	93,156	1	92,175	6	594
Jefferson County	72,092	50,800	1	17,563	4	2,016
Arvada	12,551	10,344	1	2,056	3	4
Westminster	5,224	3,935	0	1,210	4	5
ROI (County Total)	410,529	241,052	1	151,049	5	9,787
1980						
Colorado						
Adams County	89,280	58,354	5	25,865	8	10,297
Arapahoe County	113,229	75,471	6	30,547	7	2,294
Boulder County	74,638	42,428	9	26,536	6	3,608
Boulder	30,287	13,489	6	15,185	5	723
Denver County	227,879	106,299	6	105,267	8	718
Jefferson County	138,542	98,633	6	36,145	7	1,751
Arvada	29,360	20,860	3	7,342	6	10
Westminster	18,560	12,083	7	5,093	7	578
ROI (County Total)	643,568	381,185	6	224,360	8	18,668
1990						
Colorado						
Adams County	106,947	63,129	4	33,224	14	12,803
Arapahoe County	168,665	98,376	3	56,334	13	3,411
Boulder County	94,621	54,031	2	34,371	5	4,730
Boulder	36,270	16,007	2	18,674	5	1,070
Denver County	239,636	103,765	4	107,187	14	2,645
Jefferson County	178,611	116,830	3	49,715	9	3,107
Arvada	33,643	23,085	2	8,813	9	181
Westminster	29,868	18,151	3	9,677	10	652
ROI (County Total)	788,480	436,131	3	280,831	11	26,696

Source: Census, 1972, 1982, 1991b.

E4 3741

TABLE E3.8–3.—*Primary Municipal Water and Wastewater Systems in the Rocky Flats Plant ROI*

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1989)			
Adams County, CO			
City of Thornton	50.00	12.70	25
City of Westminster	36.00	23.00	64
City of Northglenn	15.00	4.22	28
City of Brighton	12.00	2.80	23
South Adams County Water and Sewer District (1991)	15.50	3.50	23
Arapahoe County, CO			
City of Aurora	130.00	40.00	31
City of Englewood	34.00	8.00	24
Boulder County, CO			
City of Boulder	55.00	20.10	37
City of Longmont	50.00	12.60	25
City of Broomfield[a]	8.00	2.68	34
City of Lafayette	8.00	2.20	28
Denver County, CO			
Denver Water Board	715.00	211.68	30
Jefferson County, CO			
City of Arvada	52.00	15.60	30
City of Golden	15.00	3.44	23
Total	1,195.50	362.52	30
Wastewater Systems (1989)			
Adams County, CO			
City of Westminster	5.50	4.18	76
City of Northglenn	6.50	3.10	48
City of Brighton	2.63	1.76	67
South Adams County Water and Sewer District (1991)	4.00	2.60	65
Arapahoe County, CO			
City of Aurora[b]	2.50	2.30	92
City of Englewood	35.00	23.00	66
Boulder County, CO			
City of Boulder (1991)	16.00	16.00	100
City of Broomfield	5.40	2.52	47
City of Lafayette	1.80	1.20	67
City of Longmont	11.55	6.99	61
Denver County, CO			
Denver (Metro WW Reclamation District) (Metro)	185.00	140.00	76
Total	275.88	203.65	74

E4 3945

[a] Purchases an average of 1.8 MGD in addition to city-supplied water.

[b] Represents only approximately 10 percent of Auroras daily flow, remaining 90 percent to Metro system.

Source: CO Municipal, 1991; CO DOH, 1992; Roecker, Simpson, Jones, Fabisiak, Bebler, Schat.

TABLE E3.8–4.—*Rocky Flats Plant ROI Education Characteristics, 1990*

County/School District	Enrollment[a]	Enrollment Capacity[b]	Pupil-Teacher Ratio[a]	Per Pupil Expenditure[a,c]
Colorado				
Adams County	47,496	57,625	18.5	4,681.70
Adams County	5,981	13,000	19.5	4,549.76
Bennett	810	931	15.1	5,313.05
Brighton	3,925	4,565	17.9	5,217.36
Mapleton	4,727	6,000	20.0	4,448.24
Northglen-Thornton	20,692	22,304	18.5	4,715.89
Strasburg	437	325	13.2	6,132.97
Westminster	10,924	10,500	18.3	4,492.88
Arapahoe County	74,811	80,731	18.6	5,332.17
Adams-Arapahoe	25,345	25,983	18.2	5,264.16
Byers	339	520	13.3	6,164.35
Cherry Creek	28,027	28,097	18.6	5,733.66
Deer Trail	181	350	10.3	6,441.77
Englewood	4,039	7,000	20.0	4,708.99
Littleton	15,356	17,200	19.4	4,818.58
Sheridan	1,524	1,581	17.5	5,589.22
Boulder County	35,942	45,322	18.3	5,318.49
Boulder Valley	21,013	28,255	18.0	5,980.55
St. Vrain Valley	14,929	17,067	18.8	4,386.63
Denver County	58,299	81,851	16.0	6,192.31
Denver	58,299	81,851	16.0	6,192.31
Jefferson County	75,164	83,674	21.1	4,775.62
Jefferson	75,164	83,674	21.1	4,775.62
ROI (County Total)	291,712	349,203	18.5	5,253.07

E4 3846

[a] CO DEd,1990.

[b] Goldberg, Lathrop, Bennett, Pocello, Hill, Keanan, Pachello, Morris, Glanstaff, Phillips, Collins, Colt, Dempsey, Beabar, Atchinson, Geist, Eckering, Saltzman.

[c] CO DEd, 1989.

TABLE E3.8–5.—*Baseline Traffic by Link at Rocky Flats Plant* [a]

Route	From	To	1995			2000		
			ADT	PHV	LOS	ADT	PHV	LOS
CSR 93	CSR 58 in Golden	CSR 128	15473	1547	D	19834	1983	E
CSR 128	CSR 93	CSR 121	8174	817	C	10479	1048	C
Indiana St	CSR 72	CSR 128	10364	1036	C	13285	1329	C

E4 3914

[a] Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: CO DHwy, 1990, 1991b; TRB, 1985.

Consultation and Coordination

The Federal, state, and local agencies and private organizations and agencies that were contacted in 1992 during the course of preparing the Socioeconomics and Community Services sections of this Environmental Assessment are listed below.

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APPENDIX F

APPENDIX F: EXPOSURES AND HEALTH EFFECTS METHODOLOGY

F.1 SUMMARY

Normal Operations Impacts. The information contained in the site environmental reports and received in response to a project datacall was used to evaluate the No Action, Proposed Action, and other consolidation alternatives at host and donor sites. The air and water resources sections for each site in chapter 4 discuss potential releases and resulting concentrations of hazardous and radioactive materials and compare these data to applicable permit, regulatory, and Department of Energy (DOE) operational limits. These estimated air concentrations were compared to acceptable reference concentrations (for chronic exposures) and adjusted threshold limit values (TLV) or permissible exposure limits (PEL) (for daily worker exposures). The exposure concentrations for air were converted to doses in milligrams per kilogram (mg/kg) per day and multiplied by a cancer potency factor (slope factor) to calculate the cancer risk (see section F.3). Additionally, each operation was examined for the hazardous and radioactive materials used in the processes. When available, monitoring data were compared to DOE, Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH) limits for worker exposure. The results of these comparisons were used to assess human health effects.

Accident Impacts. The hazardous and radioactive materials associated with each activity proposed for transfer were assessed for their potential to affect human health in the event of an accident. These impacts are bounded by the atmospheric pathway as well as engineering barriers, catchments, and mitigation plans that would ameliorate the hydrologic pathway. Since the designs of the various activity transfers have not been finalized, a probabilistic risk assessment, which considers engineering mitigation and initiating events, was not possible. However, a preliminary identification of hazardous/toxic chemicals was conducted to generate a list of toxicants associated with the processes. In addition, quantitative hazard assessments and safety analyses and assessments that had been previously performed and documented were reviewed to determine the accidents that had been assessed or analyzed. Accidents at receiver sites involving hazardous and radioactive materials used in processes to be relocated to the receiver sites were used to make qualitative comparisons. In all cases, the hazardous and radioactive materials and processes assessed or analyzed at receiver sites were the same or very similar to those hazardous and radioactive materials and processes at donor sites. Additionally, the amount of hazardous and radioactive materials from donor sites was small compared to existing receiver site inventories. The hazards associated with the relocated functions are expected to be of the same kind and the consequences of the same magnitude as those previously reviewed and documented.

F.2 APPROACH TO THE RISK ASSESSMENT OF THE WORKERS (ONSITE) AND THE GENERAL PUBLIC (OFFSITE) FOR NONNUCLEAR MATERIALS

Objectives. This risk assessment achieved two objectives:

- Estimation of risk due to normal facility operations.

- Establishment of risk due to facility accidents or failure.

Definitions. Normal operations is a concept that assumes all process operations are in place and that all equipment, procedures, devices, and controls (including engineering, etc.) are in the best possible condition and functioning in accordance with design. If a process, by necessity, involves some level of exposure to humans, either onsite or offsite, of an identified hazardous/toxic substance, the process will be designed so the exposure is below the level that could cause adverse health effects.

Accident or upset condition is a concept that assumes a failure in some control or containment system (e.g., facility or engineering), or procedure that could potentially lead to human exposure to a hazardous/toxic substance at an unacceptable level. In some instances, this exposure may include a level or concentration above the normal condition, but still within a safe range. For example, in a complex control system designed for maximum protection, one of several safety controls may not perform as expected, leading to an exposure that still lies within a safe range.

Approach. For purposes of this Environmental Assessment (EA), information on hazardous chemicals was made available from the Kansas City Plant (KCP), the Pinellas Plant (Pinellas), the Sandia National Laboratories, New Mexico (SNL), the Los Alamos National Laboratory (LANL), the Y-12 Plant (Y-12), the Rocky Flats Plant (RFP), and the Mound Plant (Mound) facilities. Several steps were involved in the total process of establishing risk for purposes of the EA. These include the following:

- *Process Identification.* This activity involves the identification of the processes and associated materials that go into (input) and come out of (output) each process.

- *Screening for Hazardous Substances.* This activity involves development and implementation of a screening procedure for hazardous substances that are used or produced in the processes. It also involves selection of those substances with the potential to elicit adverse health effects.

- *Selection of Significant Hazardous Substances.* This activity involves the selection of hazardous substances and associated processes for substances at sufficient volumes and toxicity to cause adverse health effects to workers (onsite) or the public (offsite) should a release occur.

- *Hazard Identification.* This is the identification of chemicals, their location, quantities, and the nature of the hazard (within a process or module) they pose. This step was of sufficient depth to verify or validate that a potential hazard could exist. The chemical name(s) and properties associated with chemical or physical structure were defined; a toxicity profile was developed; the approximate level of concern or other concentration-effect parameters was defined; and maximum/average quantities stored or input into a process were assessed. At this stage, the selected chemicals are likely to be used extensively or associated with a previous history of adverse health effects, including cancer or other chronic or continuous exposure-related endpoints.

- *Release Analysis.* The areas affected by the release (vulnerable zones) were determined from estimated quantities of extremely hazardous substances released to the air, the rate of release, dispersion, and the airborne concentrations causing death or adverse health effects. However, not all of the quantity of an extremely hazardous

substance would actually be released, and of that amount released, not all would become airborne. Furthermore, certain variables may affect the vulnerable zones. Although these factors were recognized, the initial estimates of the vulnerable zones were made using conservative estimates. The essential information for these assumptions included:

— Identification of the chemical(s).

— Maximum potential quantity in a single vessel, interconnected vessel, or input into a process.

— Location of the chemical source within the process or module.

— Physical state under assumed sets of conditions.

— Quantity of extremely hazardous substances likely to be released (past performances including facility toxic release inventories were used).

— Site specific topographical considerations.

— Site specific meteorological conditions.

— Level of concern, TLV, PEL, Protection Action Guides, or other action/response parameters.

For guidance purposes, a level of concern is based upon the concentration shown in the NIOSH publication, *Immediately Dangerous to Life and Health* (IDLH).

Level of concern applies to concentrations that might cause serious irreversible health effects or death. The 0.1 IDLH level, derived from animal toxicity data, was also used for guidance because this level defines the maximum concentration from which a worker could escape within 30 minutes without irreversible health effects (EPA, FEMA, 1987; NIOSH, 1990).

OSHA's PELs are exposure standards set for the workplace and are listed in 29 CFR 1910, Subpart 2, *General Industry Standards for Toxic and Hazardous Chemicals.*

OSHA's PELs are regulatory limits legislated for worker protection. PELs refer to air concentrations and may be expressed as either a time-weighted average (TWA) or ceiling value, to which an employee can be exposed for a normal 8-hour day, 40-hour work week without ill effects (29 CFR 1910).

The American Conference of Governmental Industrial Hygienists, a recognized professional society, recommend their own exposure values or TLVs. TLVs may also be expressed as TWAs, a level to which workers can be exposed for a normal 8-hour day, 40-hour work week without ill effects. TLV ceiling limits indicate an exposure limit that must not be exceeded at any time during the work day. A TLV STEL is defined as a short-term exposure limit, usually a 15-minute TWA, which should not be exceeded (ACGIH, 1991; 29 CFR 1910).

NIOSH also recommends exposure limits for workers. Following an extensive review of the literature and analysis, recommended exposure levels are put forward by NIOSH to protect worker health (Lewis, 1992).

A Protective Action Guide is defined as an exposure or concentration that can trigger a protective response or action, i.e., the necessary action to avoid or reduce a projected harmful exposure. The Emergency Response Planning Guidelines, developed by the American Industrial Hygiene Association (AIHA, 1992) for airborne concentrations up to one hour,

were the Protective Action Guides used when applicable. These effect levels are as follows:

- *Emergency Response Planning Guidelines-1.* The subject experiences a mild transient adverse health effect, encounters an objectionable odor, or experiences lacrimation (e.g., excessive eye watering).

- *Emergency Response Planning Guidelines-2.* Irreversible or other serious health effects occur which could impair the ability to take protective action. Treatment may be required, and this treatment may reverse some effects.

- *Emergency Response Planning Guidelines-3.* Life threatening health effects occur; impairment of ability to take protective action also occurs.

Another Protective Action Guide is the Short-term Public Exposure Guidance Level that applies to exposures from 1 to 24 hours (National Research, 1986).

The PEL and TLV values were used for daily worker exposures because they represent typical exposure protections for workers that are both official and widely accepted.

Although the approach discussed above deals with air emissions, these principles are also broadly applicable to potential exposure through water.

- *Exposure Assessment.* This process measured or estimated the intensity, frequency, and duration of human exposures to substances which could arise if chemicals were released into the environment.

Several critical components were characterized for this exposure assessment. These were as follows:

— Population and population distribution.

— Exposure pathway (e.g., inhalation, ingestion, dermal).

— Source of exposure and documentation of these sources (e.g., modeling of air dispersion, toxic release inventory data, National Pollutant Discharge Elimination System (NPDES) data, environmental monitoring).

— Duration of exposure (i.e., continuous, intermittent, sporadic).

From the above, uptake values were calculated, where uptake consists of concentration of the pollutant in water or air (converted from parts per billion (ppb), when required, to micrograms (μg) or micrograms per liter (μg/L) or micrograms per cubic meter (μg/m^3), respectively); ingestion or respiration rate (absorption in the case of dermal); and body weight of the exposed person.

- *Risk Characterization.* In this process, the incidence of health effects under various conditions/scenarios of human exposure (developed in the exposure assessment) were estimated. This process used exposure assessment and dose-response data for an identified hazardous chemical and incorporated the uncertainties associated with the type and quality of the data used (e.g., human epidemiology vs. animal bioassay data or complete data vs. limited data). Both acute and chronic exposures were evaluated, as appropriate, for each chemical release. For chronic exposures, the risk was divided into non-carcinogenic health outcomes (threshold) and carcinogenic (probabilistic) outcomes. Health risks were characterized for the following:

— Noncarcinogenic effects for single compounds by comparing reference levels (reference concentration or reference dose) to uptake levels.

— Noncarcinogenic effects for exposure to multiple compounds by summation of single compound effects.

— Cancer risk from individual compounds.

— Cancer risk as summation of risk from all identified carcinogens.

Reference dose, reference concentration, and cancer unit risk were taken from the Integrated Risk Information System, Health Effects Assessment Summary Tables, and the Battelle Pacific Northwest Laboratories database (see table F-2).

F.3 Determination of Risks from Nonradioactive Materials

Carcinogens. The procedure for calculating risk of exposure to carcinogenic compounds is well documented (National Research, 1983; EPA, 1983; EPA, 1989a; Roderick, 1984; SR King, 1987). A non-threshold dose-related model was used to calculate a cancer potency factor (slope factor) for each carcinogenic chemical. Table F-2 gives a unit value of slope factors for selected constituents based on oral or inhalation reference values developed in the Environmental Protection Agency (EPA) Integrated Risk Information System. The cancer potency factor was multiplied by the estimated average daily lifetime dose experienced by the exposed population to the chemical of concern to derive an estimate of risk frequency as follows:

- $R=DxSF$

Where: D=average daily lifetime dose (milligrams per kilogram of body weight per day) derived from the exposed concentration of the chemical for the pathway of concern (ingestion or inhalation). The inhalation concentration is converted to the same units as the reference dose when used in the above equation, where $0.286 x mg/m^3 = mg/kg\text{-}day$.

SF=slope factor for this pathway of concern (milligrams per kilogram of body weight per day)$^{-1}$. The slope factor converts estimated daily intakes averaged over a lifetime of exposure to the incremental risk of an individual developing cancer. Slope factors are usually documented, i.e., in the Integrated Risk Information System for each individual toxic chemical according to the potential exposure pathway; however, the unit risk can be used to determine a slope factor. The following equation can be used to convert an air concentration to a slope factor:

- $SF=\text{Unit Risk}(\mu g/m^3)^{-1} x 70\ kg x 10^3(\mu g/mg)/20(m^3/day)$

Where: 70 kg is the assumed average weight of an adult, $10^3(\mu g/mg)$ converts micrograms to milligrams and $20(m^3/day)$ is the estimated volume of air inhaled by an average adult.

For the purposes and scope of the proposed project, this method is adequate because it usually will overestimate the risk because between 50 and 100 percent uptake is assumed.

R is an explicit estimate of the upper limit of risk for the pathway of concern and would have a value between zero and one.

If the inhaled dose, D, is given in mg/m^3, it can be converted to units of mg/kg-day by the following calculation:

- $[x\ mg/m^3]x[20m^3/day x 70\ kg]=0.286$ or $0.286 x mg/m^3 = mg/kg\text{-}day$

Noncarcinogens. The traditionally accepted practice of evaluating exposure to a noncarcinogenic compound has been to determine experimentally a

no-observable-adverse-effect level and to divide this by an uncertainty factor to establish a reference dose (RfD) for ingestion and a reference concentration (RfC) for inhalation. The reference concentration values were compared to the exposure concentration according to the pathway of concern (ingestion or inhalation) to obtain a Hazard Quotient as follows:

- Hazard Quotient=C/RfC

Where: C=average daily lifetime concentration derived from the concentration level of the chemical for the pathway of concern at the point of potential exposure.

Human health effects resulting from multiple exposures are addressed by the Hazard Index.

- Hazard Index=$C_1/RfC_1+C_2/RfC_2+ \ldots +C_i/RfC_i$ where C_i=average daily lifetime dose for i^{th} toxic chemical and RfC_i=reference concentration for the ith toxic chemical.

Establishing acceptable exposure limits implies that the application of uncertainty factors to an experimentally derived no-observable-adverse-effect level would prevent an adverse health risk. The reference doses typically are derived by making assumptions about the nature of dose-response relationships at low doses and by drawing inferences based on the available data (National Research, 1983).

The Hazard Index value derived for noncarcinogens could vary from less than one to more than one. It is to be recognized that these values for non-carcinogens represent the potential for an adverse health effect at the assessed exposure level if the Hazard Index is greater than one. There is no effect risk if the Hazard Index is less than one since these values are very conservative. This Hazard Index is only a numerical indicator of the threshold between acceptable and unacceptable exposure levels and is not a mathematical prediction of incidence of effects or their severity.

F.4 Identification of Hazardous Materials and their Associated Processes

The toxic chemicals associated with processes proposed for transfer and others of major concern with ongoing plant processes were characterized according to their general properties and chemical toxicity (table F-1) and according to various exposure limits or standards (table F-2). By comparing these values to the concentrations occurring onsite (worker exposure) and to those offsite (public exposure), the potential for adverse health effects could be assessed. The values presented in these tables and exposure levels could then be used to determine risk for adverse health effects.

Activities to be Transferred. Processes were identified with associated materials required to operate the process (input) as well as the end products, releases, and wastes (output). The objective was to identify hazardous materials associated with each process and to assess/identify those having potential for causing adverse health effects, i.e., toxicants. The *NIOSH Pocket Guide to Chemical Hazards* provided the primary information to identify chemicals considered to be hazardous in the workplace. This information was supplemented by additional authoritative references cited in table F-1. The first review of the transferred processes produced the following list of toxicants:

Compounds Considered

- Lithium
- Thionyl chloride
- Isopropyl alcohol
- Sulfur Dioxide (SO_2) gas
- Methylene chloride

- Trichloroethylene (TCE)
- 4,4-methylene dianiline (from epoxy mixture)
- Nickel compounds
- 1,1,1-trichloroethane (TCA)
- Chromium trioxide
- Hydrogen fluoride
- Toluene diisocyanate, free state
- Lead titanate
- Beryllium compounds
- Volatile organic compounds (VOC)
- Polycyclicaromatic hydrocarbons

From this list, compounds were selected if they were considered hazardous and of concern for a potential exposure generated as a consequence of conducting work which involved nonnuclear manufacturing processes. This selection was based upon compound toxicity, concentrations used, frequency of use, and on the fact that the process(es) was selected for transfer to a consolidation site. The industrial hygiene criteria, such as health rating, frequency of use, and permissible exposure level discussed in the next section, and the actual use of chemicals in the processes being transferred (section 3.3) were used to reduce this list. The compounds and processes identified for further analysis because of their hazard potential are identified in table F-3.

F.5 Evaluation of Potential Offsite (Public) and Onsite (Worker/ Occupational) Risks for Hazardous Chemicals

Although the endpoint health effects of onsite and offsite releases can be similar, it is not valid to assume that this would be the case. Distance, exposure and pathways, and the hazardous materials that are candidates for onsite or offsite exposures may differ, and even the effects from the same material may differ according to concentration level and route of exposure (e.g., inhalation vs. ingestion and low-chronic vs. high-acute exposures). The initiating events for onsite and offsite exposures are also likely to differ, and the mitigation and control procedures can be entirely different. Therefore, different approaches were chosen to identify the hazardous chemicals likely to cause health effects, should they be released.

Offsite (Public) Impacts. The screening of hazardous chemicals for the potential to cause offsite effects involves assessing the emission or discharge potential to the public. The physiochemical properties, especially the physical state (e.g., vapor pressure, boiling point, solubility, and mobility characteristics) were considered in assessing container and control failures. The hazard potential (e.g., toxic dose and potential health effects at various concentration levels) was assessed. The quantities stored, transported, or used during a given process were determined. A limited number of major source terms (i.e., quantities released or potentially released over a given period) were identified. The most likely release and dispersion media for source terms were also considered; air and water were the major candidates for planned and unplanned releases that could result in either acute or chronic adverse health effects offsite. A third medium, soil, was also considered, although it was not of major importance for a plant (production) operation due to the flow route, containment barriers, and other engineering controls that are in place (e.g., spill tanks and troughs). However, it was recognized that hazardous chemical plumes have developed in soil and

underground water from large accidental releases or waste management practices in the past. Solid substances, because of their relatively low mobility and complexity, were generally given low priority unless a scenario involved a release associated with fire or explosion.

For source term selection with a potential offsite effect, extremely hazardous materials exceeding the *Superfund Amendment and Reauthorization Act* (SARA) Title III Tier Two threshold were identified. Less hazardous chemicals whose plant site storages were identified in design documents as being stored in bulk quantities (chemicals with release of less than 100 pounds were excluded) were also considered. Tier Two threshold is based on physical and health hazards, i.e., fire, sudden release of pressure, acute health hazard, chronic health hazard, and reactivity with the environment or other chemicals within the site.

Offsite chemical effects were evaluated relative to the RfC and RfD values and other standard parameters in table F–2 for protection of the public against adverse health effects. In addition, the dose from exposure to carcinogens was needed to calculate the cancer risk at the site boundary as a conservative estimate of public risk.

The methodology used for modeling normal releases is described in appendix D. The concentrations of chemicals developed using this methodology are presented in tables F-4 though F-11; these values were used to calculate Hazard Quotients for individual chemicals and the Hazard Indexes (chemicals summed) at individual sites which are presented in tables F-12 through F-19.

Onsite (Occupational/Worker) Impacts. The chemical hazards involving onsite workers may be significantly different from those that may cause offsite (public) adverse effects. Depending on several factors, some onsite worker exposures can trigger a Protection Action Guideline (e.g., exceeding the PEL), whereas the quantity/toxicity offsite would fall far below a measurable concentration or observable effect. In addition, onsite workers are more likely to encounter more chemicals than offsite (i.e. the public). The controls to prevent occupational exposure may include engineering and mechanical barriers and special protective devices (e.g., respirators, goggles, and chemical-impermeable outerwear). However, it is possible to apply a scoring system based on the experience with industrial hygiene. The industrial hygiene assessment matrix developed for AlliedSignal at KCP was used for this purpose, and includes a score based on the criteria which follow:

- *Health Rating.* This rating is based on the toxicological properties associated with a given hazardous chemical (e.g., the Diamond Label established by the National Fire Protection Association, which uses a range of 0 to 4 with 4 being the most hazardous), and both acute and chronic toxicity should be considered.

- *Frequency of Use.* The frequency is based on length of exposure per month; the matrix uses a range of 0 to 3 with 3 being the highest frequency.

  0 - on inventory list, but not in use

  1 - low (≤ 4 hours/month)

  2 - medium (4 to 39 hours/month)

  3 - high (≥ 39 hours/month)

- *Permissible Exposure Level.* The PEL established by OSHA for each toxicant serves as the standard for this component of the matrix score.

  0 - Evaluated within 1 year and detected in work area or in personnel

  1 - Evaluated within 1 year and determined as < 25 percent of PEL

2 - Evaluated within 2 years and determined as < 50 percent of PEL

3 - Evaluated within 2 years and determined as > 50 percent of PEL

Based on a maximum possible score of ten as a sum of the three criteria, all candidate chemicals were considered and those with a combined score of six or more were further evaluated.

The approach for deciding which chemicals to model for occupational exposure and the potential for adverse health effects is process-dependent. Each process (independent of site designation) to be included in the DOE's Nonnuclear Consolidation Plan (NCP) was studied and evaluated for potential exposures that the worker might encounter. The hazardous materials used as input into each process were identified, along with the quantity and frequency of use. This process permitted application of a scoring matrix to hazardous materials that might create a concern rather than random selection from an inventory. Where actual monitoring data were available or there was sufficient evidence that a process operates safely under normal conditions, scenarios for upset conditions were considered along with engineering and procedural controls and the ability to mitigate.

By modeling the toxic air pollutant emission rates for each site (appendix D), the current and proposed toxic air pollutant concentrations onsite and at the site boundary were calculated. Tables F-4 to F-11 present the toxic air pollutant concentrations for the No Action alternatives (current operations) and for the proposed consolidation alternatives relative to each site. The exposure limits, i.e., lifetime reference concentration (reference dose or reference concentration), 8-hr PEL, 8-hr TLV, and slope factor (unit risk for carcinogenic compounds) are also presented in these tables to permit the reader to evaluate the potential for adverse health effects. If the concentrations of hazardous chemicals presented in this table fall below the exposure limits, no adverse health effects can be expected. If the limits are exceeded, there is a possibility for adverse health effects to occur, such as those presented in table F-2. However, it is cautioned that exposure limits are usually very conservative to ensure that both workers and the public are protected. The difference in the exposure concentration and the appropriate reference concentration, PEL, TLV, etc., therefore, represents the margin of safety; the Hazard Index, as discussed in section F.3, is the ratio of the exposed level to its established reference.

Using the information in tables F-4 through F-11, the Hazard Quotients (values for single hazardous chemicals) and the Hazard Indexes (summation of quotients for all chemicals) were consolidated for the workers and the public at each site. The RfC, PEL, and TLV values for each toxic chemical appearing in tables F-4 through F-11 (according to site) are those listed in table F-3 (official sources appear in the table footnotes). The RfCs represent lifetime exposure limits, which were compared to the annual exposure concentrations for a conservative estimate of the potential for chronic adverse health effects. The PEL (regulatory standard) and TLV (guideline) values were compared to eight-hour exposures to estimate the possibility for adverse health effects induced by daily worker exposures. In the event that the PEL and TLV values differed, the lower of the two was chosen so that calculations would be as conservative as possible.

By way of example, the RfC value for acetone is 10.5 mg/m^3 and the cumulative annual onsite level at KCP is 0.002 mg/m^3 (see table F-4), so dividing the onsite concentration by the RfC gives a Hazard Quotient of 0.0002 for cumulative onsite acetone (see table F-12a). The PEL (8-hr) for acetone is 1,800 mg/m^6 and the onsite 8-hr concentration is 0.030 mg/m^3, so dividing the onsite concentration by the PEL gives a Hazard Quotient value of 1.67×10^{-5} for eight hours. Since this value is very small compared to an acceptable value of 1.0, i.e. less than 10^{-4}, it was recorded as 0.0000 in the table. The sums of all Hazard Quotients for all chemicals gives the Hazard Indexes at each site.

In addition, the cancer risk to workers and to the public were determined for those chemicals where a cancer potency (slope factor) was available. The calculation methods are presented in section F.3 of this appendix; the results for these calculations are presented in tables F-12 through F-19. By way of example, the No Action onsite cancer risk for methylene chloride at KCP was calculated using a methylene chloride concentration of 0.00077 mg/m^3. This concentration was converted to a dose (mg/kg-day) using the multiplier of 0.286 (section F.3) to give an average daily lifetime dose (D) of 1.22×10^{-4} mg/kg-day. When this dose was multiplied by the slope factor for methylene chloride, i.e., 2.6×10^{-3} (mg/kg/day)-1, an individual cancer risk of 5.72×10^{-7} at this level of exposure was obtained (see table F-12b). The total risk was the sum of all cancer risks. The chemicals identified in table F-1 were assessed separately and used to assess the baseline.

F.6 Evaluation of Potential Offsite (Public) and Onsite (Worker/Occupational) Risks for Radioactive Materials

Releases of radioactive materials at the sites from normal operations and associated doses were taken from the sites' Annual Environmental Reports. Increases in releases as a result of the Proposed Action were also taken from the sites' reports and the associated doses were reflected in ratios. The radiological risks were calculated using the following methodology.

Health impacts from radiation exposure, whether from sources external or internal to the body, generally are identified as "somatic" (affecting the individual exposed) or "genetic" (affecting descendants of the exposed individual). Radiation is more likely to produce somatic effects rather than genetic effects and if the former are acceptable, the latter are not generally estimated. Therefore, for this EA, only the somatic risks are evaluated. The somatic risks of most importance are the induction of cancers.

The fatal cancer risk estimators presented in this appendix technically apply only to low-Linear Energy Transfer radiation (gamma rays and beta particles). However, on a per rem basis, the fatal risk estimators are higher for this type radiation than for high-Linear Energy Transfers radiation (alpha particles). In this EA, the low-Linear Energy Transfer risk estimators are conservatively assumed to apply to all radiation exposures.

The National Research Council's Committee on the Biological Effects of Ionizing Radiation (BEIR) has prepared a series of reports to advise the U.S. Government on the health consequences of radiation exposures. The latest of these reports, Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V (NAS, 1990), provides the most current estimates for excess mortality from leukemia and cancers other than leukemia expected to result from exposure to ionizing radiation. The BEIR V report updates the models and risk estimates provided in the earlier report of the BEIR III Committee published in 1980 (NAS, 1980). BIER V models were developed for application to the U.S. population. Thus, consideration of the recent report of the BEIR V Committee is especially important.

BEIR V provides risk estimates that are consistently higher than those in BEIR III. This is attributed to several factors including the use of a linear dose response model for cancers other than leukemia, revised dosimetry for the Japanese Atomic bomb survivors, and additional follow-up of the Atomic bomb survivors and cohorts. BEIR III employs constant relative and absolute risk models, with separate coefficients for each of several sex- and age-at-exposure groups, while BEIR V develops models where the excess relative risk is expressed as a function of age at exposure, time after exposure, and sex for each of several cancer categories. BEIR III models were based on the assumption that absolute risks are comparable between the Atomic

bomb survivors and the U.S. population, while BEIR V models were based on the assumption that relative risks are comparable. For a disease such as lung cancer, where baseline risks in the U.S. are much larger than those in Japan, the BEIR V approach leads to larger risk estimates than the BEIR III approach.

The models and risk coefficients in BEIR V were derived through analysis of relevant epidemiologic data including the Japanese A-bomb survivors, ankylosis spondylitis patients, Canadian and Massachusetts fluoroscopy patients (breast cancer), New York postpartum mastitis patients (breast cancer), Israel Tinea Capitis (thyroid cancer), and Rochester thymus patients (thymus cancer). Models for leukemia, respiratory cancer, digestive cancer, and other cancer used only the A-bomb survivor data, although results of analyses of the ankylosis spondylitis patients were considered. A-bomb survivor analyses were based on revised DS86 dosimetry with an assumed Radio Biological Effectiveness of 20 for neutrons, and were restricted to doses less than 400 rads. Estimates of risks of fatal cancers other than leukemia were obtained by totaling the estimates for breast cancer, respiratory cancer, digestive cancer, and other cancer.

Risk Estimates for Doses Received During An Accident. BEIR V includes risk estimates for a single exposure of 10 rem to a population of 100,000 people (10^6 person-rem). In this case, mortality estimates for leukemia, breast cancer, respiratory cancer, digestive cancer, and other cancers are given for both sexes and nine age-at-exposure groups. These estimates are summarized in table F–20. The average risk estimate for all ages and both sexes is 885 excess cancer mortalities per million person-rem. This is the risk value used in this EA for accident situations.

Risk Estimates for Doses Received During Normal Operations. For low dose rates, a linear-quadratic model was found to provide a significantly better fit to the data for leukemia than a linear one, and leukemia risks were based on a linear-quadratic function. This reduces effects by a factor of two over estimates that are obtained from the linear model. For other cancers, linear models were found to provide an adequate fit to the data, and were used for extrapolation to low doses. However, the BEIR V Committee recommended reducing these linear estimates by a factor between 2 and 10 for doses received at low dose rates. For this EA, a risk radiation factor of two was adopted. The resulting risk estimate would then be equal to half the value observed for accident situations or approximately 445 excess cancer mortalities per million person-rem. This is the risk value used in this EA for normal operations.

TABLE F–1.—*Chemical Toxicity Profiles* [Page 1 of 4]

Compounds	CAS No.[a]	Solubility[a]	Vapor Pressure[a]	Flammability[a, b]	Incompatibilities[a]	Route of Exposure[a]	Target Organs[a]	Carcinogenicity[d]
Acetone	67-64-1	miscible	180 mm	1B	oxidizers, acids	inh,ing,con[c]	respiratory system, skin	j
Ammonia	7664-41-7	34% in water at 68°F	> 1 atm.	combustible gas, but difficult to burn	strong oxidizers, acids, halogens, salts of silver & zinc	inh,ing,con[c]	respiratory system, eyes	j
Beryllium and Beryllium Compounds	7440-41-7	insoluble	0 mm	non-combustible	acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium	inh[c]	lungs, skin, eyes, muc. membranes	sufficient evidence in animals, limited evidence in humans
Cadmium Dust	7440-43-9	insoluble	0 mm	non-combustible solid, but will burn in powder form	strong oxidizers, elemental sulfur, selenium & tellurium	inh, ing[c]	respiratory system, kidneys, prostate, blood	sufficient evidence in animals, limited evidence in humans
Cadmium Fume	1306-19-0	insoluble	0 mm	non-combustible	not applicable	inh[c]	respiratory system, kidneys, blood	i
Carbon Tetrachloride	56-23-5	0.05%	91 mm	non-combustible	chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum; Note: forms highly toxic phosgene gas when exposed to flames or welding arcs	inh, abs, ing, con[c]	CNS, eyes, lungs, liver, kidneys, skin	sufficient evidence in animals, no data for humans
Chlorine	7782-50-5	0.7%	> 1 atm.	noncombustible gas, but a strong oxidizer	reacts explosively or forms explosive compounds with many common substances such as acetylene, ether, ammonia, fuel gas, hydrogen, finely divided metals	inh, con[c]	respiratory system	j

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Footnotes at end of table.

TABLE F–1.—*Chemical Toxicity Profiles*—Continued [Page 2 of 4]

Compounds	CAS No.[a]	Solubility[a]	Vapor Pressure[a]	Flammability[a,b]	Incompatibilities[a]	Route of Exposure[a]	Target Organs[a]	Carcinogenicity[d]
Chromium Trioxide	1333-82-0	very soluble[g]	i	contact with combustible materials may cause fires[g]	Alcohol, ether, glycerol, spirit nitrous ether and almost every organic substance, bromides chlorides, iodides, hypophosphites, sulfites, sulfides[g]	inh, ing, con[c,g]	skin, respiratory system, kidney[g]	sufficient evidence in both animals and humans
Dimethylform-amide	68-12-2	miscible	4 mm (77°F)	IIIA	carbon tetrachloride, other halogenated compounds when in contact with iron; strong oxidizers; alkyl aluminums; inorganic nitrates	inh, abs, ing, con[c]	liver, kidneys, skin, cardiovascular system	j
1,4-Dioxane	123-91-1	miscible	29 mm	flammable liquid[f]	strong oxidizers, decaborane, triethynyl aluminum	inh, abs, ing, con[c]	skin, liver, eyes, kidneys[e], CNS[g]	sufficient evidence in animals, insufficient evidence in humans
Formaldehyde	50-00-0	miscible	> 1 atm/1mm	IIIB	strong oxidizers, alkalis & acids; phenols; urea; pure formaldehyde has a tendency to polymerize	inh, ing, con[c]	respiratory system, eyes, skin	sufficient evidence in animals, limited evidence in humans
Hydrogen Cyanide	74-90-8	miscible	630 mm	IA	amines, oxidizers, acids, sodium hydroxide,calcium hydroxide, sodium carbonate, water, caustics, ammonia	inh, abs, ing, con[c]	CNS, cardiovascular systems, liver, kidneys	j

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Footnotes at end of table.

TABLE F–1.—*Chemical Toxicity Profiles*—Continued [Page 3 of 4]

Compounds	CAS No.[a]	Solubility[a]	Vapor Pressure[a]	Flammability[a,b]	Incompatibilities[a]	Route of Exposure[a]	Target Organs[a]	Carcinogenicity[d]
Isopropyl Alcohol	67-63-0	miscible	33 mm	IB	strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids, isocyanates	inh, ing, con[c]	eyes, respiratory system, skin	j
Lead Titanate	12060-00-3	i	i	i	i	i	i	i
Lithium	7439-93-2	liquid ammonia[e]	1 mm (723°C)[e]	flammable solid[e]	atmospheric gases; bromide pentafluoride; diazomethane; metal chloride; metal and non-metal oxides[e]	inh, con[c,e]	eyes, skin, kidney[g]	j
Methylene Chloride	75-09-2	2%	350 mm	combustible liquid	strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium, powders, potassium and sodium; concentrated nitric acid	inh, ing, con[c]	skin, cardiovascular system, eyes, CNS	Sufficient evidence in animals, limited evidence in humans
4,4 Methylene Dianiline	101–77–9	slightly soluble[g]	i	combustible solid[e]	i	ing, con[c,e]	liver, eye[e]	sufficient evidence in animals, insufficient evidence in humans
Methylene Diisocyanate	4747–90–4	i	i	i	polymerizes violently on contact with dimethyl formamide (DMF)[e]	i	i	i
Methyl Ethyl Ketone (2-Butanone)	78-93-3	28%	71 mm	IB	strong oxidizers, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines	inh, ing, con[c]	CNS, lungs	inadequate evidence in animals, no data in humans[h]
Nickel Chloride	7718-54-9[g]	soluble[g]	i	i	i	ing[e]	i	i
Nitric Acid	7697-37-2	miscible	48 mm	non-combustible liquid but increases flammability of combustible materials	combustible materials; metallic powders; hydrogen sulfide; carbides; alcohols	inh, ing, con[c]	eyes, respiratory system, skin, teeth	j

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Footnotes at end of table.

TABLE F–1.—*Chemical Toxicity Profiles*—Continued [Page 4 of 4]

Compounds	CAS No.[a]	Solubility[a]	Vapor Pressure[a]	Flammability[a,b]	Incompatibilities[a]	Route of Exposure[a]	Target Organs[a]	Carcinogenicity[d]
Phenol Isocyanate	i	i	i	i	i	i	i	i
Thionyl Chloride	7719-09-7	benzene, chloroform, carbon tetrachloride[e]	100mm (21.4°C)[e]	non-combustible[e]	ammonia; dimethyl formanide and trace iron or zinc; linseed oil and quinoline, toluene, ethanol and water[e]	inh, abs, ing, con[c,e]	eyes, skin, muc. membrane[g]	j
Toluene	108-88-3	0.05%	20 mm (65° F)	IB	strong oxidizers	inh, abs, ing, con[c]	CNS, liver, kidneys, skin	j
Toluene Diisocyanate	26471-62-5	i	i	combustible liquid[e]	bases and acyl chloride[e]	inh, con, ing[c,e]	eye, skin, respiratory system, nose[e]	sufficient evidence in animals, no data in humans
1,1,1-Trichloroethane	71-55-6	insoluble[g]	i	non-combustible liquid[g]	i	inh[c,g]	CNS, eyes, mucus membrane[g]	j
1,1,2-Trichloroethane	79-00-5	0.4%	19 mm	non-combustible liquid	strong oxidizers and caustics; chemically-active metals such as aluminum, magnesium powders, sodium & potassium	inh, abs, ing, con[c]	CNS, eyes, nose, liver, kidneys	limited evidence in animals, no evidence in humans[h]
Trichloroethylene	79-01-6	0.1% (77° F)	58 mm	IC	strong caustics & alkalis; chemically-active metals such as barium, lithium, sodium, magnesium, titanium, and beryllium	inh, ing, con[c]	respiratory system, heart, liver, kidneys, CNS, skin	sufficient evidence in animals, inadequate evidence in humans[h]
Trichlorotrifluor-oethane	76-13-0	i	i	flammable[e]	aluminum, barium, lithium, samarium, sodium potassium alloy, titanium[e]	inh, ing, con[c,e]	CNS, skin[e]	i

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[a] *NIOSH Pocket Guide to Chemical Hazards*, June 1990.
[b] Flammable liquids are classified by OSHA (29 CFR 1910.106) as follows: Class IA- Fl.P below 73 °F and BP below 100 °F; Class IB- Fl.P below 73 °F and BP at or above 100 °F; Class IC-Fl. P at or above 73 °F and below 100 °F. Class II-Fl.P at or above 100 °F and below 140 °F; Class IIIA- Fl.P at or above 140 °F and below 20 °F; Class IIIB- l.P at or above 200 °F.
[c] Routes of exposure abbreviated as follows: inh-inhalation; abs-skin absorption; ing-ingestion; con-skin and/or eye contact.
[d] *Sixth Annual Report on Carcinogens, Summary*, 1991.
[e] *Sax's Dangerous Properties of Industrial Materials*, Eighth Edition, 1992.
[f] Registry of Toxic Effects of Chemical Substances (RTECS).
[g] *Merck Index*, 11th Edition, 1989.
[h] Integrated Risk Information System (IRIS).
[i] Information is not available.
[j] Not applicable.

TABLE F–2.—*Exposure Limits* [Page 1 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)[a]	RfC (mg/m^3) (inhalation)[a]	Cancer Class[b]	Slope Factor $(mg/kg/day)^{-1}$[b]	Conversion Factors (mg/m^3)[c]	Occupational Exposure Levels
Acetone	67-64-1	0.1	10.5 (PNL)	D	e	2.42	OSHA-PEL: 1800 mg/m^3 and 15-minute STEL of 2400 mg/m^3[c] ACGIH-TLV: Same as above[d] NIOSH-REL: 590 mg/m^3[c]
Ammonia	7664-41-7	0.014[g]	0.1	e	e	0.71	OSHA-PEL: 27 mg/m^3[c] ACGIH-TLV: 17 mg/m^3 and a 15-minute STEL of 24 mg/m^3[d] NIOSH-REL: 18 mg/m^3 and a 15-minute STEL of 27 mg/m^3[c]
Beryllium and Beryllium Compounds	7440-41-7	5×10^{-3}	0.018[i]	B2	4.3 (oral)		OSHA-PEL: 2 $\mu g/m^3$ [8-hr TWA], 5 $\mu g/m^3$ [ceiling], 25 $\mu g/m^3$ [30-min max peak][c] ACGIH-TLV: 0.002 mg/m^3 [8-hr TWA][d] NIOSH-REL: not to exceed 0.5 $\mu g/m^3$[c]
Cadmium Dust	7440-43-9	5×10^{-4}	0.0018[i]	B1	f		OSHA-PEL: 0.2 mg/m^3 [8-hr TWA], 0.6 mg/m^3 [ceiling][d] ACGIH-TLV: 0.05 mg/m^3[d] NIOSH-REL: reduce exposure to lowest feasible concentration[d]
Cadmium Fume	1306-19-0	7×10^{-4}[h]	2.5×10^{-3}[i]	f	f		OSHA-PEL: 0.1 mg/m^3 [8-hr TWA], 0.3mg/m^3 [ceiling][l] NIOSH-REL: reduce exposure to lowest possible concentration[d]
Carbon Tetrachloride	56-23-5	7×10^{-4}	0.0025[i]	B2	1.3×10^{-1} (oral) 5.3×10^{-2} (inhal)[j]	6.39	OSHA-PEL: 12.6 mg/m^3 [8-hr TWA][c] ACGIH-TLV: 32 mg/m^3 [skin][d] NIOSH-REL: 12.6 mg/m^3 [60-min ceiling limit][c]
Chlorine	7782-50-5	0.011[h]	3.9×10^{-2} (PNL)	e	e	2.95	OSHA-PEL: 1.5 mg/m^3 and a 15-minute ceiling STEL of 3 mg/m^3[c] ACGIH-TLV: same as above[d] NIOSH-REL: same as above[c]

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Footnotes at end of table.

TABLE F–2.—*Exposure Limits*—Continued [Page 2 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)[a]	RfC (mg/m^3) (inhalation)[a]	Cancer Class[b]	Slope Factor $(mg/kg/day)^{-1}$[b]	Conversion Factors (mg/m^3)[c]	Occupational Exposure Levels
Chromium Trioxide	1333-82-0	3.5×10^{-3}[h]	1.23×10^{-2}[i]	f	f		OSHA-PEL: 0.1 mg/m^3 [ceiling][d] ACGIH-TLV: 0.05 mg/m^3[d] NIOSH-REL: 0.025 mg/m^3 [10 hr TWA], 0.05 mg/m^3 [15-min ceiling][d]
Dimethylformamide	68-12-2	0.112[g]	3×10^{-2}	f	f	3.04	OSHA-PEL: 30 mg/m^3 [8-hr TWA skin][c] ACGIH-TLV: same as above[d] NIOSH-REL: same as above[c]
1,4-Dioxane	123-91-1	0.08[g]	0.28[g]	B2	1.1×10^{-2} (oral)	3.66	OSHA-PEL: 90 mg/m^3[c] [skin] ACGIH-TCV: 90 mg/m^3[d] [skin] NIOSH-REL: 3.6 mg/m^3 [30-minute exposure][c]
Formaldehyde	50-00-0	0.2	0.7[i]	B1	4.5×10^{-2} (inhal); unit risk factor: 1.3 x 10-5 (inhal)	1.2	OSHA-PEL: 0.9 mg/m^3 with a 15-minute STEL of 2.4 mg/m^3[l] ACGIH-TLV: 1.2 mg/m^3[d] NIOSH-REL: limit to lowest feasible level[d]
Hydrogen Cyanide	74-90-8	2×10^{-2}	f	e	e	1.12	OSHA-PEL: 5 mg/m^3 [15-minute STEL] [skin][c] ACGIH-TLV: 11 mg/m^3 [skin][ceiling][d] NIOSH-REL: 5 mg/m^3 [15-min STEL limit][skin][c]
Isopropyl Alcohol	67-63-0	0.202[g]	24.15 (PNL)	e	e	2.50	OSHA-PEL: 980 mg/m^3 [8-hr TWA], 1225 mg/m^3, [15-min STEL limit][c] ACGIH-TLV: 1,000 mg/m^3 and STEL of 1250 mg/m^3[d] NIOSH-REL: same as OSHA[c]
Lead Titanate	12060-00-3	0.0011[h]	f	f	f		OSHA-PEL: 0.05 mg Pb/m^3[d] ACGIH-TLV: 0.15 mg Pb/m^3[d] NIOSH-REL: 0.10mg Pb/m^3[d]

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Footnotes at end of table.

TABLE F–2.—*Exposure Limits*—Continued [Page 3 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)[a]	RfC (mg/m^3) (inhalation)[a]	Cancer Class[b]	Slope Factor $(mg/kg/day)^{-1}$[b]	Conversion Factors (mg/m^3)[c]	Occupational Exposure Levels
Lithium	7439-93-2	f	f	f	f		f
Methylene Chloride	75-09-2	6×10^{-2}[b]	3 *	B2	7.5×10^{-3} (oral) 2.6×10^{-3} (inhal)[k]	3.53	OSHA-PEL: 1765 mg/m^3 [8-hr TWA], 3500 mg/m^3 [ceiling], 7000 mg/m^3 [5-min max peak in any 2 hours][c] ACGIH-TLV: 174 mg/m^3[d] NIOSH-REL: reduce exposure to lowest feasible concentration[c]
4,4 -Methylene Dianiline	101-77-9	7×10^{-4}[h]	under review 2.5×10^{-3}[h]	f	f		ACGIH-TLV: 0.81 mg/m^3 [skin][c]
Methylene Diisocyanate	4747-90-4	f	f	f	f		f
Methyl Ethyl Ketone (2-Butanone)	78-93-3	5×10^{-2} * (withdrawn)	1.0	D	e		OSHA-PEL: 590 mg/m^3 [8-hr TWA], 885 mg/m^3[15-min STEL limit][c] ACGIH-TLV: same as above[d] NIOSH-REL: same as above[c]
Nickel Chloride	7718-54-9	7×10^{-4}[h]	2.45×10^{-3}[h]	f	f		OSHA-PEL: 0.1 mg/m^3[d] ACGIH-TLV: same as above[d] NIOSH-REL: 0.015mg/m^3[d]
Nitric Acid	7697-37-2	0.035[h]	0.123 (PNL)	e	e	2.62	OSHA-PEL: 5 mg/m^3 and a 15-minute STEL 10 mg/m^3[c] NIOSH-REL: same as above[c]
Phenol Isocyanate	f	f	f	f	f	f	f
Thionyl Chloride	7719-09-7	f	f	f	f		OHSA-PEL: 5mg/m^3 [ceiling][l] ACGIH-TLV: same as above[d] NIOSH-REL: same as above[m]

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Footnotes at end of table.

TABLE F–2.—*Exposure Limits*—Continued [Page 4 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)[a]	RfC (mg/m^3) (inhalation)[a]	Cancer Class[b]	Slope Factor $(mg/kg/day)^{-1}$[b]	Conversion Factors (mg/m^3)[c]	Occupational Exposure Levels
Toluene	108-88-3	3.46×10^{-1} #	2.0 (PNL)	D	e	3.83	OSHA-PEL: 375 mg/m^3 [8-hr TWA], 560 mg/m^3 [15-min STEL limit][c] ACGIH-TLV: 383 mg/m^3 [8-hr TWA], 575 mg/m^3 [15-minute STEL][d] NIOSH-REL: same as OSHA[c]
Toluene Diisocyanate	584-84-9	2.8×10^{-4}[h]	9.8×10^{-4}[h]	f	f	7.24	OSHA-PEL: 0.04 mg/m^3 [8-hr TWA], 0.15 mg/m^3 [15-min STEL limit] (for Toluene -2,4-Diisocyanate)[c] ACGIH-TLV: 0.036 mg/m^3, [15-minute STEL 0.14 mg/m^3] (for Toluene -2,4-Diisocyanate)[d] NIOSH-REL: same as OSHA[c]
1,1,1-Trichloroethane	71-55-6	3.5×10^{-2} #	1.0 *	D	e		OSHA-PEL: 1,900 mg/m^3 [15-min STEL 2450 ppm mg/m^3][l] ACGIH-TLV: same as above[d]
1,1,2-Trichloroethane	79-00-5	4×10^{-3}	under review	C	5.7×10^{-2} (inhal)	5.55	OSHA-PEL: 45 mg/m^3 [skin][c] ACGIH-TLV: 55 mg/m^3 [skin][d] NIOSH-REL: same as OSHA[c]
Trichloroethylene	79-01-6	7.35×10^{-3} #	0.046 (PNL)	B2	f	5.46	OSHA-PEL: 270 mg/m^3; STEL 1,080 mg/m^3[l] ACGIH-TLV: same as above[d] NIOSH-REL: 1,365 mg/m^3[d]
Trichlorotrifluor-oethane	76-13-1	3×10^1	105 (PNL)	e	e		OSHA-PEL: 7,600 mg/m^3 with a 15-minute STEL of 9,500 mg/m^3[l] ACGIH-TLV: same as above[d]

E4 3935-4

[a] The majority of the RfD and RfC values in this table are taken from July 1992 versions of the Integrated Risk Information System (IRIS) file for the particular chemical. In a few cases, values were copied from the Health Effects Assessment Summary Tables (HEAST), March 1992 edition. Values from the HEAST tables are denoted with the symbol (*). Values followed by the symbol (#) were taken from the Office of Drinking Water's Health Advisories, issued March 31, 1987. Values followed by PNL were taken from Pacific Northwest Laboratories of Battelle (1991).

[b] Values in the table are taken from the 1992 IRIS.

[c] *NIOSH Pocket Guide to Chemical Hazards*, June 1990; *1991-1991 Threshold Limit Values for Chemical Substances and Physical Agents,* ACGIH, 1991; conversion factors used to convert ppm to mg/m^3.

[d] *Sax's Dangerous Properties of Industrial Materials*, Eighth Edition, 1992.

[e] Not Applicable.

[f] Information is not available.

[g] Derived from LD_{50} in Sax's Eighth Edition, 1992/Registry of Toxic Effects of Chemical Substances (RTECS); calculations from the Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

[h] Derived from TWA value in this table; calculations from the Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

[i] Derived from RfD in this table; calculations from the Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

[j] *Health Effects Assessment Summary Table* (HEAST), 1992.

[k] National Toxicology Program, 1986. NTP-TRS-306.

[l] 29 CFR 1910.1000.

[m] *NIOSH Recommendations for Occupational Safety and Health*, 1992. DHHS No. 92-100.

TABLE F–3.—*Compounds and Processes of Major Concern Because of Their Hazardous Potential*[a]

Compounds	Compound Associated Processes	Use
Methylene Chloride	Support Pads (Sunshine Foam) Optoelectronics CAP Assembly Reservoir Assembly and Testing (in Cee Bee)	Cleaning
Methylene Dianiline	Transducers	Resins/Epoxy Mixtures
Beryllium Compounds (BeO, $BeSO_4$)	Vacuum Induction Melting Machining Technology	Mold/Crucible coatings Parts Manufacturing
Trichloroethylene	Optoelectronics CAP Assembly Transducers Neutron Detectors Round Wire Cables Reservoirs	Degreasing
Toluene Diisocyanate & Methylene Diisocyanate	Lightning Arrestor Connectors	Foam Mixing

E4 3830

[a] Alternative chemicals or reduced levels of these chemicals may be proposed in order to reduce or eliminate the risk to workers (onsite) and/or the public (offsite).

Source: FDI, 1993; KC ASAC, 1993b; WRSC, 1992a–f; LA FDI, 1993; Y-12 DOE, 1992b; SNL, 1992.

TABLE F–4.—*Comparison of Toxic Air Pollutant Concentrations (mg/m^3) to Exposure Limits[a] (mg/m^3) at Kansas City Plant[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1×10^{-2}[c]	0.00014	0.00286	0.00006	0.00108	0.00014	0.00286	0.00006	0.00108
1,1,1-Trichloroethane	1.0	1,910.0	1,910.0	---	0.00497	0.098	0.00188	0.0371	0.00497	0.098	0.00188	0.0371
Acetone	10.5	1,800.0	1,780.0	---	0.00154	0.03047	0.00059	0.01153	0.00162	0.03214	0.00062	0.01216
Dimethylformamide	0.03	30.0	30.0	---	0.00005	0.00095	0.00002	0.00036	0.00005	0.00095	0.00002	0.00036
Isopropyl Alcohol	24.15	980.0	983.0	---	0.00294	0.058	0.0012	0.022	0.00357	0.07051	0.00144	0.02673
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0.00014	0.00286	0.00006	0.00108	0.00014	0.00286	0.00006	0.00108
Methylene Chloride	3.0	1,765.0	174.0	2.6×10^{-3}[e]	0.00077	0.01523	0.00029	0.00577	0.00077	0.01523	0.00029	0.00577
Nitric Acid	0.123	5.0	5.0	---	0.00183	0.03618	0.0007	0.137	0.00183	0.03618	0.0007	0.137
Toluene	2.0	375.0	377.0	---	0.00082	0.0162	0.00031	0.00613	0.00082	0.0162	0.00031	0.00613
Trichlorethylene	0.046	270.0	269.0	4.6×10^{-3}[f]	0.00858	0.16948	0.00325	0.06414	0.00858	0.16948	0.00325	0.06414

E4 4010

a Levels below which there are no adverse health effects.

b All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.

d Cumulative levels reflect the amount of a compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

e Oral value (mg/kg/day).

f Slope factor calculated from unit risk where 1 $\mu g/m^3$ of TCE in air is 1.3×10^{-6} (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

TABLE F–5.—*Comparison of Toxic Air Pollutant Concentrations (mg/m^3) to Exposure Limits[a] (mg/m^3) at Los Alamos National Laboratory[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1×10^{-2}	6.6×10^{-5}	1.8×10^{-3}	6.3×10^{-6}	2.9×10^{-4}	6.6×10^{-5}	1.8×10^{-3}	6.3×10^{-6}	2.9×10^{-4}
Acetone	10.5	1,800.0	1,780.0	---	0.006	0.165	0.0006	0.026	0.006	0.165	0.0006	0.026
Ammonia	0.1	27.0	17.0	---	0.002	0.058	0.0002	0.009	0.002	0.058	0.0002	0.009
Chromium Trioxide	1.23×10^{-2}	0.1	0.05	---	5.5×10^{-7}	1.5×10^{-5}	5.2×10^{-8}	2.4×10^{-6}	5.5×10^{-7}	1.5×10^{-5}	5.2×10^{-8}	2.4×10^{-6}
Dimethylformamide	3.0×10^{-2}	30.0	30.0	---	3.0×10^{-5}	8.3×10^{-4}	2.8×10^{-6}	1.3×10^{-4}	3×10^{-5}	8.3×10^{-4}	2.8×10^{-6}	1.3×10^{-4}
Formaldehyde	0.7	0.9	1.2	4.5×10^{-2}	5.5×10^{-6}	1.5×10^{-4}	5.2×10^{-7}	2.4×10^{-5}	5.5×10^{-6}	1.5×10^{-4}	5.23×10^{-7}	2.4×10^{-4}
Isopropyl Alcohol	24.15	980.0	983.0	---	0.0005	0.013	0.00004	0.002	0.0005	0.013	0.00004	0.002
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0.002	0.049	0.0002	0.008	0.002	0.049	0.0002	0.008
Methylene Chloride	3.0	1,765.0	174.0	2.6×10^{-3}	0.0004	0.011	0.00004	0.002	0.0004	0.011	0.00004	0.002
Nitric Acid	0.123	5.00	5.0	---	0.0009	0.026	0.00009	0.004	0.0009	0.026	0.00009	0.004
Trichloroethylene	0.046	270.0	269.0	4.6×10^{-3}[e]	0.0007	0.019	0.00006	0.003	0.0007	0.019	0.00006	0.003

E4 4011

[a] Levels below which there are no adverse health effects.

[b] All RfC, PEL, TLV and slope factor values in this table were presented in table F5–2.

[c] Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.

[d] Cumulative levels reflect the amount of a compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

[e] Slope factor calculated from unit risk where $1 \mu g/m^3$ of TCE in air is 1.3×10^{-6} (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

TABLE F–6.—*Comparison of Toxic Air Pollutant Concentrations (mg/m^3) to Exposure Limits[a] (mg/m^3) at Rocky Flats Plant[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1×10^{-2}	0	0	0	0	0.00014	0.00635	0.000003	0.00051
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.02	0.873	0.0004	0.07	0.02005	0.87512	0.000401	0.07017
Acetone	10.5	1,800.0	1,780.0	---	0	0	0	0	0.00162	0.072	0.00004	0.00576
Ammonia	0.1	27.0	17.0	---	0.008	0.347	0.0002	0.028	0.008	0.347	0.0002	0.028
Carbon Tetrachloride	0.0025	12.6	31.0	5.3×10^{-2}	0.035	1.567	0.0008	0.125	0.035	1.567	0.0008	0.125
Dimethylformamide	0.03	30.0	30.0	---	0	0	0	0	0.00005	0.00212	0.000001	0.00017
Isopropyl Alcohol	24.15	980.0	983.0	---	0	0	0	0	0.00319	0.142	0.00007	0.01135
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0	0	0	0	0.00014	0.00635	0.000003	0.00051
Methylene Chloride	3.0	1,765.0	174.0	2.6×10^{-3}	0.003	0.148	0.00007	0.012	0.00305	0.15012	0.000071	0.01217
Nitric Acid	0.123	5.0	---	---	0	0	0	0	0.00181	0.08047	0.00004	0.00644
Toluene	2.0	375.0	377.0	---	0	0	0	0	0.00081	0.036	0.00002	0.00288
Trichloroethylene	0.046	270.0	269.0	4.6×10^{-3}[e]	0	0	0	0	0.0009	0.04024	0.00002	0.00322

E4 4012

a Levels below which there are no adverse health effects.
b All RfC, PEL, TLV and slope factor values in this table were presented in table F5–2.
c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.
d Cumulative levels reflect the amount of compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.
e Slope factor calculated from unit risk where 1 $\mu g/m^3$ of TCE in air is 1.3×10^{-6} (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

TABLE F–7.—*Comparison of Toxic Air Pollutant Concentrations (mg/m^3) to Exposure Limits[a] (mg/m^3) at Mound Plant[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1×10^{-2}	0	0	0	0	0.00021	0.00358	0.000003	0.00021
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.0002	0.004	0.000003	0.0002	0.00027	0.00519	0.000004	0.00027
Acetone	10.5	1,800.0	1,780.0	---	0.008	0.143	0.0001	0.008	0.01035	0.18352	0.00014	0.01037
Dimethylformamide	0.03	30.0	30.0	---	0	0	0	0	0.00007	0.00119	0.000001	0.00007
Isopropyl Alcohol	24.15	980.0	983.0	---	0.003	0.052	0.00005	0.003	0.00806	0.139	0.00013	0.00809
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0	0	0	0	0.00021	0.00358	0.000003	0.00021
Methylene Chloride	3.0	1,765.0	174.0	2.6×10^{-3}	0	0	0	0	0.00007	0.00119	0.000001	0.00007
Nitric Acid	0.123	5.0	---	---	0	0	0	0	0.00263	0.04529	0.00004	0.00265
Toluene	2.0	375.0	377.0	---	0	0	0	0	0.00118	0.02026	0.00002	0.00118
Trichloroethylene	0.046	270.0	269.0	4.6×10^{-3}	0	0	0	0	0.00132	0.02264	0.00002	0.00132

E4 4013

a Levels below which there are no adverse health effects.
b All RfC, PEL, TLV and slope factor values in this table were presented in table F5–2.
c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.
d Cumulative levels reflect the amount of a compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

TABLE F–8.—*Comparison of Toxic Air Pollutant Concentrations (mg/m³) to Exposure Limits[a] (mg/m³) at Sandia National Laboratories[b], New Mexico*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.0007	0.014	0.00003	0.0007	0.002	0.047	0.0001	0.0025
Acetone	10.5	1,800.0	1,780.0	---	---	---	---	---	0.002	0.041	0.00008	0.002
Chromium Trioxide	1.23×10^{-2}	0.1	0.05	---	1.3×10^{-6}	2.7×10^{-5}	5.5×10^{-8}	1.4×10^{-6}	1.26×10^{-6}	2.75×10^{-5}	5.49×10^{-8}	1.4×10^{-6}
Methylene Chloride	3.0	1,765.0	174.0	2.6×10^{-3}	---	---	---	---	0.004	0.094	0.0002	0.005
Nickel Chloride	2.45×10^{-3}	0.1	0.1	---	1.4×10^{-6}	3.0×10^{-5}	6.0×10^{-8}	1.6×10^{-6}	1.4×10^{-6}	3.0×10^{-5}	6.0×10^{-8}	1.6×10^{-6}
Toluene	2.0	375.0	377.0	---	0.0005	0.011	0.00002	0.0006	0.0005	0.011	0.00002	0.0006
Trichlorethylene	0.046	270.0	269.0	4.6×10^{-3}[e]	---	---	---	---	0.002	0.051	0.0001	0.003

E4 4014

[a] Levels below which there are no adverse health effects.

[b] All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

[c] Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.

[d] Cumulative levels reflect the amount of compound releaseed from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

[e] Slope factor calculated from unit risk where $1 \mu g/m^3$ of TCE in air is 1.3×10^{-6}, see toxicity profile.

TABLE F–9.—*Comparison of Toxic Air Pollutant Concentrations (mg/m³) to Exposure Limits[a] (mg/m³) at Pinellas Plant[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1×10^{-2}	0	0	0	0	0.00014	0.00241	0.00014	0.00221
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.01646	0.27461	0	0.04	0.01651	0.27541	0.00005	0.04074
Acetone	10.5	1,800.0	1,780.0	---	0.01405	0.23447	0.04869	0.34	0.01559	0.26019	0.05017	0.36354
Ammonia	0.1	27.0	17.0	---	0.00017	0.00282	0.00062	0.00434	0.00017	0.00282	0.00062	0.00434
Dimethylformahide	0.03	30.0	30.0	---	0	0	0	0	0.00005	0.0008	0.00005	0.00074
Isopropyl Alcohol	24.15	980.0	983.0	---	0.00355	0.05915	0.01225	0.08573	0.00687	0.11461	0.01545	0.13649
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0.00008	0.00141	0.00027	0.00187	0.00022	0.00382	0.00041	0.00408
Methylene Chloride	3.0	1,765.0	174.0	2.6×10^{-3}	0.04233	0.70622	0.002	0.06	0.04238	0.70702	0.00205	0.06074
Nickel Chloride	0.00245	0.1	0.1	---	0.00013	0.00211	0.00001	0.0003	0.00013	0.00211	0.00001	0.0003
Nitric Acid	0.123	5.0	---	---	0.00384	0.06407	0	0.005	0.00567	0.09461	0.00176	0.03295
Toluene	2.0	375.0	377.0	---	0.0019	0.03169	0.00657	0.04598	0.00272	0.04535	0.00736	0.05849
Trichlorethylene	0.046	270.0	269.0	4.6×10^{-3}[e]	0.00701	0.11688	0	0.014	0.00793	0.13215	0.00088	0.02798

E4 4015

[a] Levels below which there are no adverse health effects.

[b] All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

[c] Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.

[d] Cumulative levels reflect the amount of compound releaseed from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

[e] Slope factor calculated from unit risk where $1 \mu g/m^3$ of TCE in air is 1.3×10^{-6} (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

TABLE F–10.—*Comparison of Toxic Air Pollutant Concentrations (mg/m^3) to Exposure Limits[a] (mg/m^3) at Savannah River Site[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Trichlorotrifluoroethane	105	7,600	7,600	---	0.007	0.137	0.0001	0.006	0.007	0.137	0.0001	0.006

E4 4016

[a] Levels below which there are no adverse health effects.
[b] All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.
[c] Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.
[d] Cumulative levels reflect the amount of compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

TABLE F–11.—*Comparison of Toxic Air Pollutant Concentrations (mg/m^3) to Exposure Limits[a] (mg/m^3) at Y-12 Plant[b]*

Compound	RfC (Lifetime)	PEL (8 Hr)	TLV (8 Hr)	Slope Factor[c]	No Action Alternative				Cumulative Levels[d]			
					Onsite		Site Boundary		Onsite		Site Boundary	
					(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Beryllium	1.8×10^{-2}	0.002	0.002	---	e	e	e	e	e	e	e	e
Trichlorotrifluoroethane	105	7,600	7,600	---	0.071	0.907	0.002	0.175	0.071	0.907	0.002	0.175

E4 4017

[a] Levels below which there are no adverse health effects.
[b] All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.
[c] Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of $(mg/kg/day)^{-1}$.
[d] Cumulative levels reflect the amount of compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.
[e] Information not available.

TABLE F–12a.—*Hazard Quotients and Hazard Index for Kansas City Plant*

Compound	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0005	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0002	0.0000
1,1,1-Trichloroethane	0.0050	0.0001	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0050	0.0001	0.0019	0.0000
Acetone	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0001	0.0000
Dimethylformamide	0.0017	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0007	0.0000
Isopropyl Alcohol	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000
Methyl Ethyl Ketone	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
Methylene Chloride	0.0003	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0001	0.0001	0.0000
Nitric Acid	0.0149	0.0072	0.0057	0.0274	0.0000	0.0000	0.0000	0.0000	0.0149	0.0072	0.0057	0.0274
Toluene	0.0004	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.0002	0.0000
Trichloroeythlene	0.1865	0.0006	0.0707	0.0002	0.0000	0.0000	0.0000	0.0000	0.1865	0.0006	0.0707	0.0002
Hazard Index	0.2096	0.0082	0.0795	0.0278	3.37×10^{-5} [a]	1.37×10^{-5} [a]	1.28×10^{-5} [a]	5.18×10^{-6} [a]	0.2096	0.0082	0.0795	0.0278

E4 4047

[a] The actual numbers given in the table are slightly greater than zero, resulting in the totals presented.

TABLE F–12b.—*Cancer Risk to Workers and Public at Kansas City Plant*

Compound	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	4.40×10^{-7}	1.89×10^{-7}	0.0000	0.0000	4.40×10^{-7}	1.89×10^{-7}
Methylene Chloride	5.72×10^{-7}	2.15×10^{-7}	0.0000	0.0000	5.72×10^{-7}	2.15×10^{-7}
Trichloroethylene	1.13×10^{-5}	4.27×10^{-6}	0.0000	0.0000	1.13×10^{-5}	4.27×10^{-6}
Total Risk	1.23×10^{-5}	4.68×10^{-6}	0.0000	0.0000	1.23×10^{-5}	4.68×10^{-6}

E4 4048

TABLE F–13a.—*Hazard Quotients and Hazard Index for Los Alamos National Laboratory*

Compound	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Acetone	0.000571	$9x10^{-5}$	$5.7x10^{-5}$	$1.4x10^{-5}$	0	0	0	0	0.000571	$9x10^{-5}$	$5.7x10^{-5}$	$1.4x10^{-5}$
Ammonia	0.02	0.0034	0.002	0.0005	0	0	0	0	0.02	0.0034	0.002	0.0005
Chromium Trioxide	$4.4x10^{-5}$	0.0003	$4x10^{-6}$	$4.8x10^{-5}$	0	0	0	0	$4.4x10^{-5}$	0.0003	$4x10^{-6}$	$4.8x10^{-5}$
Dimethylformamide	0.0010	$3x10^{-5}$	$9.3x10^{-5}$	$4.2x10^{-5}$	0	0	0	0	0.0010	$3x10^{-5}$	$9.3x10^{-5}$	$4.2x10^{-5}$
1,4 Dioxane	0.0002	$2x10^{-5}$	$2.2x10^{-5}$	$3x10^{-6}$	0	0	0	0	0.0002	$2x10^{-5}$	$2.2x10^{-5}$	$3x10^{-6}$
Formaldehyde	$7x10^{-6}$	$1.6x10^{-4}$	$7x10^{-7}$	$2.6x10^{-5}$	0	0	0	0	$7x10^{-6}$	$1.6x10^{-4}$	$7x10^{-7}$	$2.6x10^{-5}$
Isopropyl Alcohol	$2x10^{-5}$	$1.3x10^{-5}$	$1x10^{-6}$	$2x10^{-6}$	0	0	0	0	$2x10^{-5}$	$1.3x10^{-5}$	$1x10^{-6}$	$2x10^{-6}$
Methylene Chloride	0.0001	$6.3x10^{-5}$	$1x10^{-5}$	$1.1x10^{-5}$	0	0	0	0	0.0001	$6.3x10^{-5}$	$1x10^{-5}$	$1.1x10^{-5}$
Trichloroethylene	0.0152	$6.9x10^{-5}$	0.0013	$1.1x10^{-5}$	0	0	0	0	0.0152	$6.9x-10^{-5}$	0.0013	$1.1x10^{-5}$
Methyl Ethyl Ketone	0.002	$8.3x10^{-5}$	0.0002	$1.3x10^{-5}$	0	0	0	0	0.002	$8.3x10^{-5}$	0.0002	$1.3x10^{-5}$
Nitric Acid	0.0073	0.0050	0.0007	0.0008	0	0	0	0	0.0073	0.0050	0.0007	0.0008
Hazard Index	0.0464	0.0092	0.0044	0.0015	0	0	0	0	0.0464	0.0092	0.0044	0.0015

E4 4049

TABLE F–13b.—*Cancer Risk to Workers and Public at Los Alamos National Laboratory*

Compound	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	$2.08x10^{-7}$	$1.98x10^{-8}$	0	0	$2.08x10^{-7}$	$1.98x10^{-8}$
Formaldehyde	$7.10x10^{-8}$	$6.72x10^{-9}$	0	0	$7.10x10^{-8}$	$6.72x10^{-9}$
Methylene chloride	$1.83x10^{-7}$	$1.83x10^{-8}$	0	0	$1.83x10^{-7}$	$1.83x10^{-8}$
Trichloroethylene	$1.0x10^{-6}$	$7.9x10^{-7}$	0	0	$1.0x10^{-6}$	$7.9x10^{-7}$
Total Risk	$1.46x10^{-6}$	$8.35x10^{-7}$	0	0	$1.46x10^{-6}$	$8.35x10^{-7}$

E4 4050

TABLE F–14a.—*Hazard Quotients and Hazard Index for Rocky Flats Plant*

Compound	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0000	0.0000	0.0000	0.0000	0.0005	0.0001	0.0000	0.0000	0.0005	0.0001	0.0000	0.0000
1,1,1,-Trichloroethane	0.0200	0.0005	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0201	0.0005	0.0004	0.0000
Acetone	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Ammonia	0.0800	0.0204	0.0020	0.0016	0.0000	0.0000	0.0000	0.0000	0.0800	0.0204	0.0020	0.0016
Carbon Tetrachloride	14.0000	0.1244	0.3200	0.0099	0.0000	0.0000	0.0000	0.0000	14.0000	0.1244	0.3200	0.0099
Dimethylformamide	0.0000	0.0000	0.0000	0.0000	0.0017	0.0001	0.0000	0.0000	0.0017	0.0001	0.0000	0.0000
Isopropyl Alcohol	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
Methyl Ethyl Ketone	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
Methylene Chloride	0.0010	0.0009	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0010	0.0009	0.0000	0.0001
Nitric Acid	0.0000	0.0000	0.0000	0.0000	0.0147	0.0161	0.0003	0.0013	0.0147	0.0161	0.0003	0.0013
Toluene	0.0000	0.0000	0.0000	0.0000	0.0004	0.0001	0.0000	0.0000	0.0004	0.0001	0.0000	0.0000
Trichloroethylene	0.0000	0.0000	0.0000	0.0000	0.0196	0.0001	0.0004	0.0000	0.0196	0.0001	0.0004	0.0000
Hazard Index	14.1010	0.1461	0.3224	0.0117	0.0373	0.0167	0.0008	0.0013	14.1383	0.1628	0.3232	0.0130

E4 4051

TABLE F–14b.—*Cancer Risk to Workers and Public at Rocky Flats Plant*

Compound	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	0.0000	0.0000	4.40×10^{-7}	9.43×10^{-9}	4.40×10^{-7}	9.43×10^{-9}
Carbon Tetrachloride	5.30×10^{-4}	1.21×10^{-5}	0.0000	0.0000	5.30×10^{-4}	1.21×10^{-5}
Methylene Chloride	2.23×10^{-6}	5.20×10^{-8}	3.71×10^{-8}	7.43×10^{-10}	2.27×10^{-6}	5.27×10^{-8}
Trichloroethylene	0.0000	0.0000	1.18×10^{-6}	2.63×10^{-8}	1.18×10^{-6}	2.63×10^{-8}
Total Risk	5.32×10^{-4}	1.22×10^{-5}	1.66×10^{-6}	3.65×10^{-8}	5.34×10^{-4}	1.22×10^{-5}

E4 4052

TABLE F–15a.—*Hazard Quotients and Hazard Index for Mound Plant*

Compound	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000
1,1,1-Trichloroethane	0.0002	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000
Acetone	0.0008	0.0001	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0010	0.0001	0.0000	0.0000
Dimethylformamide	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000
Isopropyl Alcohol	0.0001	0.0001	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000	0.0003	0.0001	0.0000	0.0000
Methyl Ethyl Ketone	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Methylene Chloride	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitric Acid	0.0000	0.0000	0.0000	0.0000	0.0214	0.0091	0.0003	0.0005	0.0214	0.0091	0.0003	0.0005
Toluene	0.0000	0.0000	0.0000	0.0000	0.0006	0.0001	0.0000	0.0000	0.0006	0.0001	0.0000	0.0000
Trichloroeythlene	0.0000	0.0000	0.0000	0.0000	0.0287	0.0001	0.0004	0.0000	0.0287	0.0001	0.0004	0.0000
Hazard Index	0.0011	0.0001	0.0000	0.0000	0.0545	0.0094	0.0008	0.0006	0.0556	0.0095	0.0008	0.0006

E4 4053

TABLE F–15b.—*Cancer Risk to Workers and Public at Mound Plant*

Compound	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	0.0000	0.0000	6.60×10^{-7}	9.43×10^{-9}	6.60×10^{-7}	9.43×10^{-9}
Methylene Chloride	0.0000	0.0000	5.20×10^{-8}	7.43×10^{-10}	5.20×10^{-8}	7.43×10^{-10}
Trichloroethylene	0.0000	0.0000	1.73×10^{-6}	2.63×10^{-8}	1.73×10^{-6}	2.63×10^{-8}
Total Risk	0.0000	0.0000	2.45×10^{-6}	3.65×10^{-8}	2.45×10^{-6}	3.65×10^{-8}

E4 4081

TABLE F–16.—*Hazard Quotients and Hazard Index for Savannah River Site*

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**
Trichlorotrifluor-oethane	6.67×10^{-5}	1.80×10^{-5}	9.52×10^{-7}	7.89×10^{-7}	0	0	0	0	6.67×10^{-5}	1.80×10^{-5}	9.52×10^{-7}	7.89×10^{-7}
Hazard Index	6.67×10^{-5}	1.80×10^{-5}	9.52×10^{-7}	7.89×10^{-7}	0	0	0	0	6.67×10^{-5}	1.80×10^{-5}	9.52×10^{-7}	7.89×10^{-7}

E4 4054

TABLE F–17.—*Hazard Quotients and Hazard Index for Y-12 Plant*

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**	**(Annual)**	**(8 Hr)**
Chlorine	0.0179	0.00638	5.13×10^{-4}	0.00133	0	0	0	0	0.0179	0.00638	5.13×10^{-4}	0.00133
Trichlorotrifluor-oethane	6.76×10^{-4}	1.19×10^{-4}	1.90×10^{-5}	2.30×10^{-5}	0	0	0	0	6.76×10^{-4}	1.19×10^{-4}	1.90×10^{-5}	2.30×10^{-5}
Hazard Index	0.0186	0.0065	5.32×10^{-4}	0.0014	0	0	0	0	0.0186	0.0065	5.32×10^{-4}	0.0014

E4 4055

TABLE F–18a.—*Hazard Quotients and Hazard Index for Sandia National Laboratories, New Mexico*

Compound	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Acetone	0	0	0	0	0.0002	$2.3x10^{-5}$	$7x10^{-6}$	$1x10^{-6}$	0.0002	$2.3x10^{-5}$	$7x10^{-6}$	$1x10^{-6}$
Chromium Trioxide	0.0001	$5.5x10^{-4}$	$4x10^{-6}$	$2.8x10^{-5}$	0	0	0	0	0.0001	$5.5x10^{-4}$	$4x10^{-6}$	$2.8x10^{-5}$
Methylene Chloride	0	0	0	0	0.0013	0.0005	$6.6x10^{-5}$	$2.8x10^{-5}$	0.0013	0.0005	$6.6x10^{-5}$	$2.8x10^{-5}$
Nickel Chloride	0.0006	$2.9x10^{-5}$	$2.4x10^{-5}$	$1x10^{-6}$	0	0	0	0	0.0006	$2.9x10^{-5}$	$2.4x10^{-5}$	$1x10^{-6}$
Toluene	0.0003	$2.9x10^{-5}$	$1x10^{-5}$	$1x10^{-6}$	0	0	0	0	0.0003	$2.9x10^{-5}$	$1x10^{-5}$	$1x10^{-6}$
1,1,1–Trichloroethane	0.0007	$7x10^{-6}$	$3x10^{-5}$	$3.7x10^{-7}$	0.0013	$1.7x10^{-5}$	$7x10^{-5}$	$9.4x10^{-7}$	0.002	$2.4x10^{-5}$	0.0001	$1x10^{-6}$
Trichlorethylene	0	0	0	0	0.0435	0.0002	0.0022	$1.1x10^{-5}$	0.0435	0.0002	0.0022	$1.1x10^{-5}$
Hazard Index	0.0017	$6.2x10^{-4}$	$6.8x10^{-5}$	$3.0x10^{-5}$	0.0463	$7.4x10^{-4}$	0.0023	$4.1x10^{-5}$	0.0479	0.0014	0.0024	$7.1x10^{-5}$

E4 4056

TABLE F–18b.—*Cancer Risk to Workers and Public at Sandia National Laboratories, New Mexico*

Compound	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
Methylene Chloride	0	0	$3.0x10^{-6}$	$1.5x10^{-7}$	$3.0x10^{-6}$	$1.5x10^{-7}$
Trichlorethylene	0	0	$2.7x10^{-6}$	$1.3x10^{-7}$	$2.7x10^{-6}$	$1.3x10^{-7}$
Total Risk	0	0	$6.0x10^{-6}$	$3.0x10^{-7}$	$6.0x10^{-6}$	$3.0x10^{-7}$

E4 4057

TABLE F–19a.—*Hazard Quotients and Hazard Index for Pinellas Plant*

Compound	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005	0.0000
1,1,1-Trichloroethane	0.0165	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0165	0.0001	0.0001	0.0000
Acetone	0.0013	0.0001	0.0046	0.0002	0.0001	0.0000	0.0001	0.0000	0.0015	0.0001	0.0048	0.0002
Ammonia	0.0017	0.0002	0.0062	0.0003	0.0000	0.0000	0.0000	0.0000	0.0017	0.0002	0.0062	0.0003
Dimethylformamide	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0017	0.0000	0.0017	0.0000	0.0017	0.0000
Isopropyl Alcohol	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	0.0001	0.0006	0.0001
Methyl Ethyl Ketone	0.0001	0.0000	0.0003	0.0000	0.0001	0.0000	0.0001	0.0000	0.0002	0.0000	0.0004	0.0000
Methylene Chloride	0.0141	0.0041	0.0007	0.0003	0.0000	0.0000	0.0000	0.0000	0.0141	0.0041	0.0007	0.0003
Nickel Chloride	0.0531	0.0211	0.0041	0.0030	0.0000	0.0000	0.0000	0.0000	0.0531	0.0211	0.0041	0.0030
Nitric Acid	0.0312	0.0128	0.0000	0.0010	0.0149	0.0061	0.0143	0.0056	0.0461	0.0189	0.0143	0.0066
Toluene	0.0010	0.0001	0.0033	0.0001	0.0004	0.0000	0.0004	0.0000	0.0014	0.0001	0.0037	0.0002
Trichloroeythlene	0.1524	0.0004	0.0000	0.0001	0.0200	0.0001	0.0191	0.0001	0.1724	0.0005	0.0191	0.0001
Hazard Index	0.2715	0.0390	0.0196	0.0051	0.0379	0.0063	0.0365	0.058	0.3094	0.0453	0.0561	0.0109

E4 4058

TABLE F–19b.—*Cancer Risk to Workers and Public at Pinellas Plant*

Compound	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	0.0000	0.0000	4.40×10^{-7}	4.40×10^{-7}	4.40×10^{-7}	4.40×10^{-7}
Methylene Chloride	3.14×10^{-5}	1.49×10^{-6}	3.71×10^{-8}	3.71×10^{-8}	3.15×10^{-5}	1.52×10^{-6}
Trichloroethylene	9.21×10^{-6}	0.0000	1.21×10^{-6}	1.16×10^{-6}	1.04×10^{-5}	1.16×10^{-6}
Total Risk	4.07×10^{-5}	1.49×10^{-6}	1.69×10^{-6}	1.63×10^{-6}	4.23×10^{-5}	3.12×10^{-6}

E4 4059

TABLE F–20.—*Excess Cancer Mortality Estimates from a Single Exposure of 10 Rem; Lifetime Risks per 100,000 Exposed Persons*

Sex	Type of Cancer		
	Leukemia[a]	Cancers Other Than Leukemia	Total Cancers
Male	220	660	880
Female	160	730	890
Average	190	695	885

E4 4061

[a] These are the linear estimates, and are double the linear-quadratic estimates provided in BEIR V for leukemia at low doses and dose-rates.

APPENDIX G

[redacted]

APPENDIX G: FEDERAL AGENCIES, STATES, AND NATIVE AMERICAN COMMENTS AND RESPONSES

G.1 INTRODUCTION

The Department of Energy (DOE), has complied with the *National Environmental Policy Act* (NEPA) mandate of public participation in the Environmental Assessment (EA) analysis process (40 CFR 1506.6) and DOE NEPA regulations 57 FR 1522 section 1021.301 (d) April 24, 1992, to be codified at 10 CFR 1021. Copies of the Preapproval Review Copy of the Nonnuclear Consolidation Environmental Assessment were distributed on December 22, 1992 to various Federal agencies, states, elected officials, and Native American groups for review and comment. The comment period was open until January 29, 1993; however, comments were accepted as late as March 1993.

During the comment review period, a total of 19 documents were received from government agencies and officials, as well as from one Native American group.

G.2 ORGANIZATION

This appendix has been organized into the following sections:

- A list of issue categories, index of commenters, and tables cross referencing comments, responses and documents.
- Comment summaries and responses by category.
- Documents received during the review and comment process.
- Distribution list by Federal agencies, states, and Native American groups.

As each of the 19 documents were received, comments were identified, summarized, and numbered sequentially within one of each of 21 Issue Categories (see table G-1). No comments were received on Issue Categories 3, 5, 17, 18, 19, and 20. For each comment summary, the number of comments covered by the summary and the document numbers where the comments originated are indicated with the response. For example, Comment Summary 1.3 refers to comment number 3 in Issue Category 1, "Proposed Action and Alternatives." A reader who wishes to read the entire document submitted by a commenter may turn to the photocopy of the document included in this appendix.

Table G-2 includes the name of the commenters, the document numbers that have been assigned to each document, and the page number where the photocopy of the document is presented.

Two tables, G–3 and G–4, are provided to aid the reader in tracking comments and responses with the documents and issue categories. Table G–3 is organized by document and G–4 by Issue Category. Detailed instructions for use precede each table.

TABLE G–1.—*Issue Categories*

Issue Codes	Issue Areas
1	Proposed Action and Alternatives
2	Land Resources
3	Air Quality and Noise
4	Water Resources
5	Geology and Soils
6	Biotic Resources
7	Cultural Resources
8	Socioeconomics and Community Services
9	Waste Management
10	Human Health: Facility Operation and Accidents
11	Decontamination and Decommissioning
12	Intersite Transportation
13	General/Miscellaneous Environmental Comments
14	NEPA Process and Regulatory Compliance
15	National Nuclear Weapons Policies
16	Relationship to Other DOE Programs and Activities
17	Public Involvement and Community Relations
18	Conflicts with Social Issues
19	Editorial Comments
20	General/Miscellaneous Comment
21	Support Of or Opposition To DOE Policy

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TABLE G–2.—*Index of Commenters* [Page 1 of 2]

Nonnuclear Consolidation EA Preapproval Review Commenters		
Document Number	**Commenter Information**	**Page Number**
EA-S-001	Lois Pohl Coordinator Missouri Clearinghouse Office of Administration Jefferson City, MO	G-43
EA-S-002	Andreas Mager, Jr. Assistant Regional Director Habitat Conservation Division National Marine Fisheries Service, SE Region St. Petersburg, FL	G-43
EA-S-003	Ian Hill Intergovernmental Review Coordinator South Carolina Department of Archives and History State Historic Preservation Office Columbia, SC	G-44
EA-S-004	Walter Dasheno Governor Santa Clara Indian Pueblo Española, NM	G-44
EA-S-005	Coordinator Ohio Clearinghouse Columbus, OH	G-46
EA-S-006	Donald R. Schregardus Director Hazardous Waste Facility Board Environmental Protection Agency Columbus, OH	G-56
EA-S-007	David K. Coburn Director Office of Planning and Budgeting Office of the Governor Tallahassee, FL	G-58
EA-S-008	Shirley D. Gooding Florida Department of Labor and Employment Security Office of the Secretary Tallahassee, FL	G-59
EA-S-009	Greg Farmer Secretary of Commerce Florida Department of Commerce Tallahassee, FL	G-60
EA-S-010	Estus Whitfield Deputy Director Florida State Clearinghouse Executive Office of the Governor Tallahassee, FL	G-61

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TABLE G–2.—*Index of Commenters* [Page 2 of 2]

Nonnuclear Consolidation EA Preapproval Review Commenters		
Document Number	**Commenter Information**	**Page Number**
EA-S-011	Margaret Dubas Staff Assistant Colorado State Clearinghouse Denver, CO	G-61
EA-S-012	Robert W. King, Jr. Assistant Deputy Commissioner South Carolina Department Health and Environmental Control Columbia, SC	G-62
EA-S-013	Larry Weaver State/Federal Fund Coordinator State Clearinghouse Budget and Management Office Columbus, OH	G-62
EA-S-014	Julie Quinlan Ohio Historic Preservation Office Ohio Historical Center Columbus, OH	G-63
EA-S-015	Roger Suppes Chief Health Department Environmental Health Division Columbus, OH	G-64
EA-S-016	Linda Nusbaum Ohio Department of Education Columbus, OH	G-64
EA-S-017	John Zemp, Jr. Supervisor Office of the Governor Grant Services Unit Columbia, SC	G-65
EA-S-018	Bruce A. Swanton Program Manager Hazardous and Radioactive Materials Bureau Environment Department Santa Fe, NM	G-70
EA-S-019	Roy Romer Governor State of Colorado Denver, CO	G-71

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TABLE G–3.—*Comments and Responses Sorted by Document* [Page 1 of 2]

This table is provided to assist readers in relating all comment summaries and responses to the submitted documents. Column 1 and 2 identify the document and comment numbers. Column 3 provides the issue code category of the comment. Column 4 provides the page location of the Comment Summary and Response. Column 5 provides the page number of the actual comment submitted.

Document Number	Comment Number	Issue Code	Summary Page Number	Comment Letter Page Number
EA-S-002	1	6.1	G-22	G-43
EA-S-004	1	10.1	G-28	G-44
EA-S-004	2	13.1	G-32	G-44
EA-S-004	3	7.1	G-22	G-44
EA-S-004	4	7.1	G-22	G-44
EA-S-004	5	9.1	G-24	G-44
EA-S-004	5A	9.10	G-28	G-44
EA-S-004	5B	13.2	G-33	G-44
EA-S-004	6	15.1	G-35	G-44
EA-S-004	7	15.2	G-36	G-45
EA-S-004	8	10.1	G-28	G-45
EA-S-004	9	15.2	G-36	G-45
EA-S-004	10	7.1	G-22	G-45
EA-S-005	1A	10.7	G-31	G-46
EA-S-005	1B	8.4	G-24	G-47
EA-S-005	2	15.3	G-36	G-47
EA-S-005	3	12.1	G-32	G-47
EA-S-005	4	10.2	G-29	G-47
EA-S-005	5	10.3	G-29	G-47
EA-S-005	6	8.3	G-23	G-47
EA-S-005	7	2.1	G-21	G-48
EA-S-005	9	14.1	G-33	G-49
EA-S-005	10	15.7	G-37	G-49
EA-S-005	11	14.4	G-34	G-50
EA-S-005	12	1.4	G-18	G-50
EA-S-005	12A	1.9	G-21	G-51
EA-S-005	13	21.3	G-40	G-51
EA-S-005	14	1.1	G-10	G-51
EA-S-005	15	1.2	G-18	G-52
EA-S-005	16	9.2	G-25	G-52
EA-S-005	17	8.3	G-23	G-52
EA-S-005	18	21.4	G-40	G-52
EA-S-005	19	14.2	G-33	G-52
EA-S-005	20	14.4	G-34	G-53
EA-S-005	20A	1.7	G-20	G-53
EA-S-005	21	15.4	G-36	G-53
EA-S-005	22	9.3	G-25	G-53
EA-S-005	22A	11.1	G-31	G-53
EA-S-005	23	8.3	G-23	G-53
EA-S-005	24	15.6	G-37	G-53
EA-S-005	25	15.5	G-37	G-53
EA-S-005	26	21.3	G-40	G-53

TABLE G–3.—*Comments and Responses Sorted by Document*–Continued [Page 2 of 2]

Document Number	Comment Number	Issue Code	Summary Page Number	Comment Letter Page Number
EA-S-005	27	1.8	G-20	G-54
EA-S-005	28	10.5	G-30	G-54
EA-S-005	29	4.1	G-21	G-54
EA-S-005	30	10.6	G-30	G-54
EA-S-005	31	1.2	G-18	G-54
EA-S-005	32	1.3	G-18	G-54
EA-S-005	33	1.5	G-19	G-55
EA-S-005	34	15.5	G-37	G-55
EA-S-005	35	7.2	G-22	G-55
EA-S-006	1	1.1	G-10	G-56
EA-S-006	2	8.4	G-24	G-56
EA-S-006	3	21.1	G-39	G-56
EA-S-006	4	1.3	G-18	G-56
EA-S-006	5	15.6	G-37	G-56
EA-S-006	6	1.5	G-19	G-56
EA-S-006	7	1.1	G-10	G-57
EA-S-006	8	9.2	G-25	G-57
EA-S-006	9	8.3	G-23	G-57
EA-S-006	10	21.2	G-39	G-57
EA-S-006	11	15.7	G-37	G-57
EA-S-007	1	8.1	G-23	G-58
EA-S-007	2	8.2	G-23	G-58
EA-S-008	1	8.2	G-23	G-59
EA-S-009	1	14.3	G-34	G-60
EA-S-009	2	8.5	G-24	G-60
EA-S-012	1	10.4	G-30	G-62
EA-S-018	1	9.4	G-26	G-70
EA-S-018	2	9.5	G-26	G-70
EA-S-018	3	9.6	G-26	G-70
EA-S-018	4	9.7	G-27	G-71
EA-S-018	5	9.8	G-27	G-71
EA-S-018	6	9.9	G-27	G-71
EA-S-019	1	16.1	G-38	G-71
EA-S-019	2	15.8	G-38	G-71
EA-S-019	3	14.5	G-34	G-72
EA-S-019	4	14.6	G-35	G-72
EA-S-019	5	11.2	G-32	G-72
EA-S-019	6	1.6	G-20	G-72
EA-S-019	7	15.9	G-38	G-72

TABLE G–4.—*Comments and Responses Sorted by Issue Category* [Page 1 of 3]

This table is provided to assist readers in relating all comments within issue categories to submitted documents. Column 1 identifies the issue code for each summary and response. Columns 2 and 3 provide the document and comment number. Column 4 provides the page location of the Comment Summary and Responses. Column 5 provides the page number of the actual comment submitted.

Issue Code	Document Number	Comment Number	Summary Page Number	Document Page Number
Proposed Action and Alternatives				
1.1	EA-S-005	14	G-10	G-51
	EA-S-006	1	G-10	G-56
	EA-S-006	7	G-10	G-57
1.2	EA-S-005	15	G-18	G-52
	EA-S-005	31	G-18	G-54
1.3	EA-S-005	32	G-18	G-54
	EA-S-006	4	G-18	G-56
1.4	EA-S-005	12	G-18	G-50
1.5	EA-S-005	33	G-19	G-55
	EA-S-006	6	G-19	G-56
1.6	EA-S-019	6	G-20	G-72
1.7	EA-S-005	20A	G-20	G-53
1.8	EA-S-005	27	G-20	G-54
1.9	EA-S-005	12A	G-21	G-51
Land Resources				
2.1	EA-S-005	7	G-21	G-48
Water Resources				
4.1	EA-S-005	29	G-21	G-54
Biotic Resources				
6.1	EA-S-002	1	G-22	G-43
Cultural Resources				
7.1	EA-S-004	10	G-22	G-45
	EA-S-004	3	G-22	G-44
	EA-S-004	4	G-22	G-44
7.2	EA-S-005	35	G-22	G-55
Socioeconomics and Community Services				
8.1	EA-S-007	1	G-23	G-58
8.2	EA-S-007	2	G-23	G-58
	EA-S-008	1	G-23	G-59
8.3	EA-S-005	17	G-23	G-52
	EA-S-005	23	G-23	G-53
	EA-S-005	6	G-23	G-47
	EA-S-006	9	G-23	G-57
8.4	EA-S-005	1B	G-24	G-47
	EA-S-006	2	G-24	G-56
8.5	EA-S-009	2	G-24	G-60

TABLE G–4.—*Comments and Responses Sorted by Issue Category*–Continued [Page 2 of 3]

Issue Code	Document Number	Comment Number	Summary Page Number	Document Page Number
Waste Management				
9.1	EA-S-004	5	G-24	G-44
9.2	EA-S-005	16	G-25	G-52
	EA-S-006	8	G-25	G-57
9.3	EA-S-005	22	G-25	G-53
9.4	EA-S-018	1	G-26	G-70
9.5	EA-S-018	2	G-26	G-70
9.6	EA-S-018	3	G-26	G-70
9.7	EA-S-018	4	G-27	G-71
9.8	EA-S-018	5	G-27	G-71
9.9	EA-S-018	6	G-27	G-71
9.10	EA-S-004	5A	G-28	G-44
Human Health: Facility Operation and Accident				
10.1	EA-S-004	1	G-28	G-44
	EA-S-004	8	G-28	G-45
10.2	EA-S-005	4	G-29	G-47
10.3	EA-S-005	5	G-29	G-47
10.4	EA-S-012	1	G-30	G-62
10.5	EA-S-005	28	G-30	G-54
10.6	EA-S-005	30	G-30	G-54
10.7	EA-S-005	1A	G-31	G-46
Decontamination and Decommissioning				
11.1	EA-S-005	22A	G-31	G-53
11.2	EA-S-019	5	G-32	G-72
Intersite Transportation				
12.1	EA-S-005	3	G-32	G-47
General/Miscellaneous Environmental Comments				
13.1	EA-S-004	2	G-32	G-44
13.2	EA-S-004	5B	G-33	G-44
NEPA Process and Regulatory Compliance				
14.1	EA-S-005	9	G-33	G-49
14.2	EA-S-005	19	G-33	G-52
14.3	EA-S-009	1	G-34	G-60
14.4	EA-S-005	11	G-34	G-50
	EA-S-005	20	G-34	G-53
14.5	EA-S-019	3	G-34	G-72
14.6	EA-S-019	4	G-35	G-72
National Nuclear Weapons Policies				
15.1	EA-S-004	6	G-35	G-45
15.2	EA-S-004	7	G-36	G-45
	EA-S-004	9	G-36	G-45
15.3	EA-S-005	2	G-36	G-47

TABLE G–4.—*Comments and Responses Sorted by Issue Category*–Continued [Page 3 of 3]

Issue Code	Document Number	Comment Number	Summary Page Number	Document Page Number
National Nuclear Weapons Policies (continued)				
15.4	EA-S-005	21	G-36	G-53
15.5	EA-S-005	25	G-37	G-53
	EA-S-005	34	G-37	G-55
15.6	EA-S-005	24	G-37	G-53
	EA-S-006	5	G-37	G-56
15.7	EA-S-005	10	G-37	G-49
	EA-S-006	11	G-37	G-57
15.8	EA-S-019	2	G-38	G-71
15.9	EA-S-019	7	G-38	G-72
Relationship to Other DOE Programs and Activities				
16.1	EA-S-019	1	G-38	G-71
Support Of or Opposition To DOE Policy				
21.1	EA-S-006	3	G-39	G-56
21.2	EA-S-006	10	G-39	G-57
21.3	EA-S-005	13	G-40	G-51
	EA-S-005	26	G-40	G-53
21.4	EA-S-005	18	G-40	G-52

G.3 COMMENT SUMMARIES AND RESPONSES

1 Proposed Action and Alternatives

1.1 NEPA, the CEQ, and Executive Order #11988 require that reasonable alternatives be considered throughout the process. The separation of tritium-related activities from the EA process has been inappropriate from the beginning. Evaluation of the impact of transferring these activities ought to have been included in the EA. Certain alternatives including the two-site consolidation option and the tritium consolidation option were defined as unreasonable and eliminated from consideration as a result of the use of biased and/or flawed data from the NCP report and through the subjective disregard of expert input relative to environmental impact of tritium consolidation at Mound. DOE disregarded the tritium consolidation at Mound in the face of recent information which concluded that consolidation of tritium activities at either SRS or Mound would fall within DOE safety goals. This example and the funding of capital projects at SRS creates a strong appearance that DOE began the NCP process with a predisposition to consolidate tritium-related activities at SRS.

No. of Comments 3 Document No. 005, 006

Response: *The Cost Effectiveness Report, along with its input data, was reviewed by three independent consultants to the Department of Energy. Their analysis concluded that: the proposed consolidation of nonnuclear activities is cost effective and reasonable; and the proposed consolidation of nonnuclear activities will not increase the technological, environmental, safety, or health risks associated with Departmental facilities.*

Consolidation of tritium functions at Mound and the two-site alternatives are considered unreasonable. Sections 1.6, 1.8, and 3.1.4 have been revised to provide additional discussion of (1) why these alternatives have been eliminated from further consideration and (2) why the analysis in the EA is not sensitive to assumptions concerning workload. The funding of capital projects at SRS is based upon the need for SRS to meet existing mission requirements.

Consolidation of tritium-handling functions has not been separated from the EA process. The Proposed Action and each of the alternatives include consideration of tritium-handling. For the Mound alternative, tritium- handling would remain at Mound. For the Proposed Action and other alternatives, tritium-handling currently at Mound would be transferred to SRS. The environmental impacts of each of these alternatives are fully discussed in the EA.

Tritium consolidation at Mound as an option in the Nonnuclear Consolidation EA was eliminated based on cost and not environmental issues (section 3.1.4). The "Mound Tritium Feasibility Study" (MLM-ML-92-47-0001), August 1992 was prepared by EG&G Mound and the "Tritium Consolidation Comparison Study: Cost Analysis" (DOE/DP-0110P), December 1992 was prepared by DOE. The "Tritium Consolidation Comparison Study: Cost Analysis" compared the Mound Tritium option identified in the

Mound Tritium Feasibility Study with the SRS option as defined in the Proposed Action of the EA. Conclusions of the cost analysis study supported the decision to eliminate the Mound tritium consolidation option.

Analysis of Tritium Consolidation Option at Mound: *Environmental impacts of tritium operations at Mound were initially evaluated in the "Final Environmental Impact Statement for Mound" issued June 1979. The analysis covered the impact of tritium operations during normal operations and estimated potential impacts of a bounding credible accident. In 1985, the incremental impacts of tritium systems that had been constructed, as well as future T Building tritium operations were analyzed in the "Treatise on the Environmental Impact Resulting from Mound's Technical (T) Building Tritium Operations." This document was used to form the basis for the Memorandum-to-File issued July 3, 1985, which documented the determination that no additional NEPA documentation would be required for the proposed tritium projects. The 1985 NEPA Analysis concluded that the T Building tritium operations would result in a total incremental routine airborne tritium release of 1,825 curies per year. Using the actual airborne tritium releases from other Mound operations, the 1985 NEPA Analysis concluded that the T Building operations would increase the Mound routine tritium airborne releases to a total of 5,255 curies per year, approximately 7 percent greater than the lower limit cited in the 1979 Final Environmental Impact Statement.*

Additional environmental analysis concerning tritium and the T Building "C-2 Analysis of Environmental Effects of the Nuclear Facilities Modernization Project" (Draft) was prepared in April 1991 to support a DOE determination as to whether earlier NEPA documentation should be supplemented. The C-2 Analysis indicated that the potential impacts associated with the current and projected Mound tritium operations were adequately bounded by the existing environmental impacts analyzed in the 1979 Final Environmental Impact Statement for Mound, and that no supplemental NEPA documentation was needed. The C-2 analysis was not finalized however since the project was determined to meet eligibility criteria for categorical exclusion under Subpart D of DOE's NEPA implementing procedures and guidelines (10 CFR 1021).

Nevertheless, in response to the above comment DOE has prepared a brief analysis of environmental impacts of tritium consolidation at Mound based on the information contained in the previously discussed studies. These studies present a conservative case analysis; actual impacts predicted in this analysis would probably be less. The following discussion presents a brief description of the proposed tritium consolidation option, the affected environment, and the environmental consequences of the action. In addition to the "Mound Tritium Feasibility Study" and the "Tritium Consolidation Comparison Study: Cost Analysis," a comparison study of the radiological risk to the public from consolidating tritium activities at either Mound or SRS was evaluated in a separate study issued by DOE "Tritium Consolidation Comparison Study: Risk Analysis" (DOE/OP/00248-H1), December 1992. The health effects and intersite transportation risks due to shipments of tritium discussed in the following analysis use assumptions, analysis, and conclusions presented in this study.

Project Description: *The tritium consolidation option at Mound would transfer some mission activities from SRS to Mound, expand the capabilities of some existing tritium activities at Mound and potentially move some tritium activities from the Semi Works (SW) Building and Research (R) Building to the T Building at Mound. No new construction would be required to accommodate the tritium consolidation. Existing space within the T Building would be renovated to accept additional glove boxes and associated operational and support equipment.*

All of the activities necessary for tritium consolidation at Mound are currently performed at Mound, but most would require expanded capacity and/or upgraded capability to accommodate the projected increased workload. All consolidated tritium activities at Mound would be located in the T Building, which utilizes a tertiary confinement system for tritium releases. A summary of the existing capabilities and required modifications to achieve tritium consolidation at Mound can be found in appendix A of the "Tritium Consolidation Comparison Study: Cost Analysis."

Affected Environment: *The affected environment at Mound for the tritium consolidation option would be the same as that presented in the Nonnuclear Consolidation EA. Section 4.1.6 of the EA presents the environmental baseline conditions at Mound for the following issues: land resources; air quality and acoustics; water resources; geology and soils; biotic resources; cultural resources; socioeconomic and community services; waste management; and human health. Section 4.5 of the EA discusses the tritium intersite transportation issue.*

Environmental Consequences: *Only interior building modifications would be required and equipment added to the T Building to meet the expected workload requirements under the tritium consolidation option at Mound. No new exterior construction would be required, and no land disturbance would occur. The tritium consolidation option would not involve the use of surrounding land; nor would any project activities result in impacts upon local historical landmarks, floodplain or wetland areas, or threatened and endangered species. Therefore, impacts on land resources, geology and soils, biotic resources, and cultural resources during construction and operation are not expected. The T Building is an underground reinforced concrete structure with physical barriers, operational controls, and other systems to confine, capture and recover tritium releases; therefore no air quality and acoustic impacts are expected during construction and operation.*

Non-Radioactive Releases and Wastes*—Current tritium operations at Mound do not contribute significantly to site-wide non-radioactive airborne emissions or to the non-radioactive pollutants present in effluent waters. Non-radioactive liquid and solid waste due to tritium operations are also negligible. The tritium consolidation option would have no significant incremental impact on the discharge of non-radioactive pollutants or the generation of non-radioactive waste volumes, because no chemical processes nor non-radioactive hazardous materials are associated with the activities which would be transferred from SRS to Mound.*

***Water Resources**—Surface water would not impact nor be adversely impacted due to tritium consolidation at Mound. The T Building at Mound is at 830 feet elevation, which is over 100 feet above flood stage (725.5 feet) of the Miami River, therefore flooding is extremely unlikely. The Mound facility is also above the 500-year floodplain (see section 4.1.6.3 of the EA).*

Mound tritium operations do not contribute significantly to site-wide non-radioactive pollutants present in effluent waters. No new hazardous waste streams would be generated under the tritium consolidation option at Mound; therefore, no incremental impact on surface water is expected. A tritiated water recovery system is currently available at Mound to recover tritium from tritiated water. Mound operations do not routinely release any tritium by waterborne pathway that is greater than EPA National Primary Drinking Water Regulation Maximum Contaminant Level of 20,000 picocuries per liter. The average concentration of tritium at sampling points along the Great Miami River downstream from Mound is 40 picocuries per liter; maximum concentration is 220 picocuries per liter (EA section 4.1.6.3). The tritium consolidation option would have no significant incremental impact on the level of waterborne tritium releases because all tritium processing operations in the T Building are divided into separate air-tight rooms and all tritium contaminated liquid waste and tritiated water from T Building emission controls are collected and solidified before shipment and disposal offsite.

No impacts on groundwater are expected due to construction or operation activities associated with the tritium consolidation option at Mound. No increase in groundwater use from onsite wells would be required to accommodate the consolidation.

***Socioeconomics**—Under the Proposed Action analyzed in the Nonnuclear Consolidation EA, Mound would experience a workforce reduction of approximately 1,070 jobs. The economic consequences and population decreases associated with this workforce reduction are described in section 4.1.6.7 of the EA. Based on the estimated Mound direct and indirect staff count presented in table B.6 of the "Tritium Consolidation Comparison Study: Cost Analysis" for the consolidated tritium mission and present tritium mission, Mound would retain approximately 400 persons of the current workforce and it would add approximately 230 new jobs if the tritium consolidation option at Mound was implemented. A small number of indirect jobs associated with landlord functions would also remain.*

Consolidating tritium handling at Mound would still result in workforce reductions at Mound under the Proposed Action analyzed in the EA since electrical and mechanical, special products and detonators activities at Mound would be relocated to other sites. If the Mound tritium consolidation option was implemented, the workforce reduction at Mound would be approximately 400 jobs instead of the 1,070 indicated in the EA. (section 4.1.6.7) Population out-migration, housing vacancies, and other consequences would still occur; however, these effects would be less than the effects predicted in section 4.1.6.7 of the EA for Mound under the Proposed Action.

Waste Management—*Interior renovation of the T Building would generate some nonhazardous solid waste (construction debris). The amount of construction debris has not been quantified but is expected to be small (approximately 1,600 to 2,500 ft^3). Some unknown portion of this debris could potentially be contaminated from previous activities involving polonium and beryllium. The expected small incremental increase in nonhazardous and/or hazardous solid waste from the T Building renovation would not adversely affect the capacity of Mound's waste processing capabilities.*

No new hazardous wastestreams or effluent would be generated as a result of the tritium consolidation option at Mound. At Mound, all low-level tritium contaminated liquid wastes are solidified and packaged for offsite shipment in the Waste Solidification Facility and shipped offsite for burial. All solid low-level waste is transported by commercial carriers in closed vans to the Nevada Test Site for burial. Implementing the tritium consolidation option at Mound would generate an estimated 26,400 ft3 of solid low-level waste. This volume is based on todays workload which would be somewhat less with future reduced workload production levels. The additional 26,400 ft^3 represents an increase of 15 percent over the 176,678 ft^3 of solid low-level waste generated at Mound in 1991. The quantity of low-level waste generated from the tritium consolidation option is well within the storage and treatment capability of existing low-level waste management facilities. Therefore, no adverse impacts on the Mound waste management program nor indirect environmental impacts are expected due to the treatment and storage of these wastes.

The disposal of unusable tritium reservoirs and classified scrap from Mound would continue to be accommodated by SRS, which currently has the responsibility for this activity. Some classified scrap generated at Mound is also sent to Nevada Test Site for disposal. The quantity of waste tritium reservoirs would increase at Mound due to the tritium consolidation option; however, the amount being disposed of at SRS would not change since consolidating tritium at Mound merely transfers reservoir waste along with the activities. No cumulative environmental impacts are expected with the disposal of this waste.

Human Health: Facility Operations and Accidents—*Sections 4.1.6.2 and 4.1.6.9 of the EA discuss the Mound 1990 radiological releases and the resulting dose/cancer risk to the maximally exposed individual, respectively. Of the total dose of 0.16 mrem from radiological releases, tritium releases of no more then 1,825 curies contributed 0.11 mrem. The Mound alternative analyzed in the EA (section 4.2.1) and the disposition of tritium-handling is different than the tritium consolidation option at Mound in two ways: the tritium-handling activities at SRS would not be moved; and the level of tritium activities and tritium related health effects at Mound would not change from the current baseline conditions. For analysis of radiological impacts due to the tritium consolidation option at Mound, a source term for normal operations of 2,000 curies per year was used. This was the same source term used in the "Tritium Consolidation Comparison Study: Risk Analysis" developed from historical data and EG&G estimates of future tritium release control efficiency.*

Using a source term for normal operation of 2,000 curies per year, the resulting annual dose increment associated with the tritium consolidation option at Mound would be 0.011 mrem to the maximally exposed individual offsite with the associated incremental fatal cancer risk of $4.9x10^{-9}$ per year. This results in a annual cumulative dose of 0.17 mrem to the maximally exposed individual offsite and a cumulative fatal cancer risk of $7.6x10^{-8}$ per year to that individual. Based on experience at SRS (see section 4.1.2.9 of the EA), the average annual dose to a worker at Mound after tritium consolidation is estimated to be not more than 0.28 mrem; this would result in a fatal cancer risk of $1.2x10^{-7}$ per year. The incidence of risk for fatal cancers to the public and workers due to normal operations is significantly lower than the average incident to an individual in the U.S. population of $2x10^{-3}$ fatal cancers per year from all causes.

The risks associated with tritium accidents from natural phenomena and operational events within the design basis for the tritium consolidation option at Mound were analyzed as part of the "Tritium Consolidation Comparison Study: Risk Analysis." The T Building, which would house tritium operations, is classified as a moderate hazard facility. (A moderate hazard facility is one containing hazards that present considerable potential onsite impacts to people or the environment, but at most only minor offsite impacts–DOE Order 5481.1B). The Safety Analysis Report prepared for the T Building indicates the building and the process operations it contains are expected to survive all credible natural phenomena events within the design basis for a moderate hazard facility.

The operating basis accident (OBA) is representative of accidents within the design basis for the normal process operations at Mound. The OBA was selected based on review of past operations and the current plans for consolidating tritium operations at Mound. The OBA was chosen to be a 10,000 curie release from a glove box within T Building most likely caused by an operational or maintenance error. For the tritium consolidation option OBA, the dose to the population within 50 miles of Mound was estimated to be $2.0x10^{-3}$ person-rem per year, which results in an incremental increased risk in the number of fatal cancers of $1.7x10^{-6}$ per year to the population within 50 miles of Mound. For comparison, the dose to the population within 50 miles of SRS was estimated to be $2.7x10^{-3}$ person-rem per year, which results on an incremental increased risk in the number of fatal cancers of $2.4x10^{-6}$ per year to the population within 50 miles of SRS. The incidence of fatal cancers to the public at both sites from this type accident is significantly lower than the annual number of fatal cancers of 6,070 and 1,480 expected in the population within 50 miles of Mound and SRS, respectively, based on the average incident to an individual in the U.S. population of $2x10^{-3}$ fatal cancers per year from all causes.

The extremely severe earthquake accounts for the highest probability of public exposures for the accidents analyzed at Mound in the "Tritium Consolidation Comparison Study: Risk Analysis." Based on the analysis of this accident, the dose to the population within 50 miles of Mound was estimated to be $5.6x10^{-3}$ person-rem per year, which results in an incremental increased risk in the number of fatal cancers of $5.0x10^{-6}$ per year to the population within 50 miles of Mound. For comparison, the dose to the population within 50 miles of SRS for the severe accident was estimated to be $2.2x10^{-3}$ person-rem per year, which results in an incremental risk in the number of fatal cancers of $1.9x10^{-6}$ per year

to the population within 50 miles of SRS. The incidence of fatal cancers to the public at both sites from this type accident is significantly lower than the annual number of fatal cancers of 6,070 and 1,480 expected in the population within 50 miles of Mound and SRS, respectively, based on the average incident to an individual in the U.S. population of $2x10^{-3}$ fatal cancers per year from all causes.

The "Tritium Consolidation Comparison Study: Risk Analysis" also considered the onsite exposures to collocated workers due to accidents involving tritium at SRS and Mound. For the OBA at SRS, the risk (probability and dose) was estimated to be $7.3x10^{-6}$ rem per year ($7x10^{-9}$ cancer fatalities per year) for the collocated worker (maximum individual) and $2.3x10^{-4}$ person-rem/yr ($2x10^{-7}$ cancer fatalities per year) for the collocated population. For a beyond design basis accident, such as an earthquake that exceeds the design basis, the risk were estimated to be $1.1x10^{-5}$ rem per year ($9.7x10^{-9}$ cancer fatalities per year) and $5.0x10^{-6}$ person-rem per year ($4.4x10^{-9}$ cancer fatalities) to the collocated worker and collocated worker population respectively. The onsite population at SRS is on the order of 20,000.

For the OBA and severe accidents at Mound, the impacts on onsite collocated workers would be very much smaller than those at SRS and were therefore not estimated. This is because Mound is a smaller site which uses a 200 ft-tall building exhaust stack. The nearest site boundary at Mound is 0.2 miles from the T Building and at SRS the nearest site boundary from the H-area tritium facilities is 7.2 miles. As a result, accidental releases of tritium that enter the environment from the exhaust stack at Mound cause minimal exposure to individuals in the population until the plume has traveled beyond the site boundary. The onsite population at Mound is about 2000.

The effects of differences in onsite population sizes at Mound and SRS is off-set by differences in the offsite population. The offsite population within 10 miles of the site boundary is 323,000 at Mound and 65,000 at SRS. Within 50 miles of the site boundary at Mound the population is 3,035,000 and at SRS 740,000.

In summary, the population exposures from normal operations at Mound and SRS are over a thousand times lower than the population exposures from background radiation. The extremely severe earthquake accounts for the highest probability of public exposures for the accidents analyzed at Mound. Even such a severe accident and its attendant probabilities of exposure are small in comparison to background radiation exposure at both sites. The incidence of risk for fatal cancer to the population within 50 miles of both sites is significantly lower than the average incident in the U.S. population of $2x10^{-3}$ fatal cancers per year from all causes.

***Intersite Transportation**—The transportation risk due to tritium consolidation at Mound has been assessed in the "Tritium Consolidation Comparison Study: Risk Analysis," December 1992. The following analysis is based on this study.*

Since more tritium is currently at SRS, there is a difference in risk associated with the extra tritium that would have to be transported to Mound if the tritium consolidation option were

implemented, other things being equal. Based on aircraft accident rates for U.S. air carriers, the probability of an accident for a 600-mile flight is $1x10^{-6}$ to $1x10^{-7}$. The higher number of shipments associated with tritium inventory transfer to Mound leads to a higher likelihood of transportation accidents associated with the tritium consolidation option at Mound. The air mileage to accomplish the inventory transfer of tritium from SRS to Mound would involve a 425-mile route (one-way) times the required number of shipments. The event tree analysis presented in the 'Tritium Consolidation Comparison Study: Risk Analysis" demonstrated that the transportation release per shipment was very small and for the small number of shipments required to consolidate at Mound, the total probabilistic source term would be insignificant. Therefore, no significant intersite transportation impacts are expected due to the tritium consolidation proposal at Mound.

During 1991, routes, number of tritium shipments, and one-way air mileage per shipment within the Complex included the following: Mound to SRS, 8 shipments (425 miles); Pantex to Mound, 8 shipments (900 miles); Pantex to SRS and vice versa, 942 shipments (1010 miles); and Sandia National Laboratories, New Mexico to SRS and vice versa, 140 shipments (1260 miles). Assuming that the amount of 1991 inbound and outbound SRS tritium traffic is transferred to Mound as a result of the tritium consolidation option, the total annual air shipment mileage would be reduced by approximately 14 percent. The "Tritium Consolidation Comparison Study: Risk Analysis" predicted a total probabilistic source term of $2.5x10^{-4}$ curies per shipment. (The probabilistic source term is the product of the probability of an accident per shipment and the amount of tritium released in that accident). This was determined to be insignificant when considering the differential number of shipments involved with tritium consolidation at Mound, compared to SRS.

In summary, the potential risk of an accident with tritium release would increase during the period of tritium inventory transfer from SRS to Mound but would decrease in future routine operational shipments.

***Cumulative Impacts**—The consolidation of tritium activities at Mound in the T Building under the tritium consolidation option would not significantly impact human health or the environment. Because the incremental impacts of the consolidation are negligible, no significant cumulative adverse impacts would be expected when combined with other existing activities or planned operational changes of Mound facilities.*

***Summary**—This analysis indicates that the tritium consolidation option at Mound would have negligible human health and environmental impacts. All activities necessary for tritium consolidation at Mound are currently performed at the facility. Only expanded capacity and/or upgraded capability to accommodate the projected increased workload would be required. The T Building, where tritium activities would be consolidated, is equipped with adequate physical barriers, operational controls, and other systems to confine, capture and recover tritium releases. A short-term increase in tritium transportation risk would occur during the transfer of the tritium inventory from SRS to Mound during startup, but operational transportation risk would be reduced. In addition, the number of unusable tritium reservoirs from Mound to be transported and disposed of as waste at SRS would increase with the tritium consolidation option. The increased transportation risk is negligible.*

1.2 NEPA requires that all the direct, indirect, and cumulative impacts of a proposed action be considered. Several of the manufacturing operations and product lines currently utilized at Mound have been omitted from the EA. The environmental impacts of providing either primary or backup manufacturing operations at the design laboratories or primary manufacturing operations within the private sector have not been addressed in the EA. Costs for these activities have been omitted from the economic analyses as well.

No. of Comments 2 Document No. 005

Response: *All Defense Program's mission activities at Mound are included in the nonnuclear consolidation proposal. Several Defense Program (DP) functions that would not be transferred would be included in the Manufacturing Development Engineering (MDE) program. As discussed in the EA, two functions sponsored by other Offices within the Department (stable isotope separation and sales, and RTG heat source fabrication and qualification) would remain at Mound. Section 3.2.2 addresses the closeout of weapons complex missions at Mound and the effect of the closeout on the remaining DOE functions*

1.3 Numerous costs for reconfiguration are left out of the economic analysis. The flood barrier wall being constructed at KCP is well disguised. Another backup reservoir loading facility like the Savannah River Operations Contingency (SROC) facility at Mound is being estimated by Los Alamos outside the NCP costs. Weapons research, development, and testing activities, a large part of Mound's development workload for the National Laboratories, are excluded from the economic analysis.

No. of Comments 2 Document No. 005, 006

Response: *The cost analysis discussed here is beyond the scope of the EA. The flood barrier at KCP is an ongoing project discussed in section 4.1.1.3. A NEPA document was prepared for the levee project by the Corps of Engineers in 1990 and is scheduled to be completed in December 1993.*

1.4 NEPA requires that EAs and PEISs rely on expert input. The Mound Citizens Action Group believes that, in several areas, expert input has been ignored and less-than-expert input has been utilized in its place. The largest area where expert input has not been used is the extensive use of normalized data (i.e., data biased against Mound). The Mound Citizens Action Group believes that DOE manipulated their cost data to place Mound at a disadvantage while screening plant sites for ranking purposes. Further compounding this problem is that the EA uses these data for analysis of all the alternatives (including the Two-Site Study and Tritium Consolidation Study) except the proposed action.

The second area where the Mound Citizens Action Group believes that expert input was not used, even though it was provided, is in the subjective elimination of Mound as a potential consolidation site for tritium operations. The Tritium Consolidation Comparison Study: Risk Analysis stated that both Mound and Savannah River are acceptable sites and

that both sites far exceed all EPA and DOE requirements for environmental risk from credible events.

No. of Comments 1 Document No. 005

Response: *The Cost Effectiveness Report, along with its input data, has been reviewed by three independent consultants to the Department of Energy. Their analysis has determined that the proposed consolidation of nonnuclear activities is cost effective and reasonable, and will not increase the technological, environmental, safety, or health risks associated with Department facilities.*

The elimination of Mound in the EA as a potential consolidation site for tritium operations was based on an objective cost study which showed a life-cycle cost savings of almost two billion dollars. This section also acknowledges the fact that the risk assessment study showed that the risk associated with consolidating tritium operations at either Mound or Savannah River was the same. Normalization of physical data such as waste streams, utilities, and space requirements have been improved in the respective sections of chapters 3 and 4 of the EA to allow comparison between the different sites and alternatives

1.5 The costs and technical risks through consolidation as presented in the NCP and the EA are invalid and violate PL 100-456 for the following reasons. (1) The assumption that 50 percent of critical skills (people) will transfer to receiver sites is too optimistic. (2) The production of required Limited Life Component Exchange (LLCE) components, such as explosive timers, time detonators, and valve actuators, are not included in the plan. (3) The transfer of neutron generators and cap assemblies to SNL increases technical risk due to the manufacturing methodology to be used: a new untried design and distribution of processing among eight or nine buildings at two sites at SNL and the tritium containing subassembly (tube) being produced at Los Alamos. (4) High explosive surveillance of components used in stockpile would not transfer to a receiver site. This Mound mission has been overlooked in consolidation planning. (5) Tritium gas transfer reservoir surveillance would experience a hiatus of three to five years, and recent experience with construction and startup of nuclear (tritium) facilities at SRS suggests that these times are optimistic.

No. of Comments 2 Document No. 005, 006

Response: *The cost analyses referred to is beyond the scope of the EA. However, the specific reasons that are stated as making it invalid can be commented on. (1) The assumption that 50 percent of critical skills will transfer to receiver sites was used because there is no better estimate at this time. However, the assumption that critical skills can only be transferred if people are transferred is not true. Detailed transfer plans are now being prepared which will insure the orderly transfer of critical skills. (2) All LLCE components listed are included in the MDE program at SNL/NM. As discussed in Section 3.1.3, the MDE program is a procurement action which is outside the scope of this EA. (3) Since SNL/NM is the cognizant design laboratory for both neutron generators and cap assemblies, combining production and design functions should reduce technical risk.*

Dividing the processing among multiple buildings at two sites (SNL/NM and LANL), although not optimal, does not increase technical risk. Technical risk is not a function of the physical location of separate manufacturing processes. (4) High explosive surveillance of components has not been overlooked. The design laboratories will have this responsibility. (5) SRS will have the capability to perform limited function testing prior to the Mound Plant surveillance cessation date. However, there will be a hiatus of 32 months before SRS has the full capacity to conduct this activity.

1.6 The General Accounting Office (GAO) has criticized the cost analysis of the nonnuclear consolidation plan. The initial assumptions guiding the plan were prepared in 1991, prior to the decision to stop production of the W-88 warheads at the Rocky Flats facility. Consequently, the cost analysis assumptions and findings of the EA are flawed.

No. of Comments 1 Document No. 019

Response: *Section 1.6.2 has been added to the EA to address the issue of changing world events and the impacts to the NCP analysis. The cost analysis assumptions in the "NCP" and the "Reconfiguration Cost Effectiveness Report" issued in January 1993 support the assumptions and analysis presented in the EA.*

1.7 The narrow focus of this EA on Defense Program (DP) missions is inappropriate and even internally inconsistent. DOE should explain why commercial and other activities at Mound are not within the scope of the EA.

No. of Comments 1 Document No. 005

Response: *The apparent inconsistency in the EA as regards non-DP missions at Mound has been resolved. Section 3.2.2.1 now specifically addresses all current Mound missions and their disposition as a result of implementing the proposed action. Some non-DP missions will be moved (calorimeters) while others will remain at Mound (RTG's) for the near term. These DP and non-DP missions being moved as a result of the consolidation are analyzed in detail in the EA.*

1.8 Rejection of the two-site consolidation and tritium consolidation alternatives was based on two reports which were supported by inaccurate data (obsolete workloads, inclusion of non-DP mission, inaccurate plant overhead).

No. of Comments 1 Document No. 005

Response: *Both the "Two-Site Nonnuclear Consolidation Study" and the "Tritium Consolidation Feasibility Study" either used the latest workload data based on the stockpile resulting from the Bush-Yeltsin agreement of June 1992 (also known as START II) or reviewed the results in light of this study to insure that they did not affect the outcome. The inclusion of non-DP missions and calculation of plant overhead was done in accordance with currently accepted procedures and in the same manner as was done in*

the "Cost Effectiveness Report" which was submitted to Congress and is under independent review by three DOE consultants.

1.9 The General Accounting Office has reviewed the NCP report prepared by DOE prior to release of the EA and recommended that DOE start the planning process anew.

No. of Comments 1 Document No. 005

Response: *The GAO report on the NCP did not recommend starting the planning process anew. The report did recommend that "...ongoing efforts to analyze the consolidation of nonnuclear activities include further study of all reasonable consolidation options and additional analysis of the technical risks associated with nonnuclear consolidation." (GAO Report, pg 10). This recommendation is being followed in the normal process of review and approval of the EA and any items found to have a significant impact will be included in the Reconfiguration PEIS.*

2 Land Resources

2.1 Mound is a prominent figure in the City of Miamisburg's skyline. DOE does not adequately address the aesthetic impact that closing Mound would have on the City.

No. of Comments 1 Document No. 005

Response: *As discussed in section 4.4, decontamination and decommissioning of buildings would be addressed in separate studies once decisions are made about which buildings would, in fact, be declared surplus. If weapons complex missions are closed out at Mound, it is likely that existing buildings would be disposed of through the General Services Administration for other uses. Therefore, it is unlikely that the skyline would be affected.*

The EA text has been revised to "There are no construction or demolition activities planned as part of the DP nonnuclear mission close out; therefore, the physical appearance of the Mound site would remain essentially unchanged and the visual resources or VRM classification of the existing landscape would not be affected."

4 Water Resources

4.1 On-site tritium emissions at SRS would further elevate groundwater tritium levels which now exceed EPA standards.

No. of Comments 1 Document No. 005

Response: *No tritium release to surface or groundwater resources are expected from activities attributed to the Proposed Action. Text has been added in section 4.1.2.3:*

"However, the H-area operations historically release in excess of 1,000 Ci/yr of tritium to surface water. Through seepage, these releases have the potential to contaminate groundwater, although most of the shallow groundwater flows toward and discharges to streams, minimizing this potential."

6 Biotic Resources

6.1 The Proposed Action described in the EA would not significantly affect aquatic biota at any of the facilities affected by the planned consolidation. The EA states that there are no plans to significantly modify surface water withdrawals or discharges, excavate or fill aquatic habitats, or discharge hazardous materials into aquatic ecosystems. Based on these considerations, the resource descriptions and analysis of anticipated impacts to these resources appear to be adequate.

No. of Comments 1 Document No. 002

Response: *DOE agrees with your comment on biotic sections in chapter 4. No response required.*

7 Cultural Resources

7.1 Concerned about physical and spiritual impacts from nuclear weapons manufacturing activities on American Indian sacred lands. Regrets the inability to communicate to DOE why these activities violate traditional religious beliefs and culture.

No. of Comments 3 Document No. 004

Response: *Where nonnuclear manufacturing activities associated with the Proposed Action would potentially impact important Native American resources, consultation with appropriate Native American groups were initiated. All activities necessary to accommodate relocated nonnuclear functions would be within or additions to existing buildings. No impacts to Native American resources have been identified at affected DOE sites. Specific concerns of the Santa Clara Indian Pueblo regarding proposed nonnuclear consolidation activities at LANL will be discussed and addressed as appropriate during the scheduled public review process of the EA. Other reconfiguration and ongoing operational concerns at LANL would be addressed through the appropriate processes for the Complex reconfiguration and the LANL site Environment, Safety, and Health Program.*

7.2 Native American groups in Ohio have not been contacted. DOE's press releases of December 22, 1992 gave extensive credence to notice and incorporation of comments from Native American groups in the EA process as required by NEPA. Page ES-9 states that, Native American consultation has been initiated at all sites, whereas Page 4-139 of the EA states that, Consultation with the Miami and Shawnee has not yet been initiated

by DOE. The Mound Citizens Action Group contacted the Shawnee and the Miami Valley Council for Native Americans and found that they had not been contacted by DOE.

No. of Comments 1 Document No. 005

Response: *Consultations were initiated with all appropriate Native American groups that would potentially be affected by activities transferred from other sites as part of the Proposed Action.*

8 Socioeconomics and Community Services

8.1 Concern in Florida for the future of the Martin Marietta Specialty Components facility and its dedicated employees. Recommend that an EIS is prepared to fully address the human-job and family consequences of proposed actions and provide measures to mitigate impacts.

No. of Comments 1 Document No. 007

Response: *The EA was prepared in order to ascertain the need for preparing an EIS. The consequences of job losses and DOE's efforts to minimize these effects would be discussed in the Implementation Plan prepared for sites where weapons complex missions would be closed out. That document would address issues such as early retirement incentives, employee transfers to receiver sites, and other employment issues. The NEPA process would not be the appropriate avenue to address these issues.*

8.2 DOE should approve the Cooperative Research and Development Agreement (CRADA) for the Martin Marietta Specialty Components Pinellas facility which would be a partnership with the Martin Marietta Energy Systems efforts in Oak Ridge, Tennessee. This would encourage high technology production being located at the Pinellas Plant facility.

No. of Comments 2 Document No. 007, 008

Response: *The CRADA is outside the scope of this EA. Agreements of this type might more appropriately be addressed in the Implementation Plan or Transition Plan prepared for Pinellas.*

8.3 The EA does not adequately address the socioeconomic impacts the closing of the Mound Facility would have on the City, the school district and the community's local economy. The EA does not consider the impact of the closing on the school district's student enrollment and an estimated 20 percent decrease in the City's income tax revenues. Using a large land area analysis for determining socioeconomic impact dilutes and ignores the economic impact that the Mound Facility's closing would have on the community it is located within.

No. of Comments 4 Document No. 005, 006

Response: *The Region of Influence (ROI) used for the analysis is based upon the counties and cities where approximately 90 percent of the Mound Plant employees reside. The cities and counties with the greatest population change are listed in table 4.1.6.7-1. The smaller cities that would experience a greater than 1 percent increase in vacant housing units are identified in section 4.1.6.7. None of these cities would experience a greater than 2 percent change in population or housing unit vacancies. Revisions to section 4.1.6.7 have been made to the EA to address the effects on tax revenues to the city of Miamisburg.*

8.4 Closing the Mound Plant is not in the best interest of the citizens, community, state or country. The community of Miamisburg, OH has hosted DOE's Mound Plant with pride for many years; thousands of local residents have built careers at or around the plant, with results in productivity and safety easily comparable to that of any other site in the Complex. Hardly anyone in the Miamisburg area believes that DOE has acted in good faith toward them or the facility.

No. of Comments 2 Document No. 005, 006

Response: *Changes in stockpile and mission requirements have caused employment fluctuations at all facilities in the Weapons Complex, including the Mound Plant. For example, at Mound in 1970 there were 1,875 employees, which reduced to 1,575 by 1975. Employment increased to 2,398 by 1985, and then decreased to its current level of about 1,700. In light of recent world events, and Presidential arms reduction initiatives, including the START II Treaty, the workload requirements for the Weapons Complex have been and will continue to be reduced, both at Mound and the other weapons complex sites.*

8.5 Proposed action would have an adverse effect on a major element of the economic diversification of the State of Florida. It will conflict with the official local sentiment concerning economic development.

No. of Comments 1 Document No. 009

Response: *The socioeconomic effects of the Proposed Action on the communities surrounding the Pinellas Plant are presented in section 4.1.7.7. The reduction in jobs will not increase the unemployment rate, and the analysis supports the conclusion that the effects of the Proposed Action are not significant.*

9 Waste Management

9.1 Concerned about the presence of all hazardous and toxic substances, even though the proposed action would not, at this time, involve nuclear materials. Concerned more about what we do not know, than what is published.

No. of Comments 1 Document No. 004

Response: *The environmental assessment has fully disclosed those materials associated with the relocated activities. Revisions to chapter 3, 4, and appendix B have been made where waste stream data were inconsistent. All hazardous and toxic materials will be handled in full compliance with all applicable Federal and state regulations. The activities being relocated have well established and well characterized processes. Exposure and health effects for each site have been addressed in section 4.1 and appendix F (section 3.3 and appendix B). Additional discussions of waste minimization and pollution prevention have been added to the waste management section of each site in chapter 4.*

9.2 Closure of sites will create radioactive wastes (transuranic, low level, and mixed) which have been ignored in the EA. Some of these wastes would be transferred to a receiver site. Closure of sites will also generate other hazardous and nonhazardous wastes. DOE states that these would be addressed in the PEIS for environmental restoration but does not quantify the size or impact of these wastes in the EA. The EA should include an assessment of the costs and risks involved in managing these wastes.

No. of Comments 2 Document No. 005, 006

Response: *As stated in section 4.4, the closeout of Defense Programs weapons complex mission at Mound, and Pinellas, and the weapons complex nonnuclear missions at RFP does not equate to closure. There are other activities that are scheduled to continue at Mound and RFP. Environmental restoration/D&D activities would continue at Mound, Pinellas and Rocky Flats regardless of consolidation decisions. Wastes generated as a result of facilities' closure at a site will be addressed in the EM Transition Plan developed for each specific site once a facility and/or site has been declared surplus and is put in a deactivated status. All wastes will be handled and ultimately disposed of in full compliance with applicable Federal and state regulations. The cost of D&D are not "decision costs" associated with nonnuclear consolidation as discussed in section 1.3 of the EA. As discussed in section 4.4, impacts of D&D would be addressed in separate NEPA documentation at such time as there is a specific proposal to D&D a given facility.*

9.3 Statements in the EA on radioactive, sanitary, and solid waste generation at Mound are incorrect (EA p. 4-144). The EA incorrectly denies the existence of TRU wastes at Mound (EA p. 4-143).

No. of Comments 1 Document No. 005

Response: *The following text has been added to section 3.2.2.3 and 4.1.6.8 _ "However, disposal of existing TRU waste and waste generated as a result of transition activities would be addressed in the EM transition plan." The following text has been revised in section 4.1.6.8 — "Even with the closeout of DP weapons complex missions, Mound will need to continue to treat alpha wastewater generated from plutonium D&D activities and discharge pretreated process wastewater and sanitary wastewater effluents into the Great Miami River." The environmental assessment does not deny the existence of TRU wastes at Mound but only that there are no TRU wastes associated with any of the*

functions being consolidated. Section 4.4 should be consulted for more information on D&D and transition activities.

9.4 "Beryllium and Pit Support — The existing technology base and prototyping capability at LANL would be enhanced to provide limited manufacturing capability for beryllium and pit support work now done at RFP." The document is insufficiently clear regarding the nature of the "pit support work," As we would have considered the tritium functions to more properly belong in the category of nuclear functions, we wish to be clear regarding the nature of the pit-support work. According to Table B.3-2 in the Appendix, no low-level or mixed waste generation is associated with pit support functions. We conclude that the pit-support functions to be relocated to LANL are wholly without a radioactive component. Is this accurate?

No. of Comments 1 Document No. 018

Response: *Yes, the assumption is correct. Low-level or mixed waste will not be generated by the pit support function.*

9.5 "Tritium-Handling — The tritium handling capabilities at Pinellas would be relocated with similar functions at LANL." This sentence can lead to opposite interpretations: 1) that tritium handling capabilities at both Pinellas and LANL would be relocated, or 2) that those functions at Pinellas would be relocated to LANL. We assume the latter is the correct interpretations, but this phrasing, which occurs throughout the document, should be clarified.

No. of Comments 1 Document No. 018

Response: *The phrase has been changed to read "The tritium-handling capabilities at Pinellas would be relocated to LANL and collocated with similar functions there."*

9.6 "The maximum increase of tritium would be 5 percent above the quantity presently handled and stored at LANL," the document should specify this amount as well as the amount of increase in tritium loss to the atmosphere and to water treatment plant outfalls for both LANL and SNL. Neither Table 3.3.3-4 nor Appendix Table B3-2 are adequately specific with regard to tritium waste streams. Please specify anticipated increases in curies for annual increments to both atmospheric and wastewater tritium for both laboratories. We do not find projections of this kind in the Appendix.

No. of Comments 1 Document No. 018

Response: *The maximum increase of tritium at LANL is actually less than 5 percent and the text has been modified to reflect this. The absolute quantities of tritium going to LANL were listed in section 4.1.3.9. It is anticipated that none of the liquid or solid LLW generated from these activities at LANL and SNL would be released to the environment. The estimated amount of tritium that would be released to the air because of these new activities is provided in section 4.1.3.2 for LANL (122 curies) and section 4.1.5.2 for SNL*

(5 curies). The health effect of these additional releases is discussed in detail in sections 4.1.3.9 and 4.1.5.9 for LANL and SNL, respectively.

9.7 LLW would be generated from neutron tube target loading functions and calorimeters. In order to understand the impact of these operations on waste streams at LANL and SNL, what would be the radioisotopic makeup of the waste streams indicated in table B3-2?

No. of Comments 1 Document No. 018

Response: *There is no LLW generated from calorimeters. The only source of radiation contamination for waste streams from neutron tube target loading at LANL and neutron generators at SNL is tritium. The disposition of these waste streams is discussed in the response to comment 09.06.*

9.8 "The high power detonators would generate 7,000 gallons per year of High Explosive contaminated solvents, and 3,200 ft^3/yr of solid scrap HE, and HE-contaminated solid wastes." What specific type of contaminated solvents will be generated? We assume the HE scrap will be a RCRA characteristic (D002) waste. Will the HE-contaminated solids not be RCRA wastes?

No. of Comments 1 Document No. 018

Response: *The liquid hazardous wastes from the high-powered detonators is expected to consist of both HE-contaminated waste collected, retained, and separated onsite and nonhalogenated solvents (F003) in parts cleaning and recrystallization. Total annual generation of hazardous waste from this activity may be as much as 7,000 gallons. Approximately 3,200 gallons, primarily HE-contaminated wastewater, will be stored and sent to the incinerator or flashpad (TA-16) where it is burned. The remaining ash residue is considered nonhazardous and is disposed of in the industrial non-RCRA landfill.*

Up to 3,800 gallons/year of nonhalogenated solvent waste streams, approximately 20 percent acetone with a small amount of ethanol, will be generated. The remainder of the waste is water. The solvent waste would also be burned at TA-16 and the nonhazardous residue disposed of in the industrial non-RCRA landfill. A future option of offsite treatment/disposal could be pursued.

The bulk of the solid hazardous waste is routine administrative waste that is potentially HE-contaminated. The solid hazardous waste is sent to TA-16 where it is burned and the ash residue is disposed of as solid hazardous or nonhazardous waste as appropriate. The actual amount of HE-contaminated solid waste after incineration is now estimated to be only 205 ft^3 per year. For conservative planning purposes this amount is included in the annual total for solid hazardous waste. The epoxy used is a Versamid-based epoxy and the glue is Pyralux, both commercially available and used in very small quantities.

9.9 The document should include one table for each facility listing the current waste generation and the projected increment to the generation of each specific waste, not just

waste type, and the ability of the facility in question to manage each waste should be as specifically addressed.

No. of Comments 1 Document No. 018

Response: *The level of detail requested is not available at this time. The specific waste streams and exact quantities will be determined as the designs and processes are finalized. All permits will be reviewed and amended at that time, as required. The quantities listed in the EA are conservative estimates based on data from the sites where these activities currently reside. The proposed action will generate only minor incremental additions to existing waste streams. Both Los Alamos National Laboratory and Sandia National Laboratories, New Mexico have the ability to handle the estimated incremental addition. Exact quantities of wastes are expected to be lower than this based on the lower workload and anticipated process improvements that are being made as the planning and design for these transfers are finalized.*

9.10 Concern regarding cumulative impacts at Los Alamos of the proposed action on airborne contaminant deposition and intrusion of contaminants to the groundwater.

No. of Comments 1 Document No. 004

Response: *The existing air quality and groundwater quality at LANL and estimated additional air and water emissions due to the activities that are part of the Proposed Action are discussed in section 4.1.3.2 and 4.1.3.3 of the EA. The Proposed Action would add to the cumulative air quality but negligible. Cumulative impacts are not expected on groundwater resources at LANL (See section 4.3). The Proposed Action would not interfere with ongoing and planned environmental remediation activities that address known air quality concerns and groundwater contamination at LANL.*

10 Human Health: Facility Operation and Accidents

10.1 Concerned about the risks from potential accidents by vehicles moving hazardous/toxic materials and waste to and from LANL. The issue of resource allocation to assist the Indian Pueblo Tribe in building the capacity to respond to any kind of accident is not addressed in the Reconfiguration documents. The negotiated ACCORD with DOE does not buy the tribe staff, training, and equipment to deal with this issue. The tribe needs the resources to develop and carry out an emergency plan.

No. of Comments 2 Document No. 004

Response: *The EA addresses the impacts of transporting DOE property between sites as a result of transferred workload. Under the proposed action, LANL would gain five functions: calorimeters, neutron tube target loading, high power detonators, beryllium technology, and pit support functions. None of these functions require the transport of significant quantities of hazardous materials. For neutron tube target loading, only very*

small quantities of tritium would be transported to or from LANL by air. The risk of transporting this tritium is very small, as explained in section 4.5 of the EA. All shipments to and from LANL will be in compliance with Federal transportation regulations (49 CFR). By themselves, the functions that are proposed for transfer to LANL do not justify the Government's providing special technical assistance to the Indian Pueblo Tribes for emergency preparedness. In any case, the Department of Transportation (DOT) is responsible, under the Hazardous Materials Transportation Act (HMTA), as amended by the Hazardous Materials Transportation Uniform Safety Act (HMTUSA), for coordinating Federal training programs and for providing technical assistance to States, tribes and local governments for emergency response training and planning. The DOE is one of the Federal agencies involved with providing training and technical assistance under the HMTUSA.

10.2 DOE has not considered the environmental consequences to workers who would dismantle the plants and move the operations to the consolidated sites. Large doses of radiation to workers could occur during dismantling. Occupational exposure to other toxic/hazardous chemicals could also occur during the dismantling.

No. of Comments 1 Document No. 005

Response: *The transfer of nonnuclear activities from one site to another does not involve the dismantling of the plants and moving them to the consolidation sites. Transferred activities will be conducted at existing facilities at the consolidation sites. In some cases this may involve internal modifications or additions to the existing facilities to accommodate the transferred activities. Decontamination of facilities to accept relocated activities is discussed in waste management section of chapter 4 for each site.*

The facilities declared surplus at the donor sites may require decontamination or cleanup prior to final disposition; however, the characterization and determination of any decontamination or cleanup activities would be addressed by the DOE in separate NEPA documentation at such time as there is a specific proposal for D&D. Decontamination and cleanup of surplus facilities is not part of the proposed action and is not addressed in detail in the EA.

10.3 Disagrees with DOE's decision not to consolidate the tritium operations at the Mound Plant due to the concentrated population near Mound. Other areas considered may have fewer people living in the area who may be at risk in the event of an accident, but do not have adequate escape routes and may be restricted by bodies of water. Mound has no natural barriers, and has two major expressways capable of accommodating a mass evacuation. These parameters should be considered by DOE.

No. of Comments 1 Document No. 005

Response: *As discussed in section 3.1.4 of the EA, consolidation of tritium operations at the Mound Plan is considered to be an unreasonable alternative. This determination*

was not based upon the ease of evacuation from either site considered in the event of an accident.

10.4 Unable to determine from description whether tritium will be handled in the 700-Area or the 200-Area. Concern expressed that the 700-Area is much closer to population centers such as Jackson and New Ellenton than the 200-Area. Accident assessment for accidental tritium releases (P4-61) appears to assume that all tritium inventory, and therefore all potential for tritium release, will occur in the 200-Area.

No. of Comments 1 Document No. 012

Response: *Section 4.1.2.9, Human Health: Facility Operations and Accidents, for the Savannah River Site (SRS) states that most of the Mound tritium functions would be located in the existing tritium extraction and purification facility (Building 232-H) and in the new 'Replacement Tritium Facility (RTF)' (Building 233-H). The 700-Area is not discussed as a receptor area for Mound tritium functions at the SRS. All tritium inventory and potential releases associated with the transfer of Mound tritium functions are discussed as occurring from the 200-Area. Tritium functions which are not affected by the transfer of Mound tritium functions are not within the scope of the Environmental Assessment.*

10.5 The proposed consolidation of tritium activities at SRS accepts a higher environmental insult from tritium emissions, both total and as a percentage of process throughput, as validated in DOE/EH-0198P, Report of the Task Group on Operation of Department of Energy Tritium Facilities, pp. 7, 8, and 67. These emissions probably would not violate any standard, but do contribute to the global background radiation level.

No. of Comments 1 Document No. 005

Response: *The environmental impacts associated with consolidation of tritium operations at the Savannah River Site (SRS) are discussed in section 4.1.2.9 of the Environmental Assessment (EA) for both normal operations and accidents. Additionally, a review of accidental releases at SRS for the years 1986-1990 revealed that no tritium releases resulted in any significant offsite environmental or human health impacts. This accident history is discussed in section 3.2.5.2. Section 4.1.2.9 also discusses the substantial reduction of atmospheric tritium releases from SRS tritium-handling operations when the Replacement Tritium Facility (RTF) assumes Building 234-H operations. This reduction is expected to lower atmospheric tritium releases to less than 5 percent of the levels experienced in the past. The EA does not indicate that consolidation of tritium operations at SRS would result in a higher environmental insult from tritium emissions.*

10.6 In Section 4.3.7, p. 4-223 of the EA, DOE claims that, at all Proposed Action sites, project design would include best available control technologies or modifying processes to reduce criteria and hazardous/toxic air emissions. This is not the case when applied to the movement of tritium missions from Mound to SRS. This comment goes on to explain the lack of best-available technology found at SRS which would result in higher than expected emission rates (see document EA-S-005, pp, 10-11).

No. of Comments 1 Document No. 005

Response: *The statement contained in the EA which is referenced in this comment is "At all Proposed Action sites, project design would include best available control technologies or modifying processes to reduce criteria and hazardous/toxic air emissions." Radionuclides are considered hazardous substances under EPA definitions. Tritium is a radionuclide and would therefore be addressed by this statement. The statement does not state that best available control technologies would be used in every instance. Instead it states that as an alternative, processes will be modified to reduce emissions. In the case of tritium at SRS, a combination of both best available control technologies and modifications to processes will be used to reduce tritium emissions. Section 4.1.2.9 also discusses the substantial reduction of atmospheric tritium releases from SRS tritium-handling operations when the Replacement Tritium Facility (RTF) assumes Building 234-H operations to less than 5 percent of the levels experienced in the past. This EA does not present a conclusion that consolidation of tritium operations at SRS would result in higher than expected emission rates of tritium.*

10.7 If proposed consolidation should occur, adequate procedures and qualified personnel must remain at Mound to ensure a satisfactory clean-up. The community has, in commenter's opinion, a very real fear that all those capable of monitoring and effecting cleanup will be transferred or leave Mound through attrition, if these plans are implemented.

No. of Comments 1 Document No. 005

Response: *Personnel with experience and appropriate qualifications to deal with monitoring and cleanup are currently at the Mound Plant working under the Mound Environmental Restoration Program. These core personnel would remain and additional personnel added to augment the monitoring and cleanup activities required due to the closeout of Complex weapon missions at Mound.*

11 Decontamination and Decommissioning

11.1 Transitioning Mound DP operations to EM would generate nuclear material wastes during cleanup activities. These wastes include plutonium, a transuranic (TRU).

No. of Comments 1 Document No. 005

Response: *No plutonium or transuranic waste would be generated at Mound as a result of the DP transition activities to EM (section 4.1.6.8). As discussed in section 4.4.2 Decontamination and Decommissioning at Closeout Sites, Mound DP activities to be relocated and consolidated at other sites due to the Proposed Action do not include these radioactive materials. Specific building-level activities to be performed during this transition period are also discussed in section 4.4.2.*

11.2 The EA is silent on critical issues such as the impacts of nonnuclear consolidation on cleanup and waste management activities at Rocky Flats. Will moving equipment slow down these activities? How will nonnuclear consolidation impact the decommissioning process at the facility?

No. of Comments 1 Document No. 019

Response: *The relationship of ongoing cleanup and waste management activities at RFP, and the closeout of Complex nonnuclear missions at the site are discussed in section 4.4 of the EA. No equipment would be moved from RFP with the Proposed Action and no impacts to the decommissioning process at RFP would occur. As discussed in the "RFP Transition Plan" closing the nonnuclear mission at RFP would speed up the decommissioning process because the buildings identified in the plan to support decommissioning activities of facilities with nuclear missions are those buildings associated with the site's nonnuclear mission.*

12 Intersite Transportation

12.1 DOE should include an environmental impact evaluation or study of dismantling and moving equipment to other locations. These evaluations should include the potential release of radioactive and hazardous materials during dismantling and transportation of contaminated equipment. The impacts of traffic congestion, traffic accidents, and potential for large population exposures posed by transporting radioactive and hazardous wastes is not addressed in the EA.

No. of Comments 1 Document No. 005

Response: *DOE plans to relocate only very small numbers of specific equipment needed to supplement existing functions at consolidation sites. None of the transported equipment would be contaminated. Remaining equipment and inventory will be disposed of at the old sites. Equipment to be relocated from plants with terminated DP missions will be shipped by commercial carrier in compliance with U.S. Department of Transportation (DOT) regulations. Packages will meet Federal requirements for safe transport. Risks associated with intersite traffic for both No Action and Proposed Action are negligible. Refer to sections 2.3, 3.1.1, 4.4, and 4.5.*

13 General/Miscellaneous Environmental Comments

13.1 Concerned about the potential effects of unmitigated nuclear weapons manufacturing activities on air and water quality, including wildlife.

No. of Comments 1 Document No. 004

Response: *Modifications and renovations to buildings to accommodate new activities at receiving sites due to the Proposed Action would include administrative and engineering measures to minimize or eliminate potential effects on air, water and biotic resources. Potential impacts of nonnuclear manufacturing due to the Proposed Action at each site are discussed in chapter 4, section 4.1.1., 4.1.2, 4.1.3, 4.1.4, and 4.1.5. The EA has been revised (section 4.3) to include additional discussions of cumulative impacts. Table 4.3-1 has also been modified to include comparison of cumulative impacts on the Proposed Action and alternatives.*

13.2 Concerned about the transportation of hazardous and toxic materials by natural means, to Santa Clara Pueblo lands.

No. of Comments 1 Document No. 004

Response: *The potentially hazardous and toxic air emission and wastewater effluents contributed by activities associated with the Proposed Action have been characterized and analyzed in the EA at the LANL site (section 4.1.3). No adverse impacts on Santa Clara Pueblo lands are expected.*

14 NEPA Process and Regulatory Compliance

14.1 The EA, although extensive in scope, is fundamentally flawed both in compliance with NEPA requirements and assimilation of accurate data to support conclusions.

No. of Comments 1 Document No. 005

Response: *The EA was prepared to meet the requirements of both the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508) and DOE implementing procedures for NEPA (57 FR 15122, April 24, 1992 to be codified at 10 CFR 1021). Extensive interaction with all sites to obtain the best available and most accurate data was an ongoing process during the preparation of the EA. Affected DOE sites, states, Federal agencies, and Native American groups were all contacted to verify the accuracy and validity of EA conclusions.*

14.2 The EA is so broad in coverage of the environmental impact that it nearly meets the information requirements for a PEIS. Given the breadth of data and information coverage, it seems reasonable that the PEIS process should be used instead of the EA process. One of the main differences between the PEIS and EA processes is the absence of a requirement for public hearings for an EA that is required for a PEIS.

No. of Comments 1 Document No. 005

Response: *The purpose of an EA (40 CFR 1508.9 (a) (1)) is to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or*

a Finding of No Significant Impact. The EA process is part of the NEPA EIS process and does not circumvent or avoid the public involvement requirements (40 CFR 1506.6). In this case, the public will have an opportunity to review and comment on the proposed FONSI before any final decisions are made.

14.3 The proposed action is inconsistent with policy guidelines of Chapter 288, Florida Statutes and the economic criteria of those portions of the Coastal Zone Management Act of 1972 and the Florida Coastal Management Program for which the Department of Commerce has responsibility. Both the net employment and net income impacts of the plant closure would be negative.

No. of Comments 1 Document No. 009

Response: *Chapter 288 of the Florida Statutes provides policy guidelines for the Department of Commerce's mission to promote economic development. Chapter 288 does not address government agencies' or private businesses' policies to reduce the number of jobs from the current employment level. In addition, neither the Coastal Zone Management Act of 1972 nor the Florida Coastal Management Program has economic criteria that would address a reduction in the number of jobs. Therefore, DOE was not inconsistent with any specific guidelines or with economic criteria of the aforementioned laws. According to the EA discussions in section 4.1.7.7 and 4.3.2, the net employment and net income effects would be negative; however, the EA analysis determined that these effects are not significant.*

14.4 The presence of nuclear materials define Mound as a nuclear site. The separation of a nonnuclear component from the overall PEIS process, which allows only an EA and limited public comment, is entirely inappropriate for the Mound site. Not by any stretch of the imagination can a conclusion that Mound is a nonnuclear site be made (argument referenced in document EA-S-005).

No. of Comments 2 Document No. 005

Response: *The basis for including tritium handling functions in the EA is discussed in section 1.2 of the document. In addition, it should be emphasized that whether a function is nuclear or nonnuclear is not the determining factor in whether an EIS is required to analyze the impacts associated with that particular function. Rather, the most important factor is whether there are significant impacts associated with the proposal. In this case, where there is an association between the proposed action in the EA and a larger program, it is also important that there is independent utility to the action proposed in the EA, and that decisions to be made in the Reconfiguration PEIS will not be affected by the decisions to be made regarding nonnuclear consolidation.*

14.5 The Draft EA states, "if the analysis in the EA supports a finding of no significant impact (FONSI), DOE plans to proceed with nonnuclear consolidation and incorporate the nonnuclear consolidation decisions in to the PEIS analysis." It is also the misapplication of an environmental document under the National Environmental Policy Act (NEPA).

NEPA was not designed to suggest that environmental considerations be the only factors documented prior to a decision. Environmental factors are a consideration, but not necessarily the driving force in an agency decision.

No. of Comments 1 Document No. 019

Response: *The sequence of events listed in the comment and further expanded in section 1.3 of the EA (page 1-6) are in accordance with NEPA process and procedures. DOE concurs that environmental considerations are not the only factors which the decision-maker must review in making a final decision on nonnuclear consolidation. However, these other factors are outside the scope of the EA. Nonnuclear consolidation has been thoroughly studied in a number of reports, such as the "Nonnuclear Consolidation Plan," "Two-Site Study," "Tritium Consolidation Study," and the "Nonnuclear Reconfiguration Cost Effectiveness Report." Any decision made on nonnuclear consolidation would consider the information presented in these reports as well as other sources.*

14.6 To suggest, as the Draft EA does, that minimal impacts on wildlife and air quality associated with moving stainless steel work away from Rocky Flats, justifies the decision to make such a move, is a misapplication of NEPA. This approach suggests that the proposed nonnuclear consolidation is flawed and premature, irrespective of environmental impacts.

No. of Comments 1 Document No. 019

Response: *The proposal to move stainless steel work from RFP is not for the purpose of reducing impacts on wildlife and air quality. The EA analyses of impacts on these resources is a result of the moving of these functions from RFP.*

15 National Nuclear Weapons Policies

15.1 Since DOE has identified a major concern about hazardous and toxic waste from past and current practices, the existing problem should be cleaned up first. Cleanup should be DOE's first priority. No new activities should be initiated until the risks have been significantly mitigated.

No. of Comments 1 Document No. 004

Response: *DOE is committed to cleaning up environmental problems at it's sites and has implemented steps to identify and remedy these problems. Responsibility for the cleanup program lies with DOE's Office of Environmental Restoration and Waste Management and is detailed in the Department's Environmental Restoration and Waste Management Five-Year Plan. Activities associated with the Proposed Action would not interfere with these ongoing characterization and remediation programs.*

15.2 Los Alamos National Laboratory (LANL) could play a major role in helping society understand the effects of nuclear weapons manufacturing activities and could provide the science and technologies for cleaning up such sites worldwide. Rather than compounding existing environmental problems, LANL should become a world center for the science of environmental cleanup. Seeking LANL's participation in such a scheme would be beneficial when working with other nations such as the former Soviet Union. The people of the this community are especially qualified to understand and work with other cultures because of the rich American Indian and Hispanic communities found in Los Alamos. DOE should do a cost-benefit analysis for reallocating LANLs scientific resources to environmental cleanup.

No. of Comments 2 Document No. 004

Response: *Los Alamos National Laboratory (LANL) is presently engaged in conducting research related to environmental cleanup technologies. However, the United States must maintain a credible nuclear deterrent, and LANL has been and remains a critical participant in the weapons-related work necessary to assure this deterrent capability. This work need not detract from the research presently being done at the Laboratory with regard to environmental restoration.*

15.3 DOE intends to consolidate its nuclear operations without any discussion of an accident or enemy attack and the consequences such an event would have on DOE's ability to support the defense mission. DOE should consider the increased risk of an accident at a larger, more complex facility over the current smaller, highly specialized operations. An accident at the consolidated sites would render America's nuclear production capability dysfunctional.

No. of Comments 1 Document No. 005

Response: *The EA addresses, and the PEIS will address, the health and environmental impacts associated with postulated accident conditions. This includes more frequent flammable gas and chemical deliveries at sites. In all cases, although the potential for accidents may increase slightly, the accident profiles at these sites would not change. Acts of war are beyond the scope of both documents and are not addressed. Decisions made on the reconfiguration of the complex would take into account, among other things, national security concerns.*

15.4 The narrow focus of this EA on Defense Program (DP) missions is inappropriate and even internally inconsistent (See EA pp. 2-4 and Table ES-1 on Page ES-7). Mound missions, including Radioisotopic Thermoelectric Generators (heat sources), calorimeters, stable isotopes, commercial tritium sales and safeguards and security are overlooked or only recently realized as a problem by DP.

No. of Comments 1 Document No. 005

Response: *The Mound missions are discussed in section 3.2.2.1 of the EA. Non-DP missions are identified and those required to support DP missions (e.g. calorimeters), as well as the commercial sale of tritium are included in the consolidation proposal and discussed in the EA analysis. Mound missions not relocated as a result of nonnuclear manufacturing consolidation are also discussed.*

15.5 Public Law 100-456 requires that there be no hiatus in stockpile remanufacturability and surveillance in the event of a test ban. DOE's plan accepts a three to five year interruption in gas transfer system surveillance and unknown remanufacturability. There are no current plans to address explosive surveillance.

No. of Comments 2 Document No. 005

Response: *See response to comment 01.05.*

15.6 Recent world events call for a new weapon complex downsizing study. The EA and the NCP, upon which it is based, are no longer valid. The NCP contains obsolete stockpile requirements. In fact, the EA appears to have used post-START II data in evaluating the preferred alternative, and pre-START I data in evaluating other alternatives. The existing NCP is heavily weighted towards new weapons production. Due to the drastic changes which have occurred during the past two years, the NCP must change from production-driven to stockpile maintenance-driven. Maintenance has always been an integral part of the mission at the Mound Plant. One comment compared the mission at Mound to that of Kansas City stating that the orientation of the Kansas City Plant has historically been toward production of new weapons rather than maintenance.

No. of Comments 2 Document No. 005, 006

Response: *The EA has been revised (sections 1.6, 1.6.1 and 1.6.2) to include a detailed discussion of world events and reconfiguration planning. Section 1.6.2 specifically describes the basis for nonnuclear consolidation as presented in the NCP and the modifications that have been made due to changing world events and additional detailed studies. The analysis of the alternatives in section 3.4 of the EA has been changed to insure that all alternatives now use the same post-START II data as the Proposed Action.*

15.7 The fact that the NCP has been wholly overtaken by arms control agreements and political developments in the former Soviet Union, suggests that it would be best if the nonnuclear consolidation issue were entirely reconsidered as part of a broader, consensus-based consolidation of the Nuclear Weapons Complex. Believes a new consolidation plan should be drawn up by knowledgeable people outside of DOE to ensure the objectivity of the process.

No. of Comments 2 Document No. 005, 006

Response: *See response to comment 15.06.*

15.8 The DOE nuclear weapons complex is currently not in production. Neither the new administration nor the new Congress have made a determination about future weapons production, maintenance, and decommissioning needs. In light of these unknowns, is it prudent for DOE to make an investment of $550 million implementing the first five years of a nonnuclear consolidation plan in the absence of a comprehensive national nuclear weapons policy?

No. of Comments 1 Document No. 019

Response: *The costs of implementing the nonnuclear consolidation proposal are being evaluated in a separate process, and is described in the "Nonnuclear Reconfiguration Cost Effectiveness Report" (DOE/DP-0112P), January 1993. This report has been reviewed by three independent consultants to DOE and they each concluded that the proposed consolidation was cost effective and reasonable. These costs, although a factor in the decision process, are utilized in the EA only to determine the reasonableness of alternatives for evaluation.*

15.9 The Draft EA states that the nonnuclear consolidation proposal will "reduce operating costs to achieve a near term savings well in excess of $100 million a year and a long term savings in excess of $25 billion annually."

This statement does not hold up against the findings of the nonnuclear reconfiguration cost effectiveness report issued by DOE in January 1993. This report suggests that the supplemental cost study for nonnuclear consolidation "showed that the nature of fixed portions of overhead costs prevent any meaningful reductions without actually terminating the operations of the plant."

This report documents no cost savings from nonnuclear consolidation until after decontamination and decommissioning at sites like Rocky Flats and Mound — likely 20 years in the future. Until the relationship between decommissioning and nuclear consolidation is better understood, cost savings are likely to be illusory.

No. of Comments 1 Document No. 019

Response: *Chapter 2, section 2.3 of the EA states that near-term savings would be in excess of 100 million dollars a year and long-term savings in excess of one-quarter of a billion dollars annually; not $25 billion annually. This is supported by the "Nonnuclear Reconfiguration Cost Effectiveness Report" and is cited as the reference for the statement in the EA.*

16 Relationship to Other DOE Programs and Activities

16.1 Given the difficult issues involved in the larger question of reconfiguration of the entire DOE nuclear weapons complex, how can DOE made sound judgments about reconfiguration of the nonnuclear portion of the complex — particularly in advance of the programmatic environmental impact statement?

No. of Comments 1 Document No. 019

Response: *Section 1.3 of the EA explains where and how the proposal to consolidate the nonnuclear manufacturing elements of the complex fits into the proposal to reconfigure the entire nuclear weapons complex as stated in the EA (page 1-6). "DOE believes that the NEPA review of the nonnuclear consolidation proposal can and should be separated from the PEIS, because: (1) nonnuclear consolidation has benefits independent of the rest of the reconfiguration proposal; and (2) nonnuclear consolidation decisions would neither affect, nor be affected, by the reconfiguration decisions that will be made after the PEIS is published."*

21 Support Of or Opposition To DOE Policy

21.1 The Nuclear Weapons Complex does need to be downsized. While no one likes to see a major employer shut its doors, many communities throughout the country have accepted the closure of large DOD facilities, because of the need for cost-effectiveness. DOE could have easily accomplished what DOD was able to, and could have done so voluntarily. It is hard to avoid the idea that DOE took the course it did because to have taken another one would have risked being led to a different conclusion.

No. of Comments 1 Document No. 006

Response: *The Department believes that the nonnuclear consolidation proposal is cost-effective. There have been a number of studies since the Nonnuclear Consolidation Plan was completed in September, 1991 that have confirmed that conclusion. These include the Two-Site Study, the Supplemental Cost Study, and the recently issued Cost Effectiveness Report to the Congress which was based upon budget-quality cost estimates. The Cost Effectiveness Report included sensitivity analyses which further confirm these conclusions. In addition, the report, along with its input data, has been reviewed by three independent consultants to the Department of Energy. Their analysis has determined that the proposed consolidation of nonnuclear activities is cost effective and reasonable, and will not increase the technological, environmental, safety, or health risks associated with Department facilities.*

21.2 The omission and inconsistencies of the NCP and EA could possibly be explained as the inevitable products of an effort by DOE to do what has never been done before, phase out a complex designed to produce the most deadly weapons man has ever known. It is recognized that for many years DOE has provided the nuclear deterrent that helped keep America at peace, however, the Nuclear Weapons Complex was produced with large amounts of public money, and with little regard for long-term considerations of public health and safety, and in a manner that precluded public review of what money was being spent on and what risks were being run. DOE's track record does not inspire confidence in its ability to estimate accurately either the environmental risks or the financial costs associated with an undertaking of this magnitude. (This is a lengthy comment which

makes reference to the environmental disaster area at Fernald, OH – see EA-S-006 closing paragraphs).

No. of Comments 1 Document No. 006

Response: *The Nonnuclear Consolidation EA contains a thorough analysis of the environmental impacts of the Proposed Action. Affected States and Indian Tribes have had an opportunity for review and comment prior to Departmental approval of the EA, and the general public will have an opportunity for comment on the proposed FONSI before any final decisions are made regarding nonnuclear consolidation. The Department has carefully considered the comments received from the affected States and Indian Tribes in making revisions to the EA which accompanies the proposed FONSI. With regard to financial costs, see response to comment 21.01.*

21.3 NEPA requires that the government take no actions which prejudice the ROD. There has been a deliberate bias toward the funding of capital projects at receiver sites. The Mound Citizens Action Group believes that prejudicial actions have taken place. This comment contains several examples where the Mound Citizens Action Group believes the ROD has been prejudiced (reference document EA-S-005, pp. 4-5 and pp. 9-10).

No. of Comments 2 Document No. 005

Response: *The nonnuclear consolidation EA has been prepared to determine if the Proposed Action, consolidation at the Kansas City Plant, would result in significant environmental impacts and require analysis in the Reconfiguration PEIS. The decisions to be made regarding nonnuclear consolidation will not prejudice the alternatives to be discussed in the PEIS or the Record of Decision which will follow that document. Decisions regarding the future of the nuclear sites being considered as alternative sites for location for plutonium, uranium/lithium and tritium supply functions in the PEIS would be made regardless of whether the comparatively small proposed activity transfers are made.*

The apparent bias in the floor space requirements as they applied to the Proposed Action and the various alternatives has been eliminated. In the current version, the only numbers used for floor space requirements are those based on the CDR's performed for the Proposed Action. This has resulted in a single total requirement of 2,936,000 ft^2 for the consolidation of all nonnuclear activities. This number reflects any reduction in space requirements at receiver sites for activities currently at a donor site. The method of determining the required additional space needed at each alternative site was then determined based on the total requirement less those activities still going to other sites versus the total facility space at the alternate site.

21.4 The EA does not discuss community support for Mound nor a 1992 petition requesting a reconsideration by DOE of their plans to close Mound which was signed by over 46,000 Miami Valley residents. It and resolutions of support from 18 municipalities, representing

500,000 people in the Dayton, OH metropolitan area (delivered to the White House in May 1992), have been ignored in the EA.

No. of Comments 1 Document No. 005

Response: *The DOE appreciates the support that has been provided by the residents of the Dayton metropolitan area to the Defense Program weapons mission at Mound. International events and the START I and START II Treaties require the DOE to make tough decisions regarding meeting its mission requirements. These decisions must also take into account the need for better management, cost savings, and preservation of technical competence, while at the same time meeting reduced workload requirements. While the DOE has not ignored the fact that there is substantial support for the Defense Program mission at Mound, this EA is focussed on the environmental impacts of the alternatives to meet the requirements.*

G.4 DOCUMENTS RECEIVED

EA–S–001
Comment Letter

State of Missouri
OFFICE OF ADMINISTRATION
Post Office Box 809
Jefferson City
65102
(314) 751-3311

Mel Carnahan
Governor

Richard A. Hanson
Commissioner

January 13, 1993

Stephen Sohinki
DOE Office of Reconfiguration
P. O. Box 3417
Alexandria, VA 22302

Dear Mr. Sohinki:

Subject: 92120054 - Nonnuclear Consolidation Environmental Assessment - Nuclear Weapons Complex Reconfiguration Program

The Missouri Federal Assistance Clearinghouse, in cooperation with state and local agencies interested or possibly affected, has completed the review on the above project application.

None of the agencies involved in the review had comments or recommendations to offer at this time. This concludes the Clearinghouse's review.

A copy of this letter is to be attached to the application as evidence of compliance with the State Clearinghouse requirements.

Sincerely,

Lois Pohl, Coordinator
Missouri Clearinghouse

LP:cm

EA–S–002
Comment Letter

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, Florida 33702

January 12, 1993

Mr. Stephen M. Sohinki
Director, U.S. Department of Energy
Office of Environment, Safety,
Health and Quality Assurance
P.O. Box 3417
Alexandria, Virginia 22302

Dear Mr. Sohinki:

This responds to Mr. Howard R. Canter's December 22, 1992, letter which requests comments on the U.S. Department of Energy's Nonnuclear Consolidation Environmental Assessment (EA). The National Marine Fisheries Service (NMFS) has reviewed the document and provides the following comments for your consideration.

1/61 According to the EA, the Proposed Action would not significantly affect aquatic biota at any of the facilities affected by the planned consolidation. The EA states that there are no plans to significantly modify surface water withdrawals or discharges, excavate or fill aquatic habitats, or discharge hazardous materials into aquatic ecosystems.

Based on these considerations, the resource descriptions and analysis of anticipated impacts to those resources for which the NMFS has stewardship responsibility appear to be adequate.

We appreciate the opportunity to provide comments on the EA and request that we be notified of any changes in the proposed action that may significantly affect living marine resources.

Sincerely,

Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

EA-S-003
Comment Letter

South Carolina Department of Archives and History
1430 Senate Street, P.O. Box 11,669, Columbia, South Carolina 29211 (803) 734-8577
State Records (803) 734-7914; Local Records (803) 734-7917

January 15, 1993

Mr. Stephen Sohinki
US Department of Energy
Office of Reconfiguration
P.O. Box 3417
Alexandria, VA 22302

Re: Nonnuclear Consolidation
Environmental Assessment
Savannah River Site
Aiken, Aiken County
EIS-921216-019

Dear Mr. Sohinki:

The SC State Clearinghouse has provided us with a copy of the Environmental Assessment (Volumns I & II) for this project. As the State Historic Preservation Office (SHPO) for South Carolina, we are providing comments on the effect this undertaking could have on cultural resources.

A programmatic Agreement (PA) with the SHPO, DOE and the Advisory Council on Historic Preservation was ratified on August 24, 1990. This PA enables DOE to identify cultural resources, assess them in terms of National Register eligibility, and develop mitigation plans for affected resources in consultation with the SHPO.

Compliance with the stipulations of the PA should satisfy DOE's responsibility for cultural resources under Section 106 of the National Historic Preservation Act of 1966, as amended, and NEPA. If you have any questions, call either me or Ms. Nancy Brock, Review and Compliance Branch Supervisor, at 803/734-8609.

Sincerely,

Ian D. Hill
Intergovernmental Review Coordinator
State Historic Preservation Office

cc: Mr. Mark Brooks, SCIAA-SRS
Mr. Drew Grainger, DOE-SRS
Mr. Tom McCullouch, Advisory Council on Historic Presevation
Dr. Bruce Rippeteau, SCIAA
Mr. John Zemp, SC State Clearinghouse

EA-S-004
Comment Letter

SANTA CLARA
POST OFFICE BOX 580
(505) 753-7326
(505) 753-7330

INDIAN PUEBLO
ESPANOLA, NEW MEXICO
87532

OFFICE OF GOVERNOR

January 19, 1993

Mr. Richard Claytor, Assistant Secretary
for Defense Programs
C/O Stephen Sohinki
DOE Office of Reconfiguration
P.O. Box 3417
Alexandria, VA 22302

Re: Environmental Assessment: Reconfiguration

Dear Mr. Claytor:

Thank you for including Santa Clara Pueblo in your review of the proposed DOE Reconfiguration as it applies to Los Alamos National Laboratories. We have completed an initial review. It is outside our expertise to address the technical merits of weapons development. We have taken note of environmental issues including cultural resources. We are most concerned about three issues: 1) the risks posed to this Pueblo from potential accidents by vehicles moving hazardous/toxic materials and waste to and from Los Alamos; 2) the potential effects of activities on air and water quality, including wildlife, by increased and continue unmitigated activities; and 3) cultural impacts.

1/10.1
2/13.1
3/7.1

We have tried to explain to DOE and LANL officials that the area inclusive of Los Alamos is considered by the TEWA people as sacred. We are not talking necessarily of physical sites. We have tried to share a concept that explains why and how we relate activities that violate the natural environment violate our traditional religious beliefs. This has nothing to do with mapping some archaeological sites. It does have much to do with how we view activities that disturb the environment and that relationship with other aspects of our existence, yours and ours, spiritual, social, etc. The American Indian Religious Freedom Act fails to explain that relationship and how important it is to us. I can only share with you a deep regret at our inability to communicate this relationship and how it impacts any activity, and certainly, environmentally disturbing events on our culture.

4/7.1

As you stated to us, the proposed Reconfiguration would not, at this time, involve nuclear materials. We are concerned about all hazardous and toxic substances. We are more concerned with what we do not know than what is published. We are also concerned about cumulative effects. DOE has identified a major concern about hazardous and toxic waste from past and current practices at Los Alamos. We understand, from discussions with your staff, that this is a long-term process of cleaning up the site. This clean-up doesn't really address, because we have been given no resources, the transportion of hazardous and toxic materials by the wind, in the groundwater, by animals, to Santa Clara lands. If a major problem already exists, and DOE says that it does, probably of "Superfund" dimensions, does it make sense to exasperate the problem by bring more activities to Los Alamos until clean -up has

5/9.1
5/9.10
5/13.2
6/15.1

Reconfiguration
Page-2-

6/15.1 progressed to a point where the potential and real risks have been significantly mitigated? It seems to me that the United States faces major problems surrounding weapons development over at least fifty years. From my readings it also is apparent that other countries face similar problems. There are some of us who believe that Los Alamos National Laboratories could play a major role in helping society understand the effects of activities such as those that have occurred in Los Alamos and that, over time, could provide the science and technologies for cleaning up such sites world wide. If Los Alamos could change its direction such that it could become a laboratory of self-study, working with the National Academy of Science, agencies such as the Center for Disease Control, with other universities and governments, to study the long-term effects on physical features such as buildings, the natural environment, and people, from exposure to substances(toxic, hazardous),the contributions would be monumental. We 7/15.2 believe that Los Alamos has that capability if only it had the support and direction. Rather than compounding existing environmental problems, LANL should step back, and become a world center for the science of environmental clean-up. In defense of my tribe, and other communities in Northern New Mexico, the opportunity to seek our participation in studies such as those proposed to the Center for Disease Control, i.e., the dose reconstruction studies, and in seeking our participation in learning about how to live with other cultures, would also be beneficial especially when working with other nations such as in the former Soviet Union. One of the sorely lacking bits of knowledge is how to understand and work with other cultures. What better opportunity than here, in America, working with the American Indians and Hispanic communities.

The issue of resource allocation to assist our tribe in building the capacity to respond to any kind of accident is not addressed in the Reconfiguration documents. We negotiated an ACCORD with DOE, which was a first step. We met with Los Alamos Operations Staff in December and asked for assistance in scoping our needs at Santa Clara. We were told that DOE would be more comfortable working with a consortium of tribes. But such a consortium does not buy us tribal expertise, equipment, and other resources including manpower to deal with this issue. As long as there is a laboratory 8/10.1 we will be exposed to risks associated with the transportation and handling of toxic and hazardous materials. We cannot rely on their jurisdictions, which have no legal status on our reservation, to respond to an accident. We have to prioritize this issue and indicate that this is an environmental issue of major magnitude. We need to have funding to support staff, training, and equipment. We have no emergency plan and no resources to develop same.

In conclusion, we would counter the proposal for increased weapons development at Los Alamos with suggestion to revisit the role of the laboratories into the next century and look at the potential benefits and cost-benefit analysis for reallocating our rich scientific resources to areas such as environmental clean-up. Santa Clara is not anti-Los Alamos. We respect its role and the history it played in "winning the peace." We 9/15.2 suggest, as neighbors, as a sovereign government, as a potential beneficiary and participant, in a new role for Los Alamos that builds on its experience in mitigating environmental conditions world-wide. At the same time, I cannot emphasize enough the plea we make to take the time to understand our culture and the adverse impacts 10/7.1 activities at Los Alamos have on our culture.

Reconfiguration
Page-3-

I hope these comments will be seriously considered before any decision is made on the future direction of Los Alamos.

Sincerely,

Walter Dasheno, Governor

Vice President Albert Gore, Jr.
Secretary -Designate, U.S. Department of Energy
Senator Jeff Bingaman
Congressman Bill Richardson

GA 92-161

OFFICE OF BUDGET AND MANAGEMENT
STATE CLEARINGHOUSE TRANSMITTAL

30 E. Broad St., 34th Floor
Columbus, Ohio, 43266-0411
Phone (614) 466-0697 / 0698

STATE APPLICATION IDENTIFIER NO: OH921223-U978-36471
RESPONSE ON 60 DAY REVIEW SHOULD BE RETURNED 15 DAYS PRIOR TO CLEARANCE DATE OF: 93-01-27
FOR FULL APPLICATION CALL BY : 92/01/04

APPLICANT: DEPT. OF ENGERY / OFFICE OF RECONFIGURATION
ADDRESS: P.O. BOX 3417
CITY: ALEXANDRIA STATE: VA ZIP: 22302-0000
ATTENTION: STEPHEN SOHINKI PHONE: (202) 586-0838

PROPOSED FEDERAL FUND: $00
PROPOSED TOTAL FUND : $00

PROJECT : TERMINATION OF NONNUCLER MANUFACTURING

PROJECT DESC: TERMINATION OF NONNUCLEAR MANUFACTURING ACTIVITIES AT THE MOUND PLANTS IN OHIO, IMPACTS CITY OF MIAMISBURG AND MONTGOMERY COUNTY, STARTDATE 05/93

REVIEW AGENCY: DEPARTMENT OF AGRICULTURE
DEPARTMNT OF NATURAL RESOURCES
DEPARTMENT OF HEALTH
DEPARTMENT OF TRANSPORTATION
OH ENVIRONMENTAL PROTECTION AG
ST HISTORIC PRESERVATION OFC

CLEARINGHOUSE:
MIAMI VALLEY REGIONAL PLANNING COMMISSION (MVRPC)

Reviewing agency must complete this section.
COMMENTS - attach another sheet. Comments cited in this Section must include (1) Identification of reviewing agency's statute or specific plan or program related to this proposal. (2) Description of impact of this proposal on identified plan or program. (3) Reviewer's recommended changes for or additions to the proposal. Please type all comments and include SAI number on your comment sheet.

REVIEWING AGENCY POSITION ON PROJECT (Mark one only)
- ☐ No comment.
- ☐ Clearance of the project should be granted.
- ☐ Clearance of the project should not be delayed, but applicant should answer the reviewer's questions or concerns. See enclosed comments.
- ☐ Clearance of the project should only be granted on the condition that the applicant use the recommendations in the enclosed comments. (Executive or Deputy Director Signature Needed.)
- ☒ Clearance of the project should be delayed until the applicant has satisfactorily addressed the concerns stated in the enclosed comments. (Executive or Deputy Director Signature Needed.)

PLEASE TYPE THE FOLLOWING INFORMATION.

Reviewer's Name

Executive or Deputy Signature

Agency Name: Miami Valley Regional Planning Commission Div.
Street Address: 40 W. Fourth St. Ste. 400 City: Dayton State: Ohio
Phone: (513) 223-6323 Zip Code: 45402

OBM 6705 (Rev 8/87)

Miami Valley Regional Planning Commission

400 Miami Valley Tower
40 West Fourth Street
Dayton, OH 45402
(513) 223-6323
FAX (513) 223-9750

AGENCY RVIEW AND COMMENT FORM

1. APPLICANT	2. PROJECT TITLE	3. GA #
DEPT. OF ENERGY	TERMINATION OF NONNUCLER MFG. (Mound)	92-161

The attached program project has been submitted to MVRPC for its clearinghouse review. This form provides a simplified means to submit your input. If you care to comment, please complete this form and return it to MVRPC by the date noted on the transmittal letter.

4. AGENCY REVIEW COMMENTS (To be completed and returned to the MVRPC in order that your concerns or comments are considered/reflected in the review process)

Check one of the appropriate boxes. Indicate comments below the area marked. Attach an additional sheet, if necessary.

- a. ☐ Recommend Favorable Review
- b. ☒ Suggest changes for improving project. (explain below)
- c. ☐ Recommend unfavorable review (explain below)
- d. ☐ Request clarification or additional information
- e. ☐ No Comment

COMMENTS: This document should not be interpreted as an endorsement of the consolidation as proposed.

1A/10.7

If such a consolidation was to occur, adequate procedures and qualified personnel must remain at Mound to ensure a satisfactory clean-up. The community has, in my opinion, a very real fear that all those capable of monitoring and effecting clean-up will be transferred or leave Mound through attrition, if these plans are implemented.

PREPARED BY:	APPROVED BY:	AGENCY:	DATE:
	James A. Foster	Miami Township	1/15/93

City of Miamisburg

10 NORTH FIRST STREET • MIAMISBURG, OHIO 45342-2305 • FAX 513/866-0891 • PHONE 513-866-3303

January 26, 1993

Miami Valley Regional Planning Commission
Attention: Gretchen B. Brafford
Assistant Executive Director
400 Miami Valley Tower
40 W. Fourth Street
Dayton, Ohio 45402

RE: Request for Intergovernmental Review Comments
Concerning: Department of Energy – Termination of Nonnuclear Manufacturing (The Mound, Miamisburg) G.A. = 92-161

Dear Ms. Brafford:

18/8.4 The City of Miamisburg and its citizens have been actively involved in the above-referenced project since the Department of Energy announced that closing the Mound facility located in our city was a possibility. Since that time, the City of Miamisburg and its citizens have been very active in communicating with the Department of Energy. We believe that closing the Mound is not in the best interest of our citizens, our community, our state, or our country. Listed below are the specific comments that the City of Miamisburg believes supports our position that the Mound should stay open. We would like the Miami Valley Regional Planning Commission to incorporate the concerns into its response to the Department of Energy's Environmental Assessment.

2/15.3

1. As the U.S. developed its nuclear weapons capability during and after World War II, a major consideration in developing the complex was to minimize the risk of a single accident or enemy attack disabling a large fraction of DOE's nuclear mission. However, DOE now intends to consolidate its nuclear operations without any discussion of an accident or enemy attack and the consequences such an event would have on DOE's ability to support the defense mission. Furthermore, DOE does not consider the increased risk of an accident at a larger, more complex facility over the current smaller, highly specialized operations. An accident at one of DOE's current operations would not completely disarm America's nuclear production capability. An accident at the consolidated sites would render America's nuclear

2/15.3 production capability dysfunctional if the facility could not be used for any length of time.

3/12.1

2. DOE has not included an environmental impact evaluation or study of dismantling and moving equipment to other locations. Environmental impact evaluations must include the potential release of radioactive and hazardous materials during dismantling and transportation of contaminated equipment. The additional impacts on traffic congestion, traffic accidents, and the potential for large population exposures posed by transporting radioactive and hazardous wastes are not addressed.

4/10.2

3. DOE does not consider the environmental consequences to the workers who dismantle the plants and move the operations to the consolidated sites. A large dose of radiation to these workers could occur during dismantling. Occupational exposure to other chemicals (e.g., asbestos, solvents, etc.) could also occur during the dismantling, but is also not considered by DOE.

5/10.3

4. DOE states that it is inadvisable to locate the tritium operations at the Mound due to the concentrated population near the plant. The Mound currently has 979,197 people in its region of influence (ROI). Savannah River Site, where the Mound's tritium production would be relocated, has a population of 528,785 in its ROI. However, Savannah River Site has fewer paths for evacuation and more restrictions due to the location of the Savannah River to the south and west and the lack of expressways in the area capable of handling an orderly, mass evacuation. Similarly, Kansas City Plant has a population one third greater than the Mound, and is restricted by the Kansas and Missouri Rivers, making an orderly evacuation of a large number of people very difficult. The Mound has no natural barriers, and has two major expressways capable of accommodating a mass evacuation. These parameters must be considered by DOE before an accurate environmental assessment of DOE's consolidation alternatives can be considered valid.

6/8.3

5. The DOE and the environmental assessment does not adequately address the socioeconomic impacts the closing of the Mound Facility would have on the City, the school district and this community's local economy. The environmental impact does not consider the impact of the closing on the City's tax revenues, and the school district's student enrollment. By using a large land area analysis for the socioeconomic impact, the environmental assessment dilutes and ignores the economic impact that the Mound Facility's closing would have on the community it is located within.

7/2.1 6. The Mound is located on the top of a hill overlooking the City and is a prominent figure in the City's skyline. DOE does not address adequately the aesthetic impact that the closing of the Mound would have for an indefinite period of time, on the aesthetic appearance of the City of Miamisburg.

In addition to the above concerns, the City of Miamisburg has attached a copy of another review of the Department of Energy's Environmental Assessment which was prepared by the Mound Citizens Action Group. These comments are set forth in the form of a "white paper" and are adopted by the City of Miamisburg for purposes of commenting on the Department of Energy's Environmental Assessment. Please consider and include these comments as having been made in addition to the above-referenced comments by the City of Miamisburg.

If you have any questions on any of the foregoing, please feel free to contact me at any time.

Sincerely,

John K. Weithofer
City Manager

Attachment
JKW:kac

MOUND
CITIZENS ACTION GROUP

A White Paper of Comments on the U. S. Department of Energy's Nonnuclear Consolidation Environmental Assessment, DOE/EA-0792, Vol. I and II

January 10, 1993

Prepared by
The Mound Citizens Action Group

P. O. Box 1124 Miamisburg, OH 45343-1124

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Executive Summary

9/14.1 The U. S. Department of Energy's environmental assessment, DOE/EA-7092, Vol. I and II, herein referred to as EA, although extensive in scope, is fundamentally flawed both in compliance with National Environmental Policy Act (NEPA) requirements and assimilation of accurate data to support conclusions.

Recent World Events Call for a New Weapon Complex Downsizing Study

10/15.7 This EA and the Nonnuclear Consolidation Plan (NCP), upon which it is based, are no longer valid. Many of the fundamental assumptions of the original study have been made obsolete by changing world events. Not only has the size of the enduring nuclear weapons stockpile been drastically reduced by United States/Russian agreements, but the production of new nuclear weapons has been reduced to zero for the foreseeable future. As outgoing Energy Secretary James Watkins stated in his news release of December 22, 1992, the focus of the DOE Nuclear Weapons Complex must change from one of new production to one of stockpile maintenance and surveillence. The existing NCP is heavily weighted towards new weapons production. Nearly all of the analysis in the EA is based on square footage comparisons and ratios based on the square footage needed to produce new weapons. For example, twenty-seven of the twenty-eight Kansas City Plant activities are rooted in production of new weapons, while only one relates to stockpile maintenance. Environmental impacts include the loss of land for new buildings necessary only to produce new weapons. In light of these fundamental changes, the NCP must change from production-driven to stockpile maintenance-driven. Only after the NCP is rewritten on the basis of these new realities can a valid EA follow. Continued modification of the original NCP cannot overcome the drastic changes that have occurred in the past two years.

The Presence of Nuclear Materials Defines Mound as a Nuclear Site

The separation of a "nonnuclear" component from the overall Programmatic Environmental Impact Statement (PEIS) process, which allows only an EA and limited public comment, is entirely inappropriate for the Mound site. Not by any stretch of the imagination can a conclusion that Mound is a nonnuclear site be made when:

11/4.4

1. A staff of over fifty health physics workers is employed;
2. Nuclear materials accountability is rigorously practiced for tritium, uranium, plutonium, and other elements — Mound is rated as a Category 1 Nuclear Facility because of these materials;
3. Security practices are commensurate with protection of both special nuclear materials (SNM) and source materials (SM);
4. Radiation monitoring is practiced on every employee and extensive environmental monitoring is required; and
5. Mound clearly fits the definition of a "nuclear facility" contained in DOE/EA-0792 on Page 9, which states:

> "A facility whose operations involve radioactive materials in such form and quantity that a nuclear hazard potentially exists to the employees or the general public. Included are facilities that: (1) produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium; (2) conduct separation operations; (3) conduct irradiated materials inspection, fuel fabrication, decontamination or recovery operations; or (4) conduct enrichment operations. Incidental use of radioactive materials in a facility operation (e.g., check sources, radioactive sources, and X-ray machines) does not necessarily require a facility to be included in this definition."[1]

This EA, in its present form, is not an acceptable document and no decisions such as a Finding of No Significant Impact (FONSI) should be drawn from it. There *is* a nuclear component to this proposed action and as such should be part of the PEIS process.

[1]Underlining is by the authors of this white paper and denotes applicability to Mound.

General Comments

On December 22, 1992, DOE released its predecisional draft of the environmental assessment for nonnuclear consolidation along with two supporting documents — the *Two-Site Nonnuclear Consolidation Study* and the *Tritium Consolidation Comparison Study*. The DOE has requested that the EA be reviewed by the plant sites and the states concurrently. Comments from the states are due to DOE by January 29, 1993. Comments from the plant sites are due to DOE by January 26, 1993 for review at a workshop on January 26 through 28, 1993. This white paper discussion provides some general, policy-type comments relative to the EA and the two supporting documents used as key resource documents in the EA.

These general comments have been consolidated around the following NEPA requirements:

1. Reliance on Expert Input
2. Avoidance of Prejudicial Actions
3. Consideration of Reasonable Alternatives
4. Direct, Indirect, and Cumulative Impacts
5. EA versus PEIS Requirements

1. Reliance on Expert Input

NEPA requires that EAs and PEISs rely on expert input. In several areas, expert input has been ignored and less-than-expert input has been utilized in its place.

12/1.4

The largest area where expert input has not been used is the extensive use of the "normalized data"[2] contained in the NCP report prepared by DOE in September, 1991 as the primary basis for engineering design criteria and economic analysis data used in assessing the environmental and socioeconomic impacts of the proposed action. Data provided by the plant sites was "normalized" by DOE in developing the preliminary

[2]Biased against Mound. DOE manipulated their cost data to place Mound at a disadvantage.

screening of plant sites for ranking purposes. Further compounding this problem is that the EA uses these data for analysis of all the alternatives (including the Two-Site Study and Tritium Consolidation Study) except the proposed action.

12/1.4 The second area where expert input is not used, even though provided, is in the subjective elimination of Mound as a potential consolidation site for tritium operations. DOE says that it would not be "prudent" to place large inventories of tritium in a densely populated area. The *Tritium Consolidation Comparison Study: Risk Analysis* (DOE/DP/00248-H1) stated that both Mound and Savannah River are acceptable sites and that both sites far exceed all EPA and DOE requirements for environmental risk from credible events.

12A/1.9 The General Accounting Office has reviewed the NCP report prepared by DOE prior to release of the EA and recommended that DOE start the planning process anew.

2. Avoidance of Prejudicial Actions

NEPA requires that the government take no actions which prejudice the Record of Decision. The selective application of data for the various alternatives considered could constitute such an action. Other actions which have taken place which could have prejudiced the Record of Decision include the start of construction of the "flood wall" around the Kansas City Plant[3] and the start of manufacturing development engineering projects at Sandia National Laboratory for the privatization of selected manufacturing operations now performed at several of the plants. There has been a deliberate bias toward the funding of capital projects at receiver sites. 13/21.3

[3]Executive Order #11988 allows for the mitigation of potential flood damage to existing facilities, but requires establishing the "only practicable alternative" for the introduction of new activities.

An example of the bias of the NCP/EA is the reduction of floor space requirements as applied to KCP and not to Mound or Pinellas. Page H-7 of the NCP shows that 389,700 square feet of additional floor space will be needed at KCP to incorporate Mound and Pinellas missions. Page 3-77 of the EA shows that only 97,960 sqaure feet are needed at KCP to perform the same missions. This 75% reduction in floor space requirements may be reasonable in light of the reduction in stockpile and new building requirements. The Mound requirement, however, only changed from 1,745,700 square feet (NCP, Page H-8) to 1,659,804 square feet (EA, Page 3-109), five percent reduction. The Pinellas requirement changed from 1,612,400 sqaure feet (NCP, Page H-9) to 1,673,685 square feet (EA, Page 3-115), a four percent increase. This is especially interesting in light of the fact that nearly all of the KCP workload is manufacturing and assembly of new weapons, none of which will be built in the foreseeable future. If the same 75% reduction factor were applied to the Mound requirement, the resulting floor space requirement would be only 415,000 square feet. Mound has already identified 420,000 to 480,000 square feet of available space as a result of stockpile downsizing. This suggests that the NCP mission could be accomplished at Mound within existing buildings. Many of the impacts discussed in Section 4.2 of the EA are based on the perceived need for new buildings at Mound. 13/21.3

3. Consideration of Reasonable Alternatives

NEPA, the Council on Environmental Quality, and Executive Order #11988 require that reasonable alternatives be considered throughout the process. Several alternatives, including the two-site consolidation option and the tritium consolidation option, were defined as "unreasonable" and eliminated from consideration. These options were eliminated from consideration through the use of "normalized data" from the NCP report and through the subjective disregard of expert input relative to environmental impact of tritium consolidation at Mound. DOE disregarded the tritium consolidation at Mound in the face of a recent study by Scientech, Inc., hired by DOE to assess the risks involved 14/1.1

14/1.1 with the Tritium Consolidation Study. In its report to DOE, Scientech stated that, "It is also shown in the report that consolidation of tritium activities at either SRS or Mound would fall within DOE safety goals contained in SEN 35-91."[4]

4. Direct, Indirect, and Cumulative Impacts

15/1.2 NEPA requires that all the direct, indirect, and cumulative impacts of a proposed action be considered. Several of the manufacturing operations currently conducted at Mound have been omitted from the EA. These operations are critical to those weapons remaining in the nuclear stockpile. The product lines and manufacturing operations are: explosive timer production, explosive firing set production, low voltage detonator production, actuator production, explosive surveillance operations and backup production operations for gas reservoir loading operations. The environmental impacts of providing either primary or backup manufacturing operations at the design laboratories or primary manufacturing operations within the private sector have not been addressed in the EA. Costs for these activities are being omitted from the economic analyses, as well.

16/9.2 Closure of sites will create radioactive (transuranic, low level, and mixed) wastes which have been ignored in the EA. In one case, generation of transuranic waste would be transferred to a receiver site. Closure of sites will also generate other hazardous and nonhazardous wastes but does quantify the size or impact of these wastes. DOE states that these would be addressed in the PEIS for environmental restoration.

17/8.3 The socioeconomic analysis used in the EA uses relatively large land areas as the basis for the economic impact analyses. Using the large areas has hidden the impact of closure of Mound on the tax revenues for the city of Miamisburg. Closure of Mound would

[4] DOE/DP/00248-H1, "Tritium Consolidation Comparison Study: Risk Analysis", December, 1992, Page iii.

17/8.3 decrease the city's direct tax base by $1.4 million, a significant 20% impact. An analysis of all economic impacts on the local communities is absent. A similarly large impact will affect the city of Largo, Florida. However, it is impossible to make such a judgment given the dilution of the economic impacts through the reliance upon large land areas.

18/21.4 The EA does not discuss community support for Mound. Early in 1992, a petition requesting a reconsideration by the DOE of their plans to close Mound was signed by over 46,000 Miami Valley residents. It and resolutions of support from eighteen municipalities, representing 500,000 people in the Dayton, Ohio metropolitan area, were delivered to the White House in May, 1992 by Miamisburg Mayor Dick Church and other Dayton area business and political leaders. The petition was a demonstration of support by the community and a recognition of Mound's positive contributions to the community and its excellent environmental record.

5. EA versus PEIS Requirements

19/14.2 The EA is so broad in its coverage of the environmental impact that it nearly meets the information requirements for a PEIS. As originally defined, an EA was to constitute a small study to be used to expedite the review and decision process. Given the breadth of data and information coverage, it seems reasonable that the PEIS process should be used instead of the EA process. One of the major differences between the PEIS process and the scope of the nonnuclear consolidation EA is the absence of a requirement for public hearings for an EA that is required for a PEIS.

Specific Comments on the Nonnuclear Consolidation Environmental Assessment

20/14.4 1. Both the Mound and Pinellas plants are arbitrarily defined as "non-nuclear" in some cases, especially where necessary to support separation from a more rigorous PEIS process. This is discussed in some detail in Section A.

20A/1.7 2. The narrow focus of this EA on Defense Program (DP) missions is inappropriate and even internally inconsistent.[5] Mound missions, including Radioisotopic Thermoelectric
21/15.4 Generators (heat sources), calorimeters, stable isotopes, commercial tritium sales and safeguards and security are overlooked or only recently realized as a problem by DP.

3. Numerous (>1000 individual items) nuclear material wastes, including plutonium, a transuranic (TRU) waste, exist at Mound and/or will be generated by ceasing DP missions. The EA addresses this on Page 4-143 by stating:

> "Because there are no TRU wastes associated with any of the nonnuclear DP activities at Mound that would be phased out due to the proposed action, no further discussion of TRU waste management or generation is presented."

22/9.3 This is incorrect.

Statements on radioactive, sanitary, and solid waste generation on Page 4-144, such as:

> "Due to the phase out of DP nonnuclear functions, Mound would no longer treat alpha waste water and discharge pretreated processed waste water and sanitary waste water effluents into the Great Miami River.
>
> The burn area at Mound would no longer treat explosive/reactive wastes. Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, scrap and metal containers would no longer continue to be generated. Trash that would have been disposed of in the local sanitary landfill by a

[5] See Page 2-4 and Table ES-1 on Page ES-7 of the EA.

22/9.3 commercial contractor would cease, extending the operating life of the landfill"

22A/11.1 are incorrect. Transitioning Mound DP operations to EM would continue to generate these wastes during cleanup activities.

23/8.3 4. Socioeconomic impacts on Miamisburg are incompletely developed. The direct tax base contribution from payroll ($1.4 million) is not mentioned. The Region of Influence (ROI) is expanded to the greater Dayton area to conceal the significant impact on Miamisburg.

5. The consolidation plan is based on obsolete stockpile requirements and the NCP report, which was reviewed critically by the GAO, the UDRI, and, recently, the architect engineer firm, Fluor-Daniels, who compiled the report. The stockpile requirements have again been reduced by the December, 1992 Bush-Yeltsin agreement.

24/15.6 6. The consolidation focuses on new production, which is now minimal, and does not consider stockpile maintenance (replacement of limited life components), surveillance of explosive and nuclear components, which are Mound missions, and stockpile upgrades, such as insensitive valve actuators for B61 bombs and new spin rocket motors for B83s. These improvements are high dollar, multiyear programs.

25/15.5 Public Law 100-456 requires that there be no hiatus in stockpile remanufacturability and surveillance in the event of a test ban, but DOE's plan accepts a three to five year interruption in gas transfer system surveillance and unknown remanufacturability. There are no current plans to address explosive surveillance.

26/21.3 7. There is manifold evidence of bias in the decision to consolidate Mound activities at the Kansas City Plant (KCP) and the Savannah River Site (SRS) through capital funding

projects at KCP and SRS totaling over $458 million since 1988, and cancellation of a Nuclear Facility Modernization project (88-D-122) for $30 million and an explosives production facility (88-D-122) at Mound.

26/21.3 Other prejudicial actions include transfer of production responsibility for some explosive components to Sandia through a process called Manufacturing Development Engineering (MDE) prior to the Record of Decision.

27/1.8 8. The EA uses conclusions from two other recent reports, the "Two-Site Nonnuclear Consolidation Study" and the "Tritium Consolidation Feasibility Study". Those studies have many flaws, including obsolete workload projections, the inclusion of non-DP missions for economic analyses, and unfair plant overhead projections. And, these studies are used to rule out reasonable alternatives required by NEPA.

28/10.5 9. The proposed consolidation of tritium activities at SRS accepts a higher environmental insult from tritium emissions, both total and as a percentage of process throughput, as validated in DOE/EH-0198P, "Report of the Task Group on Operation of Department of Energy Tritium Facilities", Pages 7, 8, and 67. These emissions probably would not violate any standard, but do contribute to the global background radiation level. These

29/4.1 on-site emissions at SRS would further elevate ground water tritium levels which now exceed EPA standards.

30/10.6 In Section 4.3.7, Page 4-223 of the EA, DOE claims that, "At all Proposed Action sites, project design would include best available control technologies or modifying processes to reduce criteria and hazardous/toxic air emissions." This is not the case when applied to the movement of tritium missions from Mound to SRS. SRS does not use triple confinement techniques developed at Mound and incorporated in all new DOE tritium

facilities except for the Replacement Tritium Facility (RTF) at SRS. DOE facilities built since 1977 that incorporate triple confinement include the Tokamak Fusion Test Reactor at the Princeton Plasma Physics Laboratory and the Tritium Systems Test Assembly and the Weapons Engineering Test Facility, both at Los Alamos National Laboratory. In addition, the RTF, which is the cornerstone of the SRS proposal, uses many unproven technologies to support claims of reduced airborne tritium emissions. If these unproven technologies fail to perform as designed, SRS tritium emissions will revert to levels much

30/10.6 higher than advertised. One example of this is TCAP (Thermal Cycling Adsorption Process). Another is the use of room temperature catalyst for the RTF stack stripper. If TCAP performs as designed, the tritium emissions now incurred from operation of the cryogenic distillation systems will be reduced from approximately 50,000 Ci/year to approximately 5,000 Ci/year. If TCAP cannot provide the primary separation, then the stills must be operated as in the past with the resulting higher emissions. The room temperature catalyst used in the RTF stack stripper is also unproven in this application. If this catalyst does not operate as expected, emissions from the RFT gloveboxes will be 10 to 100 times higher than expected.

31/1.2 10. Numerous product lines from Mound are excluded from the EA. Explosive timers, firesets, actuators, ceramic headers, pyrotechnic powder blends, and over half (10 of 18) of the critical technologies identified under the Process Capability Assurance Program (PCAP) are left out.

32/1.3 11. Numerous other costs for reconfiguration are left out of the economic analysis. The flood barrier wall being constructed at KCP is well disguised. Another backup reservoir loading facility like the Savannah River Operations Contingency (SROC) facility at Mound is being estimated by Los Alamos outside the NCP costs. Likewise, weapons research,

32/1.3 development, and testing activities, a large part of Mound's development workload for the National Laboratories, are excluded from the economic analysis.

12. The treatment of technical risks through consolidation is invalid and violates PL 100-456 for the following reasons:

a. Assumption is that 50% of critical skills (people) will transfer to receiver sites. The one DOE experience was consolidation of Burlington, Iowa assembly operations with Pantex, Amarillo, Texas in the early 1970s, where only 4% of the workforce transferred while many more were required.

33/1.5 b. Production of required Limited Life Component Exchange (LLCE) components, such as explosive timers, timer detonators, and valve actuators, are not included in the plan. A requalification of production of these would be required at a receiver site, but this is not discussed or estimated by DOE. Some detonator requalification plans require hundreds and even thousands of component tests to assure .999 reliability data. Costs for this have been omitted even though they are LLCE items in the enduring stockpile.

c. The transfer of neutron generators and cap assemblies to SNL increases technical risk (aside from the personnel transfer issue) due to the manufacturing methodology to be used: a new, untried design and distribution of processing among eight or nine buildings at two sites at SNL and the tritium containing subassembly (tube) being produced at Los Alamos.

d. High explosive surveillance of components used in stockpile would not transfer to a receiver site. This Mound mission has been overlooked in consolidation planning.

34/15.5 e. Tritium gas transfer reservoir surveillance would experience a hiatus of three to five years, and recent experience with construction and startup of nuclear (tritium) facilities at SRS suggests these times are optimistic.

35/7.2 13. Native (Ohio) American groups have not been contacted. DOE's press releases of December 22, 1992 give extensive credence to notice and incorporation of comments from Native American groups in the EA process as required by the NEPA. Page ES-9 states that, "Native American consultation has been initiated at all sites"; whereas Page 4-139 of the EA states that, "Consultation with the Miami and Shawnee has not yet been initiated by DOE."

MCAG contacted Brian Dabe, Chairman of the Shawnee, and Guy Jones, Miami Valley Council for Native Americans. They had not been contacted by DOE.

OhioEPA
State of Ohio Environmental Protection Agency

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Columbus, Ohio 43266 0149
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George V. Voinovich
Governor

Donald R. Schregardus
Director

January 28, 1993

Mr. Steve Sohinki
Director, Office of Environmental
Safety, Health and Quality Assurance
U.S. Department of Energy
P.O. Box 3417
Alexandria, VA 22302

Dear Mr. Sohinki:

I am writing to submit the State of Ohio's comments on the draft Nonnuclear Consolidation Environmental Assessment (EA) issued by the Department of Energy on December 22, 1992, pursuant to the requirements of the National Environmental Policy Act (NEPA). As Director of the Ohio Environmental Protection Agency, I have a strong interest for the long-term considerations of public health and safety posed by both the Department of Energy (DOE) and the Department of Defense (DOD) as both federal departments downsize and close installations. The environmental issues are significant; however, in these comments I also submit the State's analysis of the socioeconomic impact of the draft EA as these affect DOE's Mound Plant.

1/1.1 Ohio has viewed the entire process used by DOE in pursuing consolidation of the Nuclear Weapons Complex with disappointment. It appears clear that, at the outset of the process, DOE was determined to consolidate tritium-related activities at the Savannah River Plant and nonnuclear activities at the Kansas City Plant, and has since been continually engaged in an effort to justify a conclusion that was reached before the requisite analysis had been done.

2/8.4 The results of DOE's first reaching its conclusion and later attempting to justify it have been unfortunate. The community of Miamisburg, Ohio has hosted DOE's Mound Plant with pride for many years; thousands of local residents have built careers at or around the Mound Plant, with results in productivity and safety easily comparable to that of any other site in the Nuclear Weapons Complex. Today, hardly anyone in the Miamisburg area believes the Department has acted in good faith toward them or the facility.

3/21.1 Further, an essential truth has been obscured. The Nuclear Weapons Complex does need to be downsized; much of our weapons-making capacity is an expensive relic from another age that the country can no longer afford. While no one likes to see a major employer shut its doors, many communities throughout the country have accepted the closure of large Defense Department facilities,

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3/21.1 because the need for and cost-effectiveness of closing these facilities was clearly demonstrated ahead of time. The Energy Department could easily have accomplished what DOD was able to, and could have done so voluntarily. It is hard to avoid the idea that DOE took the course it did because to have taken another one risked being led to a different conclusion.

The State of Ohio believes that the action proposed in the Environmental Assessment constitute a significant impact, as follows:

1. Ohio concurs with the conclusions of a General Accounting Office report published in November, 1992 that the cost estimates used in the Nonnuclear Consolidation Plan (NCP) are not of budget quality and fail to reflect all likely costs of the proposed consolidation at Kansas City. The GAO's conclusions are reinforced by some of the revisions made in the EA of NCP estimates.

4/1.3 A case in point is the estimates of floor space requirements for transfer of Complex activities under various reconfiguration options. The NCP asserts that an additional 389,700 feet of floor space would be required at Kansas City if nonnuclear activities were consolidated there; Mound was said to require an additional 1,745,700 square feet, the Pinellas Plant in Florida another 1,612,400 square feet.

As revised in the EA in light of recent arms control agreements, the respective estimated requirements for new floor space are 97,960 square feet if consolidation occurred at Kansas City, 1,659,804 if at Mound, and 1,673,685 if at Pinellas. The fact that estimated additional space requirements were reduced by 75% at Kansas City and little if at all at the other sites strongly suggests bias.

5/15.6 2. The mission of the Nuclear Weapons Complex has changed dramatically since the NCP was first assembled by DOE in the summer of 1991. Maintenance of the existing stockpile of nuclear weapons, rather than new weapons production, is now the primary task of the Complex. However, where many activities now undertaken at the Mound Plant relate directly to maintenance of existing weapons, the orientation of the Kansas City Plant has historically been to the production of new weapons. Yet neither the NCP nor the EA adequately reflect this. In fact, the EA appears to have used post-START II data in evaluating the preferred alternative and pre-START I data in evaluating other alternatives.

6/1.5 Additionally, the costs and technical risks of transferring surveillance of high explosive components used in the nuclear weapons stockpile are not evaluated in the NCP or in the EA. Costs and technical risks associated with requalifying the production of Limited Life Component Exchange (LLCE) components such as explosive timers, timer detonators, and valve actuators appear not to have been considered in either document. Although surveillance of tritium gas transfer reservoirs is proposed to be moved to the

Savannah River Plan, a hiatus of three to five years is expected. Recent experience with start-up of tritium facilities at Savannah River suggests that the hiatus could be much longer than that.

Maintaining capability for surveillance of high explosive components and tritium gas transfer reservoirs and for production of reliable LLCE components would be important under any circumstances. They are much more so in an environment when the production of new weapons will be minimal to nonexistent, and the maintenance of existing weapons will be our primary means of assuring the reliability of our nuclear deterrent. The failure to include discussion of the costs and technical risks associated with transferring these activities from the Mound Plant is consistent with the hypothesis that DOE was predisposed from the start of the NCP process to close that facility and is otherwise not easily explained. 6/1.5

Finally, the failure of the NCP to reflect the costs of transferring non-Defense Program missions prominent at the Mound Plant such as the manufacture of power sources for deep-space missions, calorimeters for measuring radioactive material quantities, and stable isotopes used in medical testing further suggests a predisposition on DOE's part to ignore factors that might weight against the preferred alternative of consolidation at Kansas City. This omission was not corrected in the EA.

3. The separation of tritium-related activities from the nonnuclear consolidation process has been inappropriate from the beginning. Evaluation of the impact of transferring these activities ought to have been included in the EA. Their exclusion, and the heavy investment DOE has made since 1988 in the Replacement Tritium Facility (RTF), the effort to restart the K reactor tritium production facility, and other capital projects at the Savannah River Plant, creates a strong appearance that the Department began the NCP process with a predisposition to consolidate tritium-related activities at Savannah River. This appearance is reinforced by the fact that DOE only produced risk and cost analyses of the tritium consolidation after pressure was applied by Members of Congress and other public officials. 7/1.1

4. Closure of the Mound and Pinellas Plants may generate transuranic, low-level, and mixed wastes, and hazardous and other wastes will continue to be generated while clean-up activities at the site are underway. The EA should include an assessment of the costs and risks involved in managing these waste streams. 8/9.2

5. The EA's analysis of the socioeconomic impact of site closures considers the potential impact on a relatively large surrounding area. In the case of the Mound Plant, the EA discusses the potential impact of plant closure on an area with almost a million residents. The closure of the Mound Plant would result in an estimated 20% decrease in income tax revenues for the City of Miamisburg, a very significant impact not mentioned in the EA. 9/8.3

The omissions and inconsistencies of the NCP and EA could possibly be explained as the inevitable products of an effort by DOE to do what has never been attempted in human history; the phasing out of a complex designed to produce the most deadly weapons man has ever known. The State of Ohio recognizes the difficulty of the task before the Department, and recognizes also that for many years DOE and its predecessor agencies provided the nuclear deterrent that helped keep America at peace during a dangerous time.

Yet Ohio also recognizes that this deterrent was produced with large amounts of public money, with scant regard for long-term considerations of public health and safety, and in a manner that precluded public review of what money was being spent on and what risks were being run. The result is a group of environmental disaster areas spread all over the country, one of which, the Fernald site, is located in Ohio. There was nothing inevitable about this; it was the product of the way the Department chose to operate, of the Department's deciding what it wanted to do first and justifying it for the public later -- exactly what the Department has done throughout the nonnuclear consolidation process. 10/21.2

This history strongly influences Ohio's perception of the NCP and the EA. It is not a story that inspires confidence in DOE's ability to estimate accurately either the environmental risks or the financial costs associated with an undertaking of this magnitude. This history, and the additional fact that the NCP has been wholly overtaken by arms control agreements and political developments in the former Soviet Union, leads the State to suggest that it would be best if the nonnuclear consolidation issue were entirely reconsidered as part of a broader, consensus-based consolidation of the nuclear weapons complex. Ohio also suggests participation in drawing up a new consolidation plan of knowledgeable people from outside DOE, to ensure the objectivity of the process. 11/15.7

Although the State recognizes that this will cause a delay in consolidating nonnuclear activities, this delay is preferable to proceeding on a course that uses the NEPA process as a mere vehicle to justify publicly a course of action that the Defense Programs bureaucracy at DOE had already decided on before the process began.

Sincerely,

Donald R. Schregardus
Director

DRS/cmw

STATE OF FLORIDA

Office of the Governor

THE CAPITOL
TALLAHASSEE, FLORIDA 32399-0001

LAWTON CHILES
GOVERNOR

January 29, 1993

Mr. Richard A. Claytor
Assistant Secretary for Defense Programs
Department of Energy
Washington, D.C. 20585

RE: U.S. Department of Energy (DOE) Non-nuclear Consolidation Environmental Assessment -- Nuclear Weapons Complex Reconfiguration Program,

Dear Mr. Claytor:

The State appreciates the opportunity to review and comment on the preapproval review copy of the Environmental Assessment for the Nuclear Weapons Complex Reconfiguration Program which will affect the Pinellas Plant in Florida. The President Bush/Yeltsin agreements of June 1992, which essentially eliminate new nuclear weapons production, require the DOE to reduce production capacity while retaining some capability for limited production. Although the Pinellas Plant's primary efforts are non-nuclear parts production, the Plant's 1,025 workers produce major components used in nuclear weapons. We are very concerned about the future of the Martin Marietta Specialty Components facility and its dedicated employees. We urge that an Environmental Impact Statement, which is the next step in the process, fully address the human-job and family consequences of these proposed actions and offer measures to mitigate these impacts. 1/8.1

Our review was conducted under the guidelines of the National Environmental Policy Act (NEPA) for federal actions which can affect "the quality of the human environment". The concerns raised in the enclosed letters sharply focus on the highly qualified labor force at the Pinellas Plant and the $101.5 million impact the DOE proposal may have on the region's economy. It is important that the DOE identify and fund technology transfer of this skilled labor pool into other DOE private sector production efforts bolstering the American economy. 2/8.2

In this regard, the Florida Department of Commerce has a Cooperative Research and Development Agreement (CRADA) for the Martin Marietta Specialty Components facility that can be approved by the DOE. The backbone of this agreement would be a partnership with the Martin Marietta Energy Systems efforts in Oak Ridge, Tennessee.

Mr. Richard A. Claytor
January 29, 1993
Page Two

In addition, we are looking forward to implementing a "technology deployment center" to fully support the Presidential and Congressional efforts to enhance American competitiveness. In this regard, the DOE and Florida's goals may be synchronized if we can encourage your participation in high technology production being located at this facility. The CRADA and the technology deployment center could be foundation stones of this mutual effort if DOE can assist with funding these enterprises. 2/8.2

We wish to work closely with you in achieving our common goals. Please contact me or Don Henningsen, at (904)488-8686 if we can assist.

Sincerely,

David K. Coburn, Director
Office of Planning and
Budgeting

DKC/ddh

Enclosures

cc: Greg Farmer, Florida Department of Commerce
Shirley O. Gooding, Florida Department of Labor and Employment Security
Robert Reinshuttle, Executive Office of the Governor
Florida Delegation
Bob Poole, Martin Marietta Corp., Largo Florida

Florida Department of Labor and Employment Security
Office of the Secretary

Lawton Chiles
Governor

Shirley D. Gooding
Secretary

January 29, 1993

Mr. Don Henningsen, Federal Consistency
Coordinator
Office of the Governor, OFB
Environmental Policy/Community and Economic
Development Unit
420 Carlton Building
Tallahassee, Florida 32399-0001

Dear Mr. Henningsen:

Our department was asked to provide comments to you by January 29, 1993, regarding the Department of Energy's (DOE's) December 1992 report entitled Nonnuclear Consolidation Environmental Assessment, Volumes I and II, Nuclear Weapons Complex Reconfiguration Program. Specifically, we were asked to respond to the sections of this report pertaining to the Pinellas Plant located in Pinellas County in Largo, Florida, and operated by Martin Marietta Specialty Components, Inc. That plant involves production of nonnuclear components, such as neutron generators, thermal and lithium ambient batteries, encapsulated magnetics, frequency devices, neutron detectors, optoelectronics, and others. Consistent with the mission of our agency, we focused on this document's potential impact on jobs in the Pinellas area.

The report considered four actions for the Pinellas Plant, as it did for the five other DOE sites that currently perform nonnuclear manufacturing functions. The four options were to: 1) make the Pinellas Plant the primary site for consolidating electrical and mechanical functions, 2) transfer other functions or technology bases, such as tritium-handling and high power detonator capabilities, to the Pinellas Plant, 3) do nothing, or 4) phase out nonnuclear functions at the Pinellas Plant.

The DOE report rejected the first and second options because they would require substantial new construction and additional National Environmental Policy Act (NEPA) documentation, compared to other sites. The "no action" alternative was rejected because it did not meet DOE's need to size the future nonnuclear manufacturing functions to the foreseeable workload, reduce operating costs, and provide adequate expertise to satisfy the future work assignments. DOE's proposal for the Pinellas Plant was the fourth option, phaseout.

Our department's concern is that the proposed phaseout of the Pinellas Plant has a significantly adverse impact on the economy and jobs in the area. DOE's report states that, "Between 1970 and 1990, employment at Pinellas increased from 1,274 to 1,667 persons. As of September 30, 1992, employment at Pinellas had decreased to 1,025 persons." The most recent available economic impact analysis of the Pinellas Plant by the Florida Department of Commerce uses 1991 data. That study estimates a total regional payroll impact from the plant to be $101.5 million. According to that same study, "It would take approximately 8,200 new jobs in the retail sector to replace the total payroll impact of the Pinellas Plant." The most recent unemployment rate for Pinellas County (for December 1992) was 5.4.

1/8.2 We strongly urge DOE to consider the Pinellas Plant as a candidate for a technology transfer program. An existing mechanism for implementing such a program is the Cooperative Research and Development Agreement (CRADA) approach established in the National Competitiveness Technology Transfer Act of 1989. Based on information from the Florida Department of Commerce, Martin Marietta Specialty Component is interested in signing a federal CRADA designating the Largo plant as available to other private manufacturers and the state for expertise, technology information, federal technology transfer, and potential cooperative technology development. Martin's facilities at Oak Ridge, Tennessee have already set a precedent for this. The Martin Marrieta Energy Systems plants there reportedly have expertise in many technology areas and have signed CRADAs with a number of other companies and states, including Tennessee. In Oak Ridge, more than 60 technology companies have located in proximity to the DOE facility and use Martin Marietta Energy Systems. Oak Ridge expertise would be available to Florida through these facilities' association with the Largo plant.

EA–S–008
Comment Letter

Mr. Don Henningsen
January 29, 1993
Page Three

1/8.2 Personnel at the Pinellas Plant have played a key role in securing America's defense. We would very much like to see an outcome where these individuals do not lose their jobs, but instead are retrained, if necessary, and are able to secure high value jobs that will increase the nation's competitiveness. This outcome is consistent with our department's mission to transform Florida's work force so that it becomes sufficiently skilled to produce high value goods and services, and to increase Floridians' ability to regain employment after loss of work.

I appreciate the opportunity to respond to the DOE report.

Sincerely,

Shirley D. Gooding

SDG/KC

cc: Secretary Greg Farmer, Florida Department of Commerce
Dr. Jerry Koehler, Assistant Secretary DLES
James Mathews, Acting Division Director, Division of Labor, Employment and Training

EA–S–009
Comment Letter

FLORIDA DEPARTMENT OF COMMERCE
Secretary Greg Farmer

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Lawton Chiles

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January 28, 1993

Ms. Janice L. Alcott, Director
State Clearinghouse
Office of Planning and Budgeting
Executive Office of the Governor
The Capitol
Tallahassee, Florida 32399-0001

RE: SAI# FL 93 01 11 0020C (Non-nuclear Consolidation/Pinellas County)

Dear Ms. Alcott:

Thank you for asking us to review this document on the Nuclear Weapons Complex Reconfiguration Program. The Department of Energy proposes to close several non-nuclear weapons plants by consolidating them at a central location. The Pinellas plant, Largo, Florida, is identified for closure and consolidation.

1/14.3 DOE reports that in September, 1992, 1,025 employees worked in that facility. We do not feel closing the plant would be in the best interest of Florida. The proposed action is inconsistent with policy guidelines of Chapter 288, Florida Statutes and the economic criteria of those portions of the Coastal Zone Management Act of 1972 and the Florida Coastal Management Program for which the Department of Commerce has responsibility: both the net employment and net income impacts of the plant closure would be negative. In

2/8.5 addition, the proposed action would have an adverse effect on a major element of the economic diversification effort of the State of Florida as well as directly conflict with official local sentiment concerning economic development.

Very respectfully,

Greg Farmer
Secretary of Commerce

GF\EA\rp

FLORIDA

Collins Building
107 West Gaines Street
Tallahassee, Florida 32399-2000

Executive Office of the Governor

The Capitol

Tallah
32399

DOE OF ENERGY
ATTN: STEPHEN SOHINKI
P O BOX 3417
ALEXANDRIA, VA 22302

SAI# FL93011100200 CFDA# 81.001
PROJECT: NONNUCLEAR CONSOLIDATION
ENVIRONMENTAL ASSESSMENT
NUCLEAR WEAPONS COMPLEX
RECEIVED: 01/11/93

dence requesting review under
e has been assigned a State
used in all communications

with the office concerning the application or project.

The State Clearinghouse will coordinate a review of the application or project pursuant to Presidential Executive Order 12372; Gubernatorial Executive Order Number 83-150; section 216.212, Florida Statutes; the National Environmental Policy Act; the Florida approved coastal management program; the Outer Continental Shelf Lands Act; and other federal or informational review requirements.

The review begins on the date the correspondence is received by the State Clearinghouse and normally is completed within 60 days. Completion of the review may be delayed if additional information is needed by reviewing agencies, in which case you will be notified.

Please send three (3) copies of your application or project to the appropriate Regional Planning Council (RPC), if applicable.

FLORIDA STATE CLEARINGHOUSE
Executive Office of the Governor/OPB
The Capitol, Tallahassee, FL 32399-0001
(904) 488-8114; (SunCom) 278-8114

STATE OF COLORADO

DIVISION OF LOCAL GOVERNMENT
Harold A. Knott, Director

Department of Local Affairs

Roy Romer
Governor

Larry Kallenberger
Executive
Director

January 26, 1993

Mr. Stephen Sohinki
U. S. Department of Energy
Office of Reconfiguration
P. O. Box 3417
Alexandria, VA 22302

SUBJECT: Nuclear Weapons Complex Reconfiguration Program
Nonnuclear Consolidation Environmental
Assessment - Preapproval Review Draft

Dear Mr. Sohinki:

The Colorado State Clearinghouse has received the above-referenced Nonnuclear Consolidation Environmental Assessment and has notified interested state agencies. No comments have been received as of this date. However, should there be any late comments, we will forward them to you for your information.

Thank you for the opportunity to review this matter.

Sincerely,

Margaret Dubas

Margaret Dubas, Staff Assistant
Colorado State Clearinghouse

/md

1313 Sherman Street, Room 521, Denver, Colorado 80203 (303) 866-2156 FAX (303) 866-2251

EA-S-012
Comment Letter

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: William E. Applegate, III, Chairman
John H. Burnes, Vice Chairman
Richard E. Jabbour, DDS, Secretary
Toney Graham, Jr., MD
Sandra J. Molander
John B. Pate, MD
Robert J. Stripling, Jr.

Promoting Health, Protecting the Environment

Stephen Sohinki
DOE Office of Reconfiruration
P.O.Box 3417
Alexandria, Va 22302

Dear Mr. Sohinki,

After review of the Preapproval Review Copy, Volume I, it is not clear from the description whether tritium will be handled in the 700-Area; the 700_Area is much closer to population centers such as Jackson and New Ellenton than the 200-Area is. The accident assessment for accidental tritium releases (p. 4-61) appears to assume that all tritium inventory, and therefore all potential for tritium release, will occur in the 200-Area.

1/104

If you have any questions, please do not hesitate to contact this office.

Sincerely,

Robert W. King, Jr.
Assistant Deputy Commissioner

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EA-S-013
Comment Letter

STATE CLEARINGHOUSE
State of Ohio - Office of Budget and Management
30 EAST BROAD STREET • 34TH FLOOR • COLUMBUS, OHIO 43266-0411 • (614) 466-0697 / 0698

January 27, 1993

U.S. Department of Energy
Office of Reconfiguration
P.O. Box 3417
Alexandria, VA 22302

Attention: Mr. Stephen Sohinki

RE: State Clearinghouse Intergovernmental Review-Environmental Impact Statement/Assessment
NEGATIVE RESPONSE
Project Description: TERMINATION OF NONNUCLEAR MANUFACTURING ACTIVITIES AT THE MOUND PLANTS IN OHIO, IMPACTS CITY OF MIAMISBURG AND MONTGOMERY COUNTY, START DATE 05/93
State Application Identification Number: OH921223-0978-36471

The State Clearinghouse (Single Point of Contact) has reviewed the Environmental Impact Statement/Assessment for the above identified project that is covered by the National Environmental Policy Act of 1969, Intergovernmental Review Process (Presidential Executive Order 12372), Gubernatorial Executive Order authorized under Ohio Revised Code, Section 107.18(A), and/or other pertinent regulations and guidelines.

This proposed project has been simultaneously reviewed by interested state agencies and the impacted area clearinghouse(s) and results of this review are attached. The comments which have been generated contain negative responses and indicate concerns which must be addressed before proceeding with the development of this proposal.

Also, you should be advised that some of the reviewing state agencies may respond directly to you without submitting their comments through the State Single Point of Contact. We encourage our reviewing agencies to keep in direct contact with issuing agencies on all environmental assessment/impact statement reviews. Therefore, consider their directly generated comments as valid responses.

It is important that coordination be followed through to respond to this letter, or its attachments. We will notify you that the concerns raised during the review process have been answered in a satisfactorily manner, as soon as we have been advised, in writing, by the agency that issued the negative response.

Sincerely,

Larry W. Weaver
State Federal Funds Coordinator
Office of Budget and Management

LWW:LEW

cc: Mari Ruiz, DWQPA, Ohio Environmental Protection Agency
Julie Quinlan, Ohio Historical Preservation Office
Miami Valley Regional Planning Commission
Joe Britt, Ohio Washington Office, 444 No Capitol St. N.W., Suite 528, Washington, D.C. 20001
CLHOBM:119

OBM 6000

OFFICE OF BUDGET AND MANAGEMENT
STATE CLEARINGHOUSE TRANSMITTAL

30 E. Broad St., 34th Floor
Columbus, Ohio, 43266-0411
Phone (614) 466-0697 / 0698

STATE APPLICATION IDENTIFIER NO: OH921223-0978-36471
RESPONSE ON 60 DAY REVIEW SHOULD BE RETURNED 15 DAYS PRIOR TO CLEARANCE DATE OF: 93-01-27
FOR FULL APPLICATION CALL BY : 92/01/04

APPLICANT: DEPT. OF ENGERY / OFFICE OF RECONFIGURATION
ADDRESS: P.O. BOX 3417
CITY: ALEXANDRIA STATE: VA ZIP: 22302-0000
ATTENTION: STEPHEN SOHINKI PHONE: (202) 586-0838

PROPOSED FEDERAL FUND: $00
PROPOSED TOTAL FUND : $00

PROJECT : TERMINATION OF NONNUCLER MANUFACTURING

PROJECT DESC: TERMINATION OF NONNUCLEAR MANUFACTURING ACTIVITIES AT THE MOUND PLANTS IN OHIO, IMPACTS CITY OF MIAMISBURG AND MONTGOMERY COUNTY, STARTDATE 05/93

REVIEW AGENCY: DEPARTMENT OF AGRICULTURE
DEPARTMNT OF NATURAL RESOURCES
DEPARTMENT OF HEALTH
DEPARTMENT OF TRANSPORTATION
OH ENVIRONMENTAL PROTECTION AG
*ST:HISTORIC PRESERVATION OFC

CLEARINGHOUSE:
MIAMI VALLEY REGIONAL PLANNING COMMISSION (MVRPC)

JAN 28 1993

Reviewing agency must complete this section.
COMMENTS - attach another sheet. Comments cited in this Section must include (1) Identification of reviewing agency's statute or specific plan or program related to this proposal. (2) Description of impact of this proposal on identified plan or program; (3) Reviewer's recommended changes for or additions to the proposal. Please type all comments and include SAI number on your comment sheet

REVIEWING AGENCY POSITION ON PROJECT (Mark one only)

- ☐ No comment.
- ☐ Clearance of the project should be granted.
- ☒ Clearance of the project should not be delayed, but applicant should answer the reviewer's questions or concerns. See enclosed comments.
- ☐ Clearance of the project should only be granted on the condition that the applicant use the recommendations in the enclosed comments. (Executive or Deputy Director Signature Needed.)
- ☐ Clearance of the project should be delayed until the applicant has satisfactorily addressed the concerns stated in the enclosed comments. (Executive or Deputy Director Signature Needed.)

PLEASE TYPE THE FOLLOWING INFORMATION:

Julie Quinlan — Reviewer's Name
Agency Name: Ohio Historic Preservation Office — Div: Ohio Historical Center
Street Address: 1985 Velma Avenue — City: Columbus, Ohio 43211 — State:
Phone: 297-2470 — Zip Code:
Executive or Deputy Signature: Martha T. Raymond

JAN 25 1993

OBM 6005 (Rev 8/87)

review/cas.doc

Ohio Historic Preservation Office
1985 Velma Avenue
Columbus, Ohio 43211
614/297-2470

SAI # U978-36471
Location: Mound Facility, Miamisburg
Reviewer: Julie Quinlan

OHIO HISTORICAL SOCIETY
SINCE 1885

The Ohio Historic Preservation Office (OHPO) is a division of the Ohio Historical Society. The Ohio Historic Preservation Officer and his staff are responsible for reviewing the effects of federally assisted projects on cultural resources, i.e. properties of archaeological, historic or architectural significance, in accordance with the National Historic Preservation Act of 1966 and the 1980 Amendments, and the National Environmental Policy Act of 1969.

____ A. One or more ____ historic, ____ architectural and/or ____ archaeological sites listed in or eligible for the National Register of Historic Places may be affected by the project. Please coordinate with this office.

____ B. These portions of the project should be coordinated with this office:

____ 1. Structural rehabilitation/revitalization
____ 2. Acquisition
____ 3. Demolition
____ 4. Land Development
____ 5. Other (see below)

____ C. Our office should be supplied with the following information:
____ 1. County, city, or USGS quad map indicating the precise location of the project.
____ 2. Description of the land and its past and present use.
____ 3. Front and rear elevation photos of structures to be affected by the project.
____ 4. Photographs of the streetscape in the project area.
____ 5. A copy of the ____ history/architecture and/or ____ archaeological survey(s)
____ 6. Date of construction

____ D. A ____ history/architecture and/or ____ archaeological survey of the project area is recommended for the following reasons:
____ 1. The Ohio Historic Inventory and the Ohio Archaeological Inventory are incomplete and we cannot state positively that cultural resources will not be affected. Properties which may be eligible for the National Register need to be identified.
____ 2. This is an archaeologically sensitive area (see attached) and the development of undisturbed land has potential for affecting undiscovered archaeological resources.
____ 3. This is an architecturally sensitive area.

____ E. Applicant should follow OEPA Procedures for Archaeological and Historic Preservation.

X F. Other: Please provide us with pages 4-138 - 139 of the Environmental Assessment, which discuss cultural resources. This was not included for our review.

EA–S–015
Comment Letter

OFFICE OF BUDGET AND MANAGEMENT
STATE CLEARINGHOUSE TRANSMITTAL

DEC 28 RECD

30 E. Broad St., 34th Floor
Columbus, Ohio, 43266-0411
Phone (614) 466-0697 / 0698

STATE APPLICATION IDENTIFIER NO: OH921225-0978-36471
RESPONSE ON 60 DAY REVIEW SHOULD BE RETURNED 15 DAYS PRIOR TO CLEARANCE DATE OF: 93-01-27
FOR FULL APPLICATION CALL BY : 92/01/04

APPLICANT: DEPT. OF ENGERY / OFFICE OF RECONFIGURATION
ADDRESS: P.O. BOX 3417
CITY: ALEXANDRIA STATE: VA ZIP: 22302-0000
ATTENTION: STEPHEN SONINKI PHONE: (202) 586-0858

PROPOSED FEDERAL FUND: $00
PROPOSED TOTAL FUND : $00

PROJECT : TERMINATION OF NONNUCLER MANUFACTURING

PROJECT DESC: TERMINATION OF NONNUCLEAR MANUFACTURING ACTIVITIES AT THE MOUND PLANTS IN OHIO, IMPACTS CITY OF MIAMISBURG AND MONTGOMERY COUNTY, STARTDATE 05/93

REVIEW AGENCY: DEPARTMENT OF AGRICULTURE
DEPARTMNT OF NATURAL RESOURCES
DEPARTMENT OF HEALTH
DEPARTMENT OF TRANSPORTATION
OH ENVIRONMENTAL PROTECTION AG
ST HISTORIC PRESERVATION OFC

CLEARINGHOUSE:
MIAMI VALLEY REGIONAL PLANNING COMMISSION (MVRPC)

RECEIVED
DEC 31 1992
State Clearinghouse
Budget & Management

Reviewing agency must complete this section.
COMMENTS - attach another sheet. Comments cited in this Section must include (1) Identification of reviewing agency's statute or specific plan or program related to this proposal. (2) Description of impact of this proposal on identified plan or program; (3) Reviewer's recommended changes for or additions to the proposal. Please type all comments and include SAI number on your comment sheet

REVIEWING AGENCY POSITION ON PROJECT (Mark one only)

- ☒ No comment.
- ☐ Clearance of the project should be granted.
- ☐ Clearance of the project should not be delayed, but applicant should answer the reviewer's questions or concerns. See enclosed comments.
- ☐ Clearance of the project should only be granted on the condition that the applicant use the recommendations in the enclosed comments. (Executive or Deputy Director Signature Needed.)
- ☐ Clearance of the project should be delayed until the applicant has satisfactorily addressed the concerns stated in the enclosed comments. (Executive or Deputy Director Signature Needed.)

PLEASE TYPE THE FOLLOWING INFORMATION:

R. L. Suppes
Reviewer's Name

Agency Name: Ohio Dept of Health Div: Environmental Health
Street Address: 246 North High City: Columbus, State: Ohio
Phone: 614/644-6811 Zip Code: 43266-0118

Executive or Deputy Signature

OBM 6005 (Rev 8/87)

EA–S–016
Comment Letter

OFFICE OF BUDGET AND MANAGEMENT
STATE CLEARINGHOUSE TRANSMITTAL

30 E. Broad St., 34th Floor
Columbus, Ohio, 43266-0411
Phone (614) 466-0697 / 0698

STATE APPLICATION IDENTIFIER NO: OH921207-0878-04129
RESPONSE ON 60 DAY REVIEW SHOULD BE RETURNED 15 DAYS PRIOR TO CLEARANCE DATE OF: 93-01-27
FOR FULL APPLICATION CALL BY : 12/17

APPLICANT: WRIGHT STATE UNIVERSITY
ADDRESS: RESEARCH & SPONSORED PROGRAM
CITY: DAYTON STATE: OH ZIP: 45435-0000
ATTENTION: LEON TESTAS, ASST DIR PHONE: (513) 873-2425

PROPOSED FEDERAL FUND: $103,860
PROPOSED TOTAL FUND : $138,961

PROJECT : REHABILAITION LONG-TERM TRAINING

PROJECT DESC: REHABILITATION ENGINEERING LONG-TERM TRAINING, IMPACT GREENE COUNTY & SURROUNDING AREA, START 09/93, 12 MONTHS DURATION, PI: BLAIR ROWLEY

REVIEW AGENCY: DEPARTMENT OF AGING
BOARD OF REGENTS
OHIO CIVIL RIGHTS COMMISSION
DEPARTMENT OF EDUCATION
DEPARTMENT OF MENTAL HEALTH
DEPT MENTAL RETARDATION & DD
DEPARTMENT OF HEALTH
REHABILITATION SERVICES COMM

CLEARINGHOUSE:
MIAMI VALLEY REGIONAL PLANNING COMMISSION (MVRPC)

RECEIVED
DEC 10 1992
State Clearinghouse
Budget & Management

Reviewing agency must complete this section.
COMMENTS - attach another sheet. Comments cited in this Section must include (1) Identification of reviewing agency's statute or specific plan or program related to this proposal. (2) Description of impact of this proposal on identified plan or program; (3) Reviewer's recommended changes for or additions to the proposal. Please type all comments and include SAI number on your comment sheet.

REVIEWING AGENCY POSITION ON PROJECT (Mark one only)

- ☐ No comment.
- ☒ Clearance of the project should be granted.
- ☐ Clearance of the project should not be delayed, but applicant should answer the reviewer's questions or concerns. See enclosed comments.
- ☐ Clearance of the project should only be granted on the condition that the applicant use the recommendations in the enclosed comments. (Executive or Deputy Director Signature Needed.)
- ☐ Clearance of the project should be delayed until the applicant has satisfactorily addressed the concerns stated in the enclosed comments. (Executive or Deputy Director Signature Needed.)

PLEASE TYPE THE FOLLOWING INFORMATION:

Linda C Nusbaum
Reviewer's Name

Agency Name: Linda C Nusbaum Div: Ohio Department of Education
Street Address: 65 So. Front St City: Columbus State: OH
Phone: 466-4838 Zip Code: 43266-0308

Executive or Deputy Signature

OBM 6005 (Rev 8/87)

State of South Carolina

Office of the Governor

CARROLL A. CAMPBELL, JR.
GOVERNOR

OFFICE OF EXECUTIVE
POLICY AND PROGRAMS

January 29, 1993

Mr. Stephan Sohinki
DOE Office of Reconfiguration.
P.O. Box 3417
Alexandria, Virginia 22302

Re: Nuclear Weapons Complex Reconfiguration Program: Nonnuclear Consolidation Environmental Assessment

Dear Mr. Sohinki:

The proposed project has been processed in accordance with Executive Order 12372. All historic preservation procedures outlined in 36 CFR 800 should be observed and any necessary plans and specifications should be submitted to the South Carolina Department of Health and Environmental Control for review and approval

The State Application Identifier number for this project is EIS-921216-019. This number should be used in future correspondence with this office regarding this proposal. If you have any questions regarding this project feel free to contact me at (803) 734-0435.

Respectfully,

John W. Zemp Jr.
Supervisor,
Grant Services Unit

Enclosures

Office of the Governor • Grant Services

South Carolina Project Notification and Review

1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019
Suspense Date
01/15/93

Steve Davis
S.C. Department of Health and Enviromental Control

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

Please review the attached information, mindful of the impact it may have on your agency's goals and objectives. Document the results of your review in the space provided. Return your response to us by the suspense date indicated above. Your comments will be reviewed and utilized in making the official state recommendation concerning the project. The recommendation will be forwarded to the cognizant federal agency.

If you have no comments, return of this form is still required.

If you have any questions, call me at (803) 734-0485.

John Zemp

- [ ] Project is consistent with our goals and objectives.
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [x] Comments on proposed Application is as follows: The Department will send comments directly to DOE.

Signature: Kenneth King Date: 1/11/93

Title: Assistant Planning Commissioner Phone: 734-5360

Office of the Governor•Grant Services
South Carolina Project Notification and Review

1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019
Suspense Date
01/15/93

Charles Logan
S.C. Land Resources Conservation Commission

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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If you have no comments, return of this form is still required.

If you have any questions, call me at (803) 734-0485.

- [x] Project is consistent with our goals and objectives. John Zemp
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Considering supplied and available information, there are no objections to r project by the S. C. Land Resources Commission due to consistency with agenc plans and policies.
We appreciate the opportunity to respond to this project. Please contact th Commission at 734-9100 if you desire additional information.

Signature: [illegible] Date: January 13, 1993

Title: Deputy Director, Conservation and Public Affairs Programs Phone: 803-734-9100

Office of the Governor•Grant Services
South Carolina Project Notification and Review

1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019
Suspense Date
01/15/93

Charles Kerekes
S.C. Jobs-Economic Development Authority

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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RECEIVED JAN 8 1993 GRANT SERVICES

If you have no comments, return of this form is still required.

If you have any questions, call me at (803) 734-0485.

- [x] Project is consistent with our goals and objectives. John Zemp
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: [illegible] Date: Jan. 7, 1993

Title: Executive Vice President and COO Phone: 737-0079

Office of the Governor • Grant Services
South Carolina Project Notification and Review
1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019

Suspense Date
01/15/93

Joseph Saleeby
South Carolina Aeronautics Commission

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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If you have no comments, return of this form is still required.

RECEIVED JAN 9 1993 John Zemp GRANT SERVICES

If you have any questions, call me at (803) 734-0485.

- [ ] Project is consistent with our goals and objectives.
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: Wm. A. Wass Date: 1-7-93

Title: Asst Dir / Airports Phone: 822-5400

Office of the Governor • Grant Services
South Carolina Project Notification and Review
1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019

Suspense Date
01/15/93

Earl F. Brown, Jr.
South Carolina Human Affairs Commission

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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RECEIVED JAN 11 1993 John Zemp GRANT SERVICES

If you have any questions, call me at (803) 734-0485.

- [x] Project is consistent with our goals and objectives.
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: Earl F. Brown, Jr. Date: 1/7/93

Title: Dir. Comm Rel'ns Phone: 803 253-6322

Office of the Governor • Grant Services
South Carolina Project Notification and Review
1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019
Suspense Date
01/15/93

Stanley M. McKinney
Governor's Division of Public Safety Programs

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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If you have no comments, return of this form is still required.

JAN 12 1993

If you have any questions, call me at (803) 734-0485.

John Zemp

- [x] Project is consistent with our goals and objectives.
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: _____ Date: 1-12-93

Title: DIRECTOR Phone: 4-0425

Office of the Governor • Grant Services
South Carolina Project Notification and Review
1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier
EIS-921216-019
Suspense Date
01/15/93

Mr. Joe Dennis
South Carolina Water Resources Commission

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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If you have no comments, return of this form is still required.

If you have any questions, call me at (803) 734-0485.

- [x] Project is consistent with our goals and objectives. John Zemp
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: _____ Date: 1-11-93

Title: _____ Phone: _____

Office of the Governor • Grant Services
South Carolina Project Notification and Review

1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier EIS-921216-019
Suspense Date 01/15/93

Larry Setzler
South Carolina State Ports Authority

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

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If you have no comments, return of this form is still required.

RECEIVED
JAN 11 1993
GRANT SERVICES

If you have any questions, call me at (803) 734-0485.

John Zemp

- [x] Project is consistent with our goals and objectives.
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: Larry W. Setzler Date: 7 JANUARY 1993

Title: ENGINEERING PROJECT MANAGER Phone: 803-856-8165

Office of the Governor • Grant Services
South Carolina Project Notification and Review

1205 Pendleton Street
Room 477
Columbia, SC 29201

State Application Identifier EIS-921216-019
Suspense Date 01/15/93

Bruce E. Rippeteau
South Carolina Archaeologist

The Grant Services Unit, Office of the Governor is authorized to operate the South Carolina Project Notification and Review System (SCPNRS). Through the system the appropriate state and local officials are given the opportunity to review, comment, and be involved in efforts to obtain and use federal assistance, and to assess the relationship of proposals to their plans and programs.

Please review the attached information, mindful of the impact it may have on your agency's goals and objectives. Document the results of your review in the space provided. Return your response to us by the suspense date indicated above. Your comments will be reviewed and utilized in making the official state recommendation concerning the project. The recommendation will be forwarded to the cognizant federal agency.

If you have no comments, return of this form is still required.

JAN 13
GS John Zemp

If you have any questions, call me at (803) 734-0485.

- [x] Project is consistent with our goals and objectives.
- [ ] Request a conference to discuss comments.
- [ ] Please discontinue sending projects with this CFDA# to our office for review.
- [ ] Comments on proposed Application is as follows:

Signature: [illegible] Date: 01/14/93

Title: COMPLIANCE REVIEW Phone: 803 734 0566

ACKNOWLEDGEMENT

January 16, 1993

Mr. Richard A. Claytor
Assistant Secretary for Defense Programs
U.S. Department of Energy
100 Independence Avenue, S.W.
Washington, D.C. 20585

Project Name: Nonnuclear Consolidation Environmental Assessment Volume I and Volume II-Appendixes Nuclear Weapons Complex Reconfiguration Program

Project Number: EIS-921216-019

Suspense Date: 01/31/93

Dear Mr. Claytor,

Receipt of the above referenced project is acknowledged. The Governor's Office, Grant Services Unit, has initiated an intergovernmental review of this project. You will be notified of the results of this review by the suspense date indicated above. South Carolina state agencies are reminded that if additional budget authorization is needed for this project, three copies of the completed GCR-1 form and two copies of the project proposal must be submitted to this office. This action should be initiated immediately, if required. You should use the State Application Identifier number in your correspondence with our office regarding this project. Contact me at (803) 734-0485 if you have any questions.

Sincerely,

John Zemp
Grants Services Supervisor

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

BRUCE KING
GOVERNOR

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

February 16, 1993

Mr. Steve Sohinki
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

RE: Nuclear Weapons Complex Reconfiguration Program, Dated December 1992

Dear Mr. Sohinki:

The subject document was reviewed strictly to evaluate the proposed action's impacts on waste generation at Los Alamos and Sandia National laboratories. The comments are keyed to the section numbers in the subject document.

1/9.4 — 3.1.1 "Beryllium and Pit Support--The existing technology base and prototyping capability at LANL would be enhanced to provide limited manufacturing capability for beryllium and pit support work now done at RFP." The document is insufficiently clear regarding the nature of the "pit support work". As we would have considered the tritium functions to more properly belong in the category of nuclear functions, we wish to be clear regarding the nature of the pit-support work. According to Table B.3-2 in the Appendix, no low-level or mixed waste generation is associated with pit support functions. We conclude that the pit-support functions to be relocated to LANL are wholly without a radioactive component. Is this accurate?

2/9.5 — 3.1.2.1 "Tritium Handling--The tritium handling capabilities at Pinellas would be relocated with similar functions at LANL." This sentence can lead to opposite interpretations: 1) that tritium handling capabilities at both Pinellas and LANL would be relocated, or 2) that those functions at Pinellas would be relocated to LANL. We assume the latter is the correct interpretation, but this phrasing, which occurs throughout the document, should be clarified.

3/9.6 — 3.3.3 "The maximum increase of tritium would be 5 percent above the quantity presently handled and stored at LANL." The document should specify this amount as well as the amount

Steve Sohinki
February 18, 1993
Page 2

3/9.6 of increase in tritium loss to the atmosphere and to water treatment plant outfalls for both LANL and SNL. Neither Table 3.3.3-4 nor Appendix Table B3-2 are adequately specific with regard to tritium waste streams. Please specify anticipated increases in curies for annual increments to both atmospheric and waste-water tritium for both laboratories. We do not find projections of this kind in the Appendix.

4/9.7 "LLW would be generated from neutron tube target loading functions and calorimeters." In order to understand the impact of these operations on waste streams at LANL and SNL, what would be the radioisotopic makeup of the waste streams indicated in table B3-2?

5/9.8 "The high power detonators would generate 7,000 gallons per year of High Explosive contaminated solvents, and 3,200 ft³/yr of solid scrap HE, and HE-contaminated solid wastes." What specific type of contaminated solvents will be generated? We assume the HE scrap will be a RCRA characteristic (D002) waste. Will the HE-contaminated solids not be RCRA wastes?

6/9.9 In summary, the document should include one table for each facility listing the current waste generation and the projected increment to the generation of each specific waste, not just waste type, and the ability of the facility in question to manage each waste should be as specifically addressed.

If you have any questions please contact me at (505) 827-4313.

Sincerely,

Bruce A. Swanton, Program Manager
Hazardous and Radioactive Materials Bureau

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Roy Romer
Governor

March 8, 1993

Steve Sohinki
Office of Environmental Safety, Health
and Quality Assurance
Department of Energy
1000 Independence Ave., S.W.
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Dear Mr. Sohinki:

Thank you and Secretary O'Leary for this opportunity to provide the Department of Energy (DOE) with my comments on the Draft Environmental Assessment (EA) for Non-nuclear Consolidation of DOE's weapons complex.

Your patience and assistance in allowing my office to get these comments to you after the deadline is appreciated.

From a broad national policy perspective, I think it is important to recognize that non-nuclear consolidation is a component of a larger nuclear weapons complex reconfiguration plan proposed under Complex 21. Moreover, the issues involved in reconfiguration of DOE's nuclear research, development and testing are to be addressed in a programmatic environmental impact statement (PEIS) to be issued later on.

1/16.1 Given the difficult issues involved in the larger question of reconfiguration of the entire DOE nuclear weapons complex, how can DOE make sound judgments about reconfiguration of the non-nuclear portion of the complex -- particularly in advance of the programmatic environmental impact statement?

Separating the non-nuclear component from the larger programmatic issues seems to me to be putting the cart before the horse.

2/15.8 The DOE nuclear weapons complex is currently not in production. Neither the new administration nor the new Congress have made a determination about future weapons production, maintenance, and decommissioning needs. In light of these unknowns, is it prudent for DOE to make an

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2/15.8 investment of $550 million implementing the first five years of a non-nuclear consolidation plan in the absence of a comprehensive national nuclear weapons policy?

3/14.5 The Draft EA states, "if the analysis in the EA supports a finding of no significant impact (FONSI), DOE plans to proceed with non-nuclear consolidation and incorporate the non-nuclear consolidation decisions into the PEIS analysis." Again, this is putting the cart before the horse. It is also the misapplication of an environmental document under the National Environmental Policy Act (NEPA).

NEPA was not designed to suggest that environmental considerations be the only factors documented prior to a decision. Environmental factors are a consideration, but not necessarily the driving force in an agency decision.

4/14.6 To suggest, as the Draft EA does, that minimal impacts on wildlife and air quality associated with moving stainless steel work away from Rocky Flats, justifies the decision to make such a move, is a misapplication of NEPA. This approach suggests that the proposed non-nuclear consolidation is flawed and premature, irrespective of environmental impacts.

5/11.2 It is also important to point out that the EA is silent on critical issues such as the impacts of non-nuclear consolidation on cleanup and waste management activities at Rocky Flats. Will moving equipment slow down these activities? How will non-nuclear consolidation impact the decommissioning process at the facility?

These critical questions need to be answered before DOE moves forward with a decision on non-nuclear consolidation.

6/1.6 As you know, the General Accounting Office (GAO) has criticized the cost analysis of the non-nuclear consolidation plan. The initial assumptions guiding the plan were prepared in 1991, prior to the decision to stop production of the W-88 warheads at the Rocky Flats facility. Consequently, the cost analysis assumptions and findings of the EA are flawed.

7/15.9 The Draft EA states that the non-nuclear consolidation proposal will "reduce operating costs to achieve a near term savings well in excess of $100 million a year and a long term savings in excess of $25 billion annually."

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7/15.9 This statement does not hold up against the findings of the non-nuclear reconfiguration cost effectiveness report issued by DOE in January, 1993. This report suggests that the supplemental cost study for non-nuclear consolidation "showed that the nature of fixed portions of overhead costs prevent any meaningful reductions without actually terminating the operations of the plant."

This report documents no cost savings from non-nuclear consolidation until after decontamination and decomissioning at sites like Rocky Flats and Mound -- likely 20 years in the future. Until the relationship between decomissioning and nuclear consolidation is better understood, cost savings are likely to be illusory.

In light of these problems with the EA, I hope that Secretary O'Leary delays issuing a FONSI until a clearer sense of nuclear consolidation policy is developed by DOE.

Thank you again for the opportunity to comment on the Draft EA. My office looks forward to working with DOE on this, and other issues of importance.

Sincerely,

Roy Romer
Governor

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