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Report
April 1, 1997

Pueblo 1, located in Pueblo Canyon just above confluence with Acid Canyon, is one of the Los Alamos National Laboratory's sediment and surface water stations sampled each year for radionuclide and metal constituents.

NMED/DOE/AIP-97/1



New Mexico Environment Department



Environmental
Oversight
and Monitoring
at
Department
of Energy
Facilities in
New Mexico

1996 Annual Performance Report



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New Mexico Environment Department

Environmental Oversight and Monitoring at Department of Energy Facilities in New Mexico

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DOE Oversight Bureau • 1996 Annual Performance Report



**The 1996 Annual Performance Report
is a publication of the
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DOE Oversight Bureau**

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Executive Summary

Introduction and Program Overview

The mission of the New Mexico Environment Department's DOE Oversight Bureau is to help assure that activities at the U.S. Department of Energy facilities in New Mexico are protective of public health and safety and the environment. Funding to support these oversight activities is provided through a grant from the DOE in accordance with the provisions stated in the *Agreement-In-Principle between the State of New Mexico and the U.S. Department of Energy*.

Los Alamos National Laboratory Oversight

Environmental monitoring at Los Alamos National Laboratory included both on-site and off-site investigations of environmental and biological media for verification of LANL's data and background parameters. Bureau staff assisted in the prioritization and systematically reviewed and evaluated cleanup activities at LANL's environmental restoration sites. Considerable time was expended on tracking, prioritizing, reviewing and submitting comments on the DOE's National Environmental Policy Act documents.

Sandia National Laboratories and Inhalation Toxicology Research Institute Oversight

Site-wide oversight activities at SNL consisted of reviewing the *Annual Site-Wide Report*, evaluating SNL's conceptual hydrogeological model and reviewing their assessment of background concentrations for major inorganic constituents in soil and water. Components of the environmental restoration oversight program included environmental sampling, reviews of facility-generated documents and discussions with personnel from DOE, SNL, ITRI and NMED regulators. The bureau's environmental surveillance program, by verifying the accuracy of SNL's surveillance systems, evaluating the performance of SNL's control measures and detecting environmental contamination, provides independent information on the impact DOE facilities have on the environment.

Waste Isolation Pilot Plant Oversight

Significant issues investigated in 1995 by WIPP oversight staff included an investigation into possible sources of lead found in routine water samples and an evaluation of the potential of boreholes to serve as a pathway for liquid migration. At the end of the federal fiscal year, the WIPP oversight office was closed due to a reduction in the DOE grant allocation. Oversight functions were transferred to technical staff located in Santa Fe.

Public Information and Public Outreach

Efforts to increase public awareness and understanding of environmental matters about the DOE facilities was greatly increased during 1995. Ongoing programs were enhanced and new initiatives including a bureau website and technical workshops were undertaken.



Introduction and Program Overview

The mission of the New Mexico Environment Department's DOE Oversight Bureau is to help assure that activities at DOE facilities in New Mexico are protective of public health and safety and the environment. The DOE Oversight Bureau's activities are funded by a grant from the U.S. Department of Energy in accordance with the provisions set forth in the *Agreement-In-Principle between the State of New Mexico and the U.S. Department of Energy*. This agreement focuses on state oversight of environmental impacts of the DOE facilities: Sandia National Laboratories and the Inhalation Toxicology Research Institute in Albuquerque, Los Alamos National Laboratory in Los Alamos and the Waste Isolation Pilot Plant in Carlsbad.

This was the sixth year that state oversight of environmental impacts of DOE facilities has been accomplished under an Agreement-In-Principle. The need for the DOE to improve its accountability concerning public health, safety and environmental protection by allowing states hosting the DOE facilities direct access to those facilities and by financially underwriting the costs of state oversight of DOE environmental monitoring programs was first announced in the Secretary of Energy's 10-point initiative on June 27, 1989. The first Agreement-In-Principle was effective from October 22, 1990 through September 30, 1995. The second five-year agreement became effective on October 1, 1995, through which the New Mexico Environment Department continues to fulfill the four primary objectives of the agreement:

- To assess the DOE's compliance with existing laws including regulations, rules, and standards.
- To participate in the prioritization of cleanup and compliance activities at the DOE facilities.
- To develop and implement a vigorous program of independent monitoring and oversight.
- To communicate with the public to increase public knowledge of environmental matters about the facilities, including coordination with local and tribal governments.

Interagency Guidance

UMBRELLA PROTOCOL — NEW MEXICO ENVIRONMENT DEPARTMENT/DOE

To provide general guidance for both New Mexico Environment Department and U. S. Department of Energy personnel involved in the oversight program the *Guidance Protocol for Implementation of the Agreement-In-Principle between the United States Department of Energy and the State of New Mexico for Environmental Oversight, Monitoring and Emergency Response at DOE Facilities in New Mexico* was finalized and distributed to all staff in January 1996. This document, a requirement under the Agreement-In-Principle, establishes procedures and guidelines for program-related day-to-day operations between the DOE, DOE contractors and the State of New Mexico.





SITE SPECIFIC PROTOCOLS

Upon final approval of the Umbrella Protocol, site specific protocols were developed by each site oversight office that describe the procedures for the AIP related day-to-day activities and interactions at the DOE facilities. Specific details were provided on the management and transfer of documents and information, meetings, public affairs, reporting, roles of site representatives, security and training. The site specific protocol for the WIPP oversight activities was approved and implemented in the summer of 1996. A revised draft of the protocol for the oversight activities at the SNL and ITRI sites was submitted to the DOE in August 1996. The draft of the protocol for the LANL site was submitted to the DOE for their review and comment.

ENVIRONMENTAL RESTORATION TECHNICAL GUIDANCE DEVELOPMENT

The DOE Oversight Bureau participated in meetings of the "core team" to address technical, administrative and regulatory issues common to the environmental restoration programs at SNL and LANL. Representatives from DOE, EPA, LANL, NMED and SNL constituted the core team.

The core team developed a series of technical annexes to the *Document of Understanding*, the interagency agreement developed and signed in 1995 to help facilitate the cost-effective implementation of the environmental restoration program. These annexes provide standard approaches to issues such as land use, cleanup levels, sampling and analysis methods, temporary waste storage, ground water and vadose zone monitoring, permit modification and public involvement. The process culminated in two training sessions on the annexes held in Santa Fe for personnel at SNL, LANL and NMED who are involved with the environmental restoration programs. Bureau staff members were presenters at both of the training sessions.

WORK PLANS

The Agreement-In-Principle requires that the State of New Mexico prepare a plan for its independent oversight of programs for monitoring the environment at and near the DOE facilities and for assessing compliance with applicable environmental laws and regulations. Additionally, the State of New Mexico must provide this plan to the DOE, the U. S. Environmental Protection Agency, other appropriate federal and state agencies, and affected local and tribal governments for review and consultation. The final version of the *Umbrella Work Plan* for the period October 1, 1995 through September 30, 2000 was submitted to the DOE in March 1996.

The site specific work plan for the WIPP oversight activities was completed in July 1996. A draft of that for SNL/ITRI was submitted to the DOE in April 1996. Final development of the work plans for SNL, ITRI and LANL oversight activities is dependent upon the completion of the sites' associated protocols. These work plans will be issued in draft form to the public to obtain stakeholder input.

PERSONNEL AND ADMINISTRATIVE ISSUES

To meet the State of New Mexico's obligations under the Agreement-In-Principle, The New Mexico Environment Department hired a total of 35 employees to fill positions that were fully funded by the Agreement-In-Principle. At the end of the federal fiscal year, due to a reduction in the DOE grant allocation, six of these positions were eliminated, leaving a total of 29 positions.

The New Mexico Environment Department employees who are funded by the DOE grant are located on-site at the Department of Energy facilities in Los Alamos and Albuquerque and at the New Mexico Environment Department in Santa Fe. The on-site office at the Waste Isolation Pilot Plant was staffed by four employees until September 30, 1996, when their positions were eliminated and the office was closed. AIP staff members in Santa Fe continue to perform environmental oversight and monitoring for the Waste Isolation Pilot Plant.

Los Alamos National Laboratory Oversight

The Environmental Surveillance Program

The scope of the New Mexico Environment Department (NMED) Department of Energy Oversight Bureau's environmental monitoring programs at Los Alamos National Laboratory (LANL) spans both on-site and off-site investigations of environmental media for verification of LANL's data and background parameters. The bureau performs environmental investigations of air, water and terrestrial pathways through field exploration, split and independent sampling and measuring field parameters. The bureau coordinates its surveillance activities with LANL's Environmental, Health and Safety Division which routinely conducts both regulator-mandated and voluntary sampling of air, water, sediment and biological media. Because many of LANL's technical areas are situated within vast expanses of forested mesa tops and canyons that potentially contain sensitive habitats and endangered species, the emphasis of the bureau's oversight at LANL is on environmental surveillance. Currently, the LANL oversight staff expends 70 percent of its resources on environmental surveillance programs which monitor terrestrial, water, and air particulate media, and environmental dosimetry.

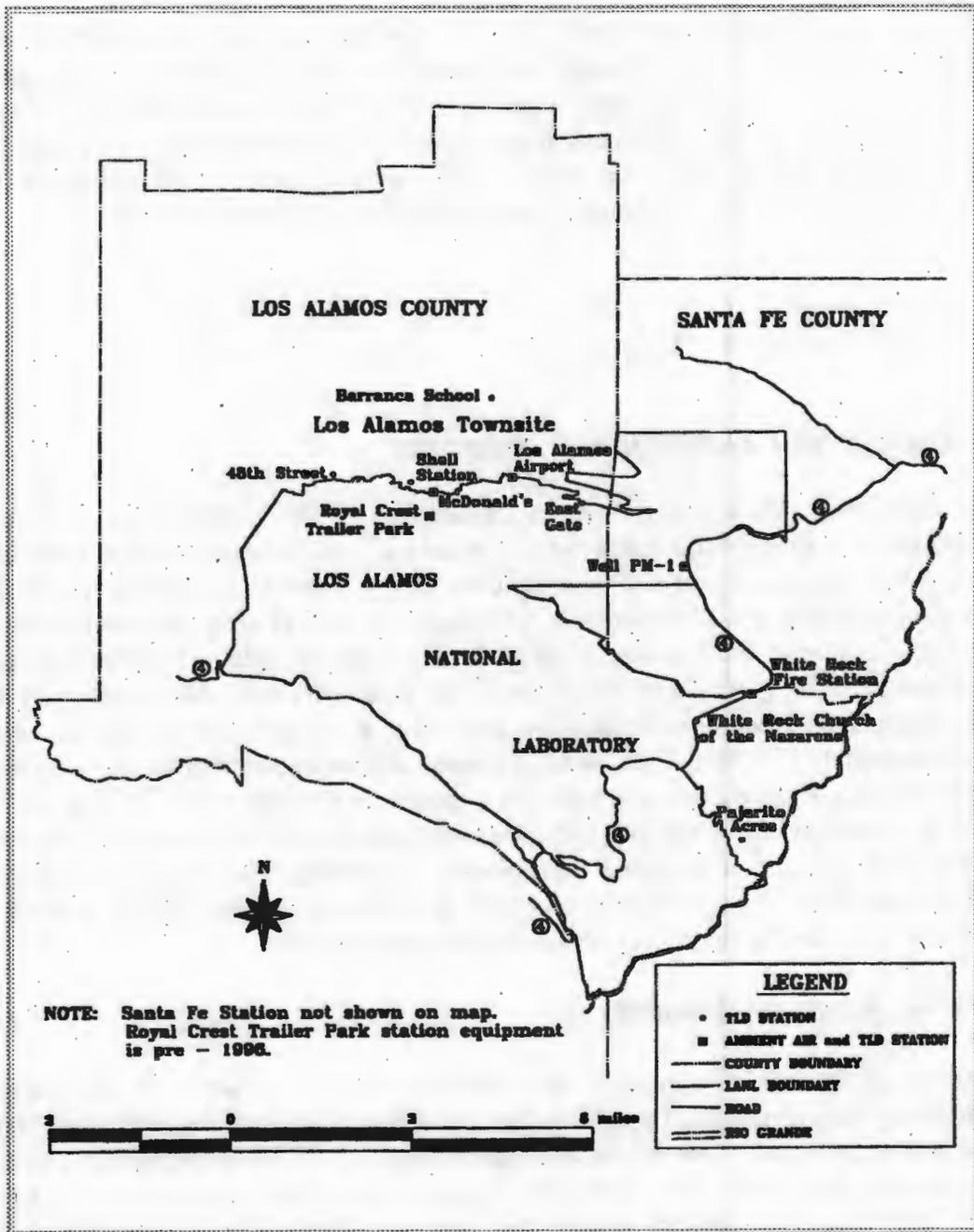
ENVIRONMENTAL RADIATION DOSIMETRY

The DOE Oversight Bureau has a network of thermoluminescent dosimeters (TLDs) for measuring the levels of gamma radiation present in the environment to assess the background baseline and any laboratory-related gamma radiation anomalies. The TLD network also serves to evaluate the effectiveness of LANL's radiation monitoring program by collocation of LANL and NMED TLDs at twelve locations around the perimeter of the laboratory shown in Figure 1. Some of these locations were selected because they are located between known sources of



radiation and population centers, while others are located in areas thought to represent background conditions. The bureau's data from these selected locations are compared to the data generated from LANL's TLDs. If the data values are similar, confidence in the integrity of LANL's data from their non-collocated TLD locations is achieved.

Figure 1.
Perimeter Ambient Air Monitoring and Thermoluminescent Dosimeter (TLD) Stations



LANL's and the DOE Oversight Bureau's use of different chip media and methodologies resulted in the bureau's values being considerably smaller than the values reported by LANL. Investigation into the data discrepancies by a bureau scientist determined that LANL's data was more accurate as it was more consistent with reported levels for the region, and that bureau data was unrealistically low. In late 1995 the bureau decided to change to different TLD chip media to achieve greater accuracy and facilitate a more scientifically valid data comparison. During 1996, both types of TLDs were used. The old chips continued with their trend of lower than established background values. The new chips showed much more comparable values. The data collected from both types of TLDs were at or below natural background radiation levels at all of the locations.



Photo by Tim Michael
Dave Baggett checking an air sampler located at the White Rock Fire Station.

AMBIENT AIR MONITORING

The ambient air monitoring program uses the same monitoring strategy as the environmental dosimetry program. The bureau collocated its stations with five of LANL's monitoring stations shown on Figure 1. Ambient air samplers draw air through filters, using a motorized pump, which collect the particulate matter. These filters are then analyzed on a quarterly basis for the radionuclides of interest, usually uranium, plutonium and americium. New monitors deployed in 1996 also have additional apparatus with the ability to sample for tritium. LANL's data can be verified by this independent monitoring program.



In 1996, with the new air monitors of the same type used by LANL and improved procedures in place, the levels of plutonium and americium detected by the oversight bureau dropped significantly from the levels the bureau reported in 1995 using monitors equipped with a less powerful air pump. Levels of radionuclides detected approached the same level that LANL reports. Uranium levels dropped slightly, but still show above levels reported by LANL. This is likely due to the natural uranium present in the glass fiber filters used by the bureau. LANL uses a different filter medium which has a lower uranium content. The values for plutonium, americium and uranium are all around two or three orders of magnitude below the Department of Energy concentration guidelines.

NEWNET

The Neighborhood Environmental Watch Network (NEWNET) is an extensive network of gamma radiation monitoring stations surrounding several DOE facilities in the United States. The off-site network in the vicinity of Los Alamos National Laboratory was established by a cooperative effort between the DOE, NMED and the concerned public of Northern New Mexico. These stations offer real time viewing of the data, as opposed to waiting up to three months for TLD data or up to two years for the annual LANL environmental report. The data are accessed by LANL from each station via a satellite link, and after quality assurance tests are performed with satisfactory results, the data are made available on a home page on the Internet. Five of these stations have been placed in communities surrounding Los Alamos that include: San Ildefonso, Española, Santa Fe, Cochiti, and El Rito. In addition to gamma radiation detection, the stations are equipped with meteorological instrumentation to measure wind speed, wind direction, temperature and barometric pressure.



Photo by Jeanne-Marie Crockett
Erecting the meteorological tower mast of a NEWNET monitoring station at the Santa Fe Indian School.

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THE DOME FIRE

The beginning of 1996 saw New Mexico facing one of the worst droughts in thirty years. In April, a vast parcel of U.S. Forest Service land southwest of the laboratory referred to as "Saint Peter's Dome" caught fire. The blaze quickly spread to neighboring Bandelier National Monument property and threatened to encroach on the southwestern perimeter of Los Alamos



National Laboratory. During the fire, many concerns were raised by the public regarding the possibility of the release of radiation from the burning of areas contaminated by laboratory activities.

The bureau responded to public concerns with the help of data from its ambient air monitoring program, environmental dosimetry program, and Internet access to the NEWNET data collected from stations located at LANL and in surrounding communities. In response to misrepresentations of bureau data, a letter to the editor was published in area newspapers clearly stating that there was no evidence that such a radioactive release had occurred. The fire did not encroach upon LANL property, nor any areas known to be contaminated by laboratory activities. Also, after carefully scrutinizing the bureau's data, it was shown that there was no increase in radiation levels during or after the Dome fire. Furthermore, weekly readings for gross beta radiation taken from the bureau's air monitors in Santa Fe during this period were not elevated. Also, a thorough review of the gamma radiation levels reported during this period on the Internet from the NEWNET stations located around Los Alamos or in Santa Fe did not show increased levels of radiation.

OVERSIGHT STAFF PARTICIPATE IN DOE'S INTERIM FIRE MANAGEMENT TEAM

The Dome fire and extremely dry conditions in 1996 raised concerns about the possibility of a fire on DOE property at LANL. In response, a task force, the Interim Fire Management Team, was formed to review fire prevention measures at the laboratory. Members of the team included employees from the DOE, the U.S. Forest Service, LANL and the Los Alamos County Fire Department. A concern that areas where fire breaks were proposed to be cut could be on or near potential release sites of hazardous and radioactive contaminants, prompted oversight staff participation at the team's meetings. A bureau staff member attended the weekly meetings expressing concerns over possible storm-water impact due to the clearing of the fire breaks, prompting the initiation of laboratory-wide measures to mitigate these concerns by planning for erosion controls at the fire break sites.

SURFACE AND GROUND WATER MONITORING

The DOE Oversight Bureau's water monitoring program's objectives are to verify LANL's data and characterize the area's surface- and ground-water systems and pathways. Activities that support these objectives include split and independent sampling of wells, springs, surface water, snowmelt and storm water. Field data such as specific conductance, pH, temperature, flow amounts and source locations are documented, and the samples are typically analyzed for one or more of the following suites of analytical parameters: general chemistry, total and dissolved metals, radionuclides and organic compounds.

In 1996, oversight staff expanded activities to include field explorations leading to the discovery of on- and off-site springs previously undocumented by LANL and DOE, which along with known wells and springs were accurately marked, located and characterized. The surface-flow measurements taken downstream from several of these newly located springs supported the



conclusion that these springs may support perennial flow within portions of Cañon de Valle and Pajarito Canyon. An analysis of data collected from several years of monitoring surface- and ground-water occurrences and pathways, shows that contaminants were detected within each of the four saturated zones in the Los Alamos area. The largest and most diverse concentrations of contaminants in ground water are found within canyon alluvium.

Contaminants were also detected in storm water within some canyons on Los Alamos property, and in storm water leaving the facility property in Los Alamos Canyon, a major tributary of White Rock Canyon and the Rio Grande. LANL implemented an extensive storm-water monitoring program in 1996 that entailed collocating automated samplers with their existing and new gaging stations in the major drainages of the laboratory. Within a few years, this program should provide an adequate characterization of possible contamination in storm-water discharges within the major canyon drainages which can then be assessed or verified by the bureau's monitoring program. Currently, the bureau conducts storm-water sampling at independent locations, but will split samples at one or more of LANL's stations in 1997.

The bureau has been working with LANL to coordinate and standardize data collection methods so that comparisons between data sets are trustworthy and scientifically valid. These efforts have resulted in a slight reduction in the variations between LANL's and the bureau's data.

TERRESTRIAL SURVEILLANCE

Terrestrial surveillance encompasses the sampling of sediment, soil, vegetation and foodstuffs to detect any possible migration of contaminated material from LANL to community locations. The program currently operates as a coordinated effort between LANL's Environmental Safety and Health Division and the DOE Oversight Bureau. Samples are collected on laboratory property and in surrounding communities in the summer when certain vegetation and foodstuffs are available. Scientists from the bureau and LANL collect and split samples which are then sent to an independent laboratory for analysis for radionuclides, organic compounds such as polychlorinated biphenyls, and inorganics such as mercury. To verify LANL's data, oversight employees sample at least 10 percent of the locations sampled by LANL. A preliminary comparison conducted this year of historical radiological data for foodstuffs, indicated that the bureau's data are consistent with LANL's.

Environmental Restoration Oversight

In order to track and systematically review activities at LANL's environmental restoration sites, individual oversight scientists are assigned responsibility for each of the five Field Units. These scientists, or "Field Unit Managers," regularly communicate with their DOE and LANL counterparts to coordinate activities and discuss activities at their assigned Field Units. The Field Unit Managers assign priorities to oversight tasks such as technical document reviews, meetings, site visits and sampling events at potential release sites. Additionally, these Field Unit Managers perform preliminary assessments of compliance with environmental regula-

tions.

EXPEDITED CLEANUP AT MATERIAL DISPOSAL AREA M, TECHNICAL AREA 9

Beginning in November 1995, DOE Oversight Bureau staff members have been involved with oversight at an expedited cleanup concluded in April 1996 by Los Alamos National Laboratory at an abandoned dump site known as Material Disposal Area M (MDA-M). Bureau staff participated in working-level meetings and observed activities in the field throughout the cleanup. Bureau staff evaluated the effectiveness of the cleanup and advised the facility regarding applicable regulatory requirements.

In total, the cleanup cost an estimated two million dollars. The work itself involved the removal of material on the ground and separation of hazardous material from nonhazardous materials before disposal. Approximately 5700 cubic yards of nonhazardous chemical or asbestos wastes were sent to industrial waste landfills. One hundred and sixty-six cubic yards of clean debris went to the Los Alamos County Landfill. About 160 cubic yards of metal were recycled and about 85 cubic yards of clean concrete were crushed and recycled. Approximately 36 cubic yards of low-level radioactive waste were disposed of at TA-54 Area G. No mixed hazardous and radioactive waste was generated.

After removal of the waste, the laboratory and the DOE Oversight Bureau each collected soil samples to determine whether or not any contamination remained at the site. Analytical results from the samples showed concentrations of contaminants below LANL's action levels based on an industrial land use scenario. Finally, the site was graded, mulched and seeded to reduce erosion. Currently, bureau staff members conduct site visits to monitor the effectiveness of the erosion control methods employed at MDA-M. Staff members have made recommendations regarding the maintenance of the erosion control methods.

This project provides an example of effective cooperation between the laboratory environmental restoration staff and the bureau. Beginning with a review of the cleanup plan, bureau staff worked with laboratory personnel and NMED regulators as the cleanup proceeded. Verification samples collected at the site by bureau staff provide an additional level of assurance to regulators regarding the adequacy of the cleanup. Cooperation of this kind in expediting cleanups helps assure that environmental threats are being addressed in a timely manner by the Environmental Restoration Project at the laboratory.

LANL'S WATERSHED MANAGEMENT PROGRAM PLAN

A major concern of DOE Oversight Bureau staff is that significant erosion of contaminated sediments is occurring at potential release sites at LANL. This contaminant mobilization and the lack of an integrated nonpoint source pollution management program are resulting in the migration of contaminants into watercourses at LANL and potential impairment of designated or attainable uses.



The bureau requested that maps be generated by LANL displaying potential release sites that were located in or near watercourses which might have the potential to affect surface and ground water quality. The bureau also recommended that erosion controls be evaluated and implemented to mitigate the spread of contamination from these sites. The New Mexico Environment Department regulators requested the same information several months later, however, while compiling data for this request, LANL encountered problems extracting the needed information from their Facility for Information Management, Analysis and Display (FIMAD) data base. Data from only a small subset of the potential release sites located at LANL were available from FIMAD and the system was not able to differentiate between soil samples, water samples, process waste, etc. This highlighted deficiencies in LANL's data management system, indicating that changes are needed in order to effectively manage these sites.

In spite of these data retrieval problems LANL transmitted a series of site-wide watershed maps depicting potential release sites in or near watercourses. In early summer 1996, the DOE and LANL began development of an administrative procedure to evaluate environmental restoration sites for potential surface and ground water concerns. Following further bureau suggestions and concerns expressed by citizens at the bureau's public meeting in midsummer, the DOE responded by requesting that LANL take the lead in forming a Watershed Management Task Force to address watershed management at the laboratory.

Because watersheds cross political boundaries, the development of a comprehensive watershed management program at the laboratory will require input from all stakeholders, including, but not limited to federal, state, and tribal government agencies. The bureau believes that this is one of the most important initiatives to be undertaken at LANL and is helping to facilitate stakeholder participation in the development and implementation of the management program.



May 1996

Members of the LANL Wetlands Working Group discuss Sandia Canyon wetlands restoration needs.

DOE LOOKS AT ECOLOGICAL RISK ASSESSMENT

From the onset of LANL's Environmental Restoration Project, characterization and cleanup of historical contamination has been driven by human health risk assessment. However, the federal regulations which govern environmental restoration programs at the DOE facilities in New



Mexico require that ecological as well as human health concerns be addressed. These regulations, although still not finalized, have been accepted in their current draft form by the DOE, the EPA and the NMED.

The NMED has consistently recommended that the environmental restoration program at LANL address ecological concerns at potential release sites. During 1996 the NMED continued to work with the EPA, the DOE and LANL in developing methods of evaluating these sites for risks to sensitive habitats or threatened or endangered species. In response to these concerns, LANL submitted its proposed approach to ecological risk assessment to the New Mexico Environment Department. In order to evaluate LANL's approach, the DOE Oversight Bureau contracted with Region 6 of the Environmental Protection Agency to present an ecological risk assessment workshop in Santa Fe in September. Representatives from the NMED, LANL, SNL and the DOE attended the workshop. The LANL approach was used as a tool in the training session to generate discussion of the EPA approved methods for ecological risk assessment. The workshop provided participants insight to the process and enabled them to express their concerns in an open forum.

ENVIRONMENTAL IMPACT STATEMENTS

Under the National Environmental Policy Act (NEPA), any ongoing or new projects at DOE facilities are subject to an extensive review process that requires a thorough technical review and public comment on the alternatives considered. In response to changes brought on by the end of the Cold War, the Department of Energy shut down or changed missions at many of its facilities within the complex. These changes necessitated NEPA reviews of complex-wide decisions and were brought before the public in two programmatic environmental impact statements for complex reconfiguration and stockpile stewardship. There were also a number of projects at LANL this year requiring NEPA reviews.

The DOE Oversight Bureau expends considerable time and effort on tracking, prioritizing, reviewing, and submitting comments on the DOE's NEPA documents. The bureau reviews *Environmental Assessments*, and *Environmental Impact Statements* as well as *Programmatic Environmental Impact Statements*. With a common sense but peripheral vision approach to meet the concerns of New Mexicans, the bureau checks these reports for technical accuracy regarding project descriptions, preferred alternatives, and more important, the oversight staff assesses the affected environment and community near the proposed site that may be adversely impacted by a DOE record of decision. During 1996, the bureau reviewed and commented on the DOE's NEPA documents as summarized below:

In December 1995, the DOE issued its *Draft Environmental Impact Statement for the Medical Isotopes Production Project: Molybdenum-99 and Related Isotopes*. In this document, the proposed action was for the DOE to establish, as soon as practicable, a domestic U.S. production capability that would ensure a reliable supply of Mo-99 and related medical isotopes (iodine-125, iodine-131, and xenon-131) for use by the U.S. medical community. The DOE's near-term goal is to provide a backup capability to Canadian production by supplying a base-



line production level of 10 to 30 percent of current U.S. demand for Mo-99 with the capability to increase production rapidly to supply 100 percent of the U.S. demand should the Canadian source be unavailable. DOE Oversight Bureau comments focused on the third alternative proposed in the document: Omega West Reactor and Chemistry and Metallurgy Research Facility at Los Alamos National Laboratory. The Omega West Reactor was shut down in 1992 because of an extensive cooling-water leak, and would need to be restarted to support isotope production. The bureau's comments requested that data and information be provided in the environmental impact statement to document the extent of surface and subsurface contamination from the former cooling water leak. Documentation of corrective actions completed would be necessary for NMED to make a reasonable determination of whether the reactor should be restarted. Additionally, the DOE Oversight Bureau made recommendations that Omega West Reactor safeguards be installed that would prevent future releases from underground piping. In September 1996, The Department of Energy issued its *Record of Decision* to proceed with the second and preferred alternative which would not require the restarting of the Omega West Reactor at Los Alamos. The facilities selected by the DOE, would use the nuclear reactor at Sandia National Laboratories in Albuquerque, New Mexico and the CMR Facility at Los Alamos National laboratory in Los Alamos, New Mexico.

In January 1996, the DOE issued its *Draft Predecisional Draft Environmental Assessment for the Proposed CMR Building Upgrades at the Los Alamos National Laboratory Los Alamos, New Mexico* (the revised assessment was issued in August 1996). This document concerned the proposal to perform certain facility upgrades to the Chemistry and Metallurgy Research (CMR) Building in Technical Area 3 at LANL. The assessment analyzed the environmental effects of construction of the proposed upgrades. The report stated that the upgrades were designed to allow LANL to continue to conduct current operations in a safe and reliable manner in the CMR Building for another 20 to 30 years. The assessment stated that the proposed action would have no adverse effects on environment and negligible effects on human health. The bureau did not have any outstanding "burning issues" with the proposed action and our comments merely focused on possible contamination being dug up during the construction and whether a storm-water pollution prevention plan was in place at this site that would allow the mitigation of any storm-water problems.

In February 1996, the DOE issued its *Predecisional Draft Environmental Assessment for the Low Energy Demonstration Accelerator (LEDA), Technical Area 53, Los Alamos National Laboratory Los Alamos, New Mexico*. This document reported the potential environmental effects that would be expected to occur if the DOE were to design, build, and test critical prototypical components of the accelerator system for tritium production, specifically, the front-end low-energy section of the accelerator, at LANL's TA-53. The project, if implemented, was expected to slightly increase the non-radioactive air emissions, but keep radioactive air emissions to approximate current levels or below. It was expected to also slightly increase the worker, coworker, and public dose from activated air products released from the LEDA building exhaust stack. Additionally, discharged cooling water was expected to produce surface flow in Sandia Canyon in the third through the seventh years of the project. The assessment stated that Sandia Canyon sediments have no known radionuclides, heavy metals, or organic

compounds above normal background levels that would move downstream. DOE Oversight Bureau comments cautioned the DOE on this summary because of known concentrations of PCBs, associated with potential release sites in upper Sandia Canyon. State and federal comments regarding this document prompted the DOE to take samples for PCBs in Sandia Canyon in early 1996. The preliminary analysis of the samples indicated that there were indeed low levels of anthropogenic PCBs in the proposed drainage for the LEDA project.

In July 1996, the DOE issued its *Predecisional Draft Environmental Assessment for Effluent Reduction, Los Alamos National Laboratory Los Alamos, New Mexico*. This document concerned the proposal to eliminate the industrial effluent from 27 outfalls at LANL. The purpose of the assessment was to provide the DOE with a sufficient information to determine whether a Finding of No Significant Impact is supported for the proposed action or whether an environmental impact statement must be prepared to more adequately analyze any potential impacts. The primary environmental effect of the proposed action's implementation would be an increase in compliance with LANL's National Pollutant Discharge Elimination System permit. The proposed measures were needed to comply with directives issued by the EPA to the DOE and the University of California requiring proper characterization of waste streams and compliance with the discharge limitations specified in LANL's permit. The report summarized that elimination of effluent at the outfalls would have a beneficial effect in that there would be diminished mobilization and transport of existing contaminants below the outfalls. Although the DOE Oversight Bureau concurred with the outfall reduction and was very encouraged to see the DOE's proposal, the bureau's comments cautioned the DOE on this summary because 23 of the 27 outfalls were listed as potential release sites. The comments recommended that some of these outfalls be assessed further. Also, bureau comments asked for supporting data to confirm whether reducing flow to wetlands below some of these potential release site outfalls may actually cause an increase in contaminants to be released through future erosion.

In September 1996, the DOE issued its *Final Programmatic Environmental Impact Statement (PEIS) for Stockpile Stewardship and Management* — the draft was first issued in February 1996. This document addresses the DOE's ability to maintain the safety and reliability of the reduced nuclear weapons stockpile in the absence of underground nuclear testing. The statement contains two major parts where stockpile stewardship refers to activities associated with research, design, development and testing of nuclear weapons and the assessment and certification of the safety and reliability. The stockpile stewardship portion of the document evaluates the potential impacts of three proposed DOE facilities including LANL. Stockpile management refers to the activities associated with the production, maintenance, surveillance, refurbishment, and dismantlement of the nuclear weapons stockpile. The stockpile management portion of the document evaluates the potential impacts of carrying out stockpile management at eight DOE sites including LANL. The DOE's preferred stockpile stewardship alternative that concerns LANL is constructing and operating the Atlas Facility at TA-35. The document states that the facility would not generate large quantities of hazardous or low-level waste and impacts to human health would be expected to be small and within regulatory limits. The preferred alternative for stockpile management will affect LANL's Plutonium Facility at TA-55: pit component fabrication, and long-term storage of plutonium-242 oxide which is



currently being stored at the Savannah River Site. The document states that the pit fabrication at LANL would have minimal impacts on air quality and extremely small added risk to the public for radiation exposure. Initially, the bureau did not have any burning issue concerns with the proposed action, but plans to further investigate and verify the data presented in the document regarding air, terrestrial, and water pathways for the preferred alternatives. The comments submitted mainly noted and corrected certain technical discrepancies regarding descriptions of the environment and habitat near the proposed sites.

In November 1996, the DOE issued its *Predecisional Draft Environmental Assessment (PEA) for the Transfer of the DP Road Tract to the County of Los Alamos*. This rather small environmental assessment addressed the DOE's proposal to transfer ownership of the undeveloped DP Road property to the County of Los Alamos as part of its initiative to fulfill its responsibilities to provide support for the county as an atomic energy community, while simultaneously fulfilling its obligations to enhance the self-sufficiency of the county under authority of the *Atomic Energy Community Act of 1955*. The assessment summarized that there would be minimal or no adverse human health or environmental impacts due to the land transfer. Even though the land tract's future use was proposed as commercial, the bureau's comments mainly noted and expressed concern for the property's future inhabitants over possible exposure to any buried contaminants due to the close proximity of historical potential release sites. Of special note were the fenced, asphalt-capped pits adjacent to the property that was used for the disposal of hazardous and radioactive materials in the 1940s and 1950s. The DOE Oversight Bureau feels assured that the DOE will address these concerns before a decision is made to formally transfer the property to the county. A DOE *Record of Decision* is expected sometime in 1997.

Sandia National Laboratories and Inhalation Toxicology Research Institute Oversight

Site-Wide Activities

To ensure adequate protection of regional ground-water resources in Sandia National Laboratories' (SNL) waste-management, surveillance, and environmental restoration activities, the facility must have a sound conceptual hydrogeological model for the Kirtland Air Force Base area. Therefore, the SNL and ITRI oversight program includes a site-wide "task." During 1996, this consisted of reviewing SNL's *1995 Annual Site-Wide Report*, evaluating SNL's conceptual hydrogeological model and reviewing their assessment of background concentrations for major inorganic constituents (metals and radionuclides) in soil and water.

SNL'S CONCEPTUAL HYDROGEOLOGICAL MODEL DEEMED ADEQUATE

SNL has conducted various studies leading to a conceptual model as part of their *Site-Wide Hydrogeologic Characterization Project*. Results of such studies have been presented in SNL's

annual site-wide reports since 1992. The DOE has requested a modification to SNL's Resource Conservation and Recovery Act permit to terminate the site-wide project and consequently to eliminate the requirement for submittal of these annual reports.

The DOE Oversight Bureau's evaluation of SNL's conceptualization of the site-wide hydrogeology involved three steps:

- Preparation of an outline of the basic elements of an ideal conceptual hydrogeological model.
- Providing a copy of the outline to SNL personnel so they could determine how many of the elements listed have already been covered in the facility's conceptual model.
- Meeting with SNL site-wide personnel to review the results.

As expected from a review of SNL's *1995 Annual Site-Wide Report*, the bureau concluded that most of the appropriate items had already been addressed.

In view of the fact that hydrogeological systems are complex, and it is impossible to ever fully characterize them, the DOE Oversight Bureau concurs with DOE/SNL that the regional setting of the Kirtland Air Force Base area is sufficiently known that SNL environmental activities can proceed without additional site-wide studies. Should site-specific investigations ever yield findings that might modify the current conceptual model, they can be presented in an addendum to the 1995 annual site-wide report. Therefore, the bureau supported the DOE's request for a RCRA permit modification.

SNL'S BACKGROUND STUDY BEING REVIEWED

A determination as to whether a site is contaminated or sufficiently cleaned up may depend on knowledge of the background concentrations of inorganic constituents of concern. SNL and Kirtland Air Force Base have cooperatively conducted a study of background concentrations in soil and ground water for 20 hazardous metals, 10 radionuclides, and nitrate/nitrite in the Air Force base area. During 1996, the DOE Oversight Bureau met with DOE/SNL personnel to discuss SNL's background study and is finishing up a detailed evaluation of the most recent report presenting the findings of the study.

Environmental Restoration Oversight

Historical waste-management practices by DOE at Sandia National Laboratories (SNL) and the Inhalation Toxicology Research Institute (ITRI) have left sites where hazardous and/or radioactive materials have been released throughout the Kirtland Air Force Base area. The released materials include a variety of chemicals, hazardous wastes and substances, fuels, explosives, metals, and radionuclides. The sites range from small, single constituent and relatively low-risk sites to those which are larger and more complex. These are all considered by the DOE Oversight Bureau as sites requiring potential environmental restoration to reduce the threat to human health and the environment.

Environmental restoration is one of the main focuses of the DOE Oversight Bureau at SNL and ITRI. This is accomplished through appropriate environmental sampling, reviews of facility-generated environmental restoration documents, and direct discussions with DOE, SNL or ITRI site personnel, and NMED regulators. During 1996, an increased effort has been made by oversight staff members in reviewing and providing feedback to DOE and NMED regulators on proposed environmental restoration site characterization and cleanup activities. Final recommendations for many of these sites have necessitated only a short site visit, review of site history, confirmation of pertinent data, and basic evaluation of related information and documents. Still others, however, have required the combined technical expertise of several DOE Oversight Bureau employees, detailed technical meetings between bureau and DOE, SNL, or ITRI staffs, and in-depth reviews of site-specific and related work plans, reports, and reference materials.

To achieve the goals of the environmental restoration oversight program, the DOE Oversight Bureau reprioritized its internal workload based upon submittal of facility documents, updated or new site information, concerns of the public, and relative risk ranking of all the known environmental restoration sites. An overview of some of the more significant environmental restoration sites and related activities conducted by the bureau during 1996 follows.

SNL'S ENVIRONMENTAL RESTORATION SITES PRIORITIZED

The DOE Oversight Bureau ranked the known environmental restoration sites at SNL several years earlier in the program; however, another round of prioritization was undertaken during 1996 for the following reasons:

- The specific criteria used in the earlier effort needed to be updated, revised and spelled out.
- The results of the previous prioritization were never formalized.
- Ranking of sites changed as studies, site characterizations and cleanups were completed.

Computerized worksheets were developed to facilitate the current ranking process and to aid in periodic, future updates. No attempt was made to quantify the ranking; rather, individual sites were given a general score (high, medium or low), based upon a set of standard criteria:

- Known and/or potential contaminants of concern.
- Form of the contaminant release (solid, liquid, or gas).
- Volume of the released, discharged or spilled contaminant.
- Known contaminated media (soil, ground water, etc.).
- Suspected contaminated media.
- Potentially contaminated media.
- Depth to ground water.
- Main exposure pathway.
- Local conditions (e.g., nearest water supply well; nearest public receptor).





Following an initial evaluation of all the environmental restoration sites, those scoring “high” were prioritized separately.

The DOE Oversight Bureau considers that the current prioritization can provide the framework for future negotiations with the DOE and SNL for allocation of funding and resources preferentially to higher priority sites. One possibly related result of this effort has been a recent public proposal by DOE and SNL to sponsor a working group of stakeholders in early 1997 to update DOE/SNL’s own site-ranking system.

CLEANUP BEGINS AT THE CHEMICAL WASTE LANDFILL

SNL’s Chemical Waste Landfill is an approximately 1.9 acre site located in Technical Area 3 in the southwestern part of Kirtland Air Force Base. The Chemical Waste Landfill was used to dispose of a variety of hazardous wastes (volatile organic compounds [VOCs], acids, reducers/oxidizers, metals, PCBs and salts) during the period from 1962 to 1985. The majority of the wastes were placed into unlined pits or trenches throughout the landfill. Ground-water monitoring at the site was initiated in 1985; the deep, regional ground water occurs at a depth of about 490 feet. Contamination, primarily trichloroethylene (TCE), has been detected continuously beneath the landfill since May 1990, through quarterly ground-water monitoring.

The DOE Oversight Bureau has provided significant comments and recommendations to DOE/SNL and regulators for several years on numerous site characterization plans and reports, including the NMED-approved Closure Plan (1993) for the Chemical Waste Landfill. SNL’s characterization efforts have shown that ground-water contamination results from shallow organic liquid wastes which become an organic vapor “cloud” in soils at depth.

During 1996, DOE/SNL proposed voluntary corrective measures to abate the TCE-contaminated soil vapor at the Chemical Waste Landfill, which should remove or significantly reduce the source of contamination to the ground water. The bureau is encouraged by this proposal and is working with DOE and SNL, through technical meetings, rapid turnarounds on reviews of corrective measure plans, and direct coordination with regulators, to ensure that this corrective action can be implemented as soon as possible. SNL has begun drilling and installation of a network of wells for extraction of contaminated soil gas and proposes to turn the system on in early 1997.

TCE CONTAMINATION DETECTED IN GROUND WATER OF THE SANDIA NORTH AREA

Sandia North is a 1.2 square-mile area located in the northern part of the Kirtland Air Force Base (see Figure 2). It encompasses SNL’s TA-1, TA-2, and TA-4 (see Figure 3); and includes about 40 environmental restoration sites. Underlying the Sandia North area is shallow, perched ground water (approximately 325 feet deep), which flows generally to the southeast, and deep, regional ground water (approximately 595 feet deep), which flows generally to the northwest. The deep ground water occurs within the Santa Fe Group aquifer — the sole source of drink-

ing water for the Air Force base and the City of Albuquerque. The Air Force base and City of Albuquerque water-supply wells pump water from this aquifer for human consumption; some of the wells are located within one mile of the Sandia North area. During 1994, TCE and nitrate contamination were detected in both the deep and shallow ground water beneath the Sandia North area.

From 1993 to the present, nine shallow and deep ground-water monitoring wells have been installed by SNL at seven locations within and outside the Sandia North area — five of these as specific TA-2 monitoring wells and four as site-wide monitoring wells. TCE and nitrate have been detected repeatedly in these wells at concentrations which locally exceed either state or federal drinking-water standards. The source of the TCE and nitrate has not been determined currently by DOE/SNL. Bureau personnel consider that there may be multiple sources among the SNL environmental restoration sites located in the technical areas and in adjacent Tijeras Arroyo.

In 1996, DOE/SNL proposed an investigation of the source(s) and extent of contamination through the *Sandia North Groundwater Investigation Plan*. In a related activity, DOE/SNL have also proposed No Further Action (NFA) for the majority of the environmental restoration sites in the Sandia North area; that is, DOE/SNL conclude that additional site characterization/cleanup is unwarranted because the sites pose minimal threat to human health or the environment under the current land-use exposure scenario (industrial).

Figure 2
Site Map of Kirtland Air Force Base

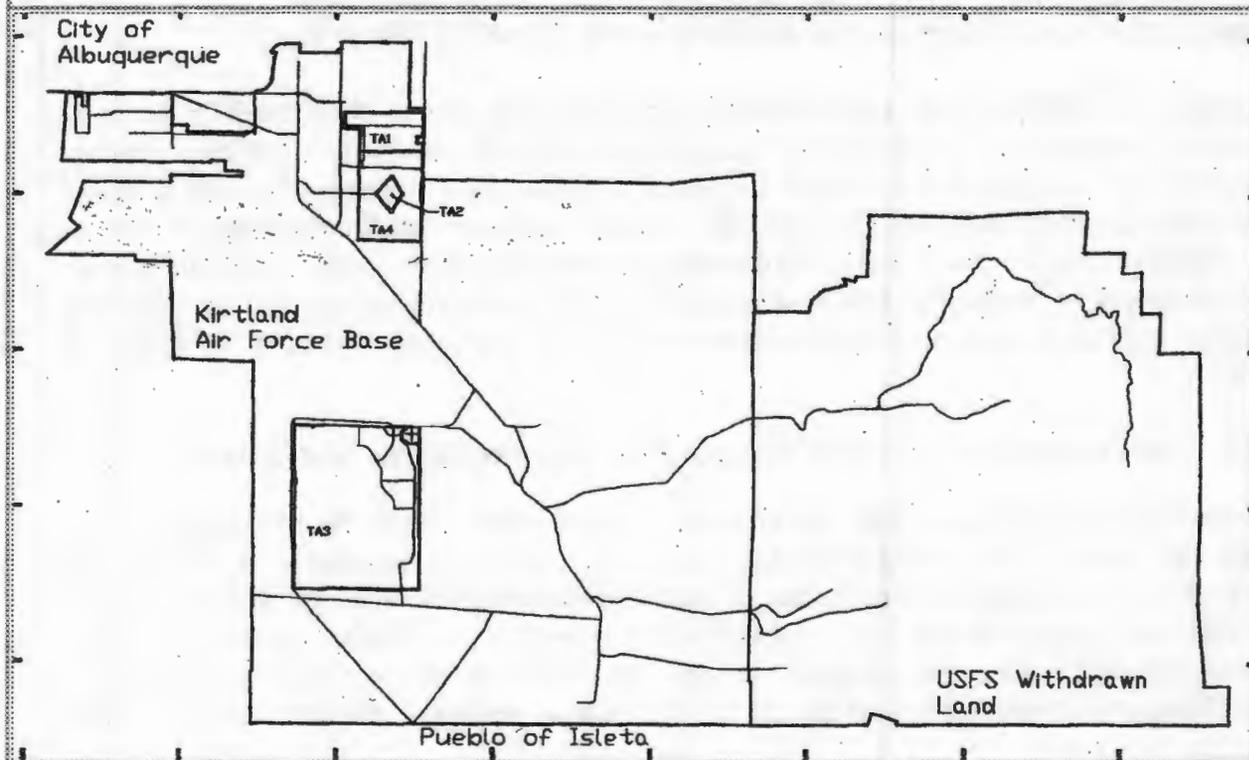
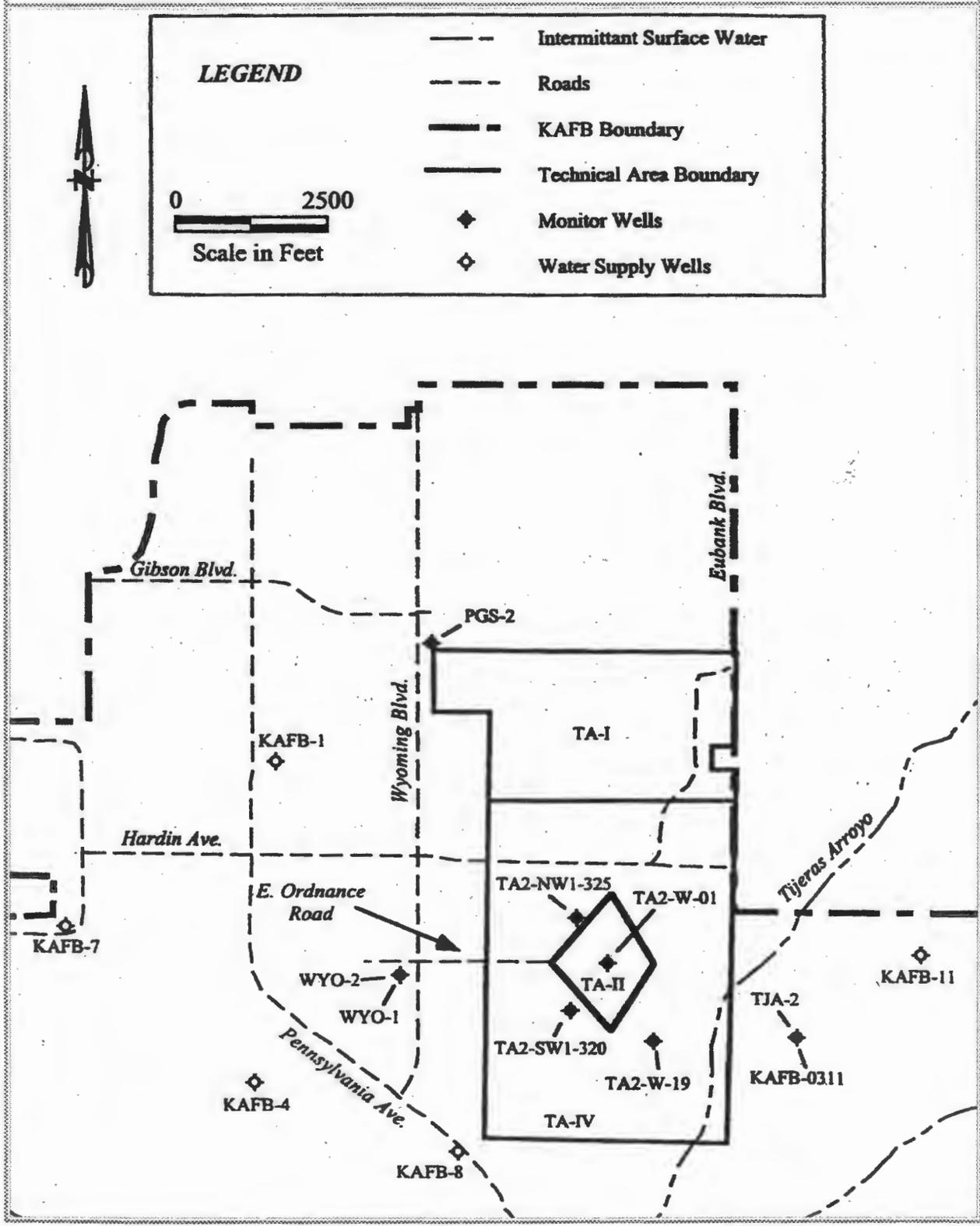


Figure 3
Approximate locations of monitor wells and water-supply wells in the vicinity of TA-11



Bureau personnel have carefully reviewed these NFA proposals and have subsequently recommended to DOE and NMED's regulatory bureaus that NFA is currently inappropriate for most of these environmental restoration sites. Historical waste-management practices at several of the sites may well have resulted in the release of TCE and/or nitrate to the environment. One of the bureau's main concerns with the *Sandia North Groundwater Investigation Plan* is that it does not provide for a timely and adequate characterization of source(s) and extent of contamination.

Considering the size of the Sandia North area and previous waste-management practices at adjacent facilities (the Air Force base and the City of Albuquerque), DOE/SNL hope to include other potentially responsible parties in the investigation. Nevertheless, with the evidence of historical releases at SNL's technical areas and the contamination in ground water beneath TA-2, the DOE Oversight Bureau concludes that SNL's environmental restoration sites are a potential source of contamination and should be investigated accordingly.

Although NMED has not approved the *Sandia North Groundwater Investigation Plan*, DOE/SNL are proceeding with initial characterization efforts (borehole drilling and a soil-vapor survey) and with plans to drill additional ground-water monitoring wells. Some of this work is centered in and around TA-2. The DOE Oversight Bureau is working closely with DOE/SNL and the regulatory bureaus of NMED to ensure that the investigation of the Sandia North area remains focused as a high-priority environmental restoration activity.

HYDROGEOLOGICAL WORK INITIATED AT THE BURN SITE

The Burn Site is located toward the eastern side of Kirtland Air Force Base in shallowly sloping terrain which forms the base of the Manzano Mountains immediately east of the site. The Burn Site was used in the 1970s for testing high explosives and is used today to test the effects of fire on weapons and equipment. Contaminants of concern include depleted uranium, lead, beryllium, high explosives, jet fuel, volatile organic compounds, and semi-volatile organic compounds. The only hydrogeological information comes from a deep water-supply well with a long-screened interval, located up slope of the active areas at the Burn Site. The regional water table occurs at a relatively shallow depth within fractured bedrock that underlies unconsolidated alluvium at the surface.

One main arroyo originally crossed the area but was filled in during grading of the Burn Site. Although occasional stream flow in the arroyo usually soaks in before reaching the site, the bureau expressed concern that such water might move through the area as underflow along the top of the bedrock, mobilize contaminants of concern, and transport them off-site through the ground water. The need for a hydrogeological study at the Burn Site was further underscored during 1996 when the DOE Oversight Bureau conducted a field test of ground water from the supply well, which yielded a nitrate concentration in excess of state and federal standards.

In 1996, the DOE Oversight Bureau recommended three measures to improve hydrogeological characterization at the Burn Site:

- Laboratory analysis of water from the supply well to determine its nitrate content.
- Construction of a piezometer in the arroyo just up slope of where it is in filled to test for underflow.
- Installation of a pair of proper ground-water monitoring wells down-canyon from the site, one for the regional aquifer and one completed at the bedrock/alluvium contact for underflow.

Two of these three actions have now been completed by DOE/SNL. Follow-up laboratory analysis of water from the supply well by both DOE/SNL and the DOE Oversight Bureau confirmed the elevated nitrate level. As the origin of nitrate in this up-gradient well is not known, SNL has also taken samples for nitrate-isotope analysis, in an effort to determine the type of source that may be involved. Also, an underflow piezometer has been constructed in the arroyo just up slope from the Burn Site. Equipment to record water level will be installed so any underflow associated with snowmelt runoff during the spring of 1997 can be monitored. Installation of the proposed down-canyon monitoring wells has been delayed due to lack of funding.

SITE CHARACTERIZATION COMPLETED FOR THE MIXED WASTE LANDFILL

The Mixed Waste Landfill was established in 1959 for the disposal of radioactive, hazardous and mixed wastes. The landfill, inactive since 1988, is located in the north-central part of Technical Area 3 and encompasses approximately 2.6 acres. Although records are incomplete, SNL reports that acids, metals, organic solvents, scintillation cocktails, uranium, thorium, transuranics, fission products, and tritium may have been disposed at the landfill in mainly unlined pits and trenches. Tritium has been detected in soils below and outside the perimeter of the Mixed Waste Landfill.

The regional water table at the Mixed Waste Landfill occurs at a depth of about 460 feet. Ground-water contamination has not been detected at the landfill. The monitoring-well network, however, has been found by DOE Oversight Bureau to be inadequate, primarily because the hydraulic gradient and the direction of ground-water flow are not known with reasonable certainty. Consequently, DOE/SNL are unable to currently provide a site-specific water-level map.

SNL has recently completed a site environmental characterization report, which provides the results of several field investigations conducted at the Mixed Waste Landfill. The field studies include the establishment of local background concentrations in soil for various metals and radionuclides, passive and active soil-gas sampling, surface and subsurface soil sampling, ground-water monitoring, and aquifer testing. The DOE Oversight Bureau plans to finish a technical evaluation of this document in January 1997.



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DOE Oversight Bureau personnel have currently been coordinating with DOE/SNL in their plans to implement several voluntary actions to stabilize the deterioration of the current landfill cover system. These actions include grading portions of the Mixed Waste Landfill to preclude ponding of rain water, constructing ditches and berms to reduce runoff to the site, and repairing and replacing some of the concrete caps covering waste pits in the classified portion of the landfill.

THE PROPOSED CAMU INCHES TOWARD REALITY

In June 1996, DOE/SNL submitted a proposal to the U.S. Environmental Protection Agency and NMED for designation of a Corrective Action Management Unit (CAMU) at SNL. When approved, the CAMU will be used for the staging, treatment, and containment of hazardous remediation wastes generated during cleanup activities at SNL's environmental restoration sites. Basically, once the CAMU is established, SNL's environmental restoration project can proceed to clean up their environmental restoration sites and manage their own remediation wastes right at SNL.

The CAMU process has been a positive one. DOE and SNL staffs have coordinated with stakeholders through a CAMU working group and the SNL/ITRI Citizens' Advisory Board to select the CAMU site (immediately northwest of the Chemical Waste Landfill) and to establish credibility with the proposal.

The DOE Oversight Bureau has participated in the CAMU Working Group, and submitted comments to the DOE and regulators after reviewing the CAMU proposal. Although DOE/SNL's proposal was essentially complete, it lacked sufficient detail in critical areas, such as the detection monitoring system (for any hazardous waste release), plus material and construction specifications, to evaluate its adequacy.

Through recent meetings and discussions among DOE/SNL, EPA, and NMED staffs, the DOE Oversight Bureau expects that a revised CAMU proposal and application to the regulatory authorities will be significantly improved. Nevertheless, due to lack of funding, DOE/SNL will probably not be able to implement the CAMU until Fiscal Year 1998, which, in turn, means that significant environmental restoration activities could also be delayed.

ITRI GROUND-WATER INVESTIGATION WINDING DOWN

The Inhalation Toxicology Research Institute (ITRI) is located on the southern border of the Kirtland Air Force Base, adjacent to the Pueblo of Isleta. From 1960 to the present, ITRI has been operated by the DOE to determine the human health effects of airborne contaminants by studying their effects on surrogate animals. Until 1992, ITRI had operated six sewage-treatment lagoons for human and animal wastes. These lagoons are permitted by NMED under a discharge plan (DP-519). During 1988, nitrate contamination was detected in excess of state and federal standards in ground water from monitoring wells near the lagoons. The nitrate exceedence placed ITRI out of compliance with DP-519. Ground water near the lagoons has



also exceeded state *aesthetic* drinking-water standards for three other constituents: sulfate, chloride, and total dissolved solids. Also detected in some of the monitoring wells are low levels of diesel-fuel constituents and Freon, as well as slightly elevated levels of gross alpha and gross beta radioactivity.

As part of the site characterization process, ITRI installed 19 ground-water monitoring wells and seven piezometers (to measure ground-water elevations) from 1988 to 1994, and conducted aquifer tests. From these efforts, ITRI formulated a conceptual hydrogeological model in which ground water flows westward and northward from the lagoons. In evaluating this model, the DOE Oversight Bureau concluded that nitrate-contaminated ground water might also flow southward onto Pueblo of Isleta property. To test which concept is correct, the DOE Oversight Bureau drilled five boreholes, resulting in three new monitoring wells, on Pueblo of Isleta property, immediately south of ITRI. Nitrate concentrations in ground-water samples from the new wells do increase slightly in a downgradient direction, thereby suggesting that contaminated ground water is being transported southward from ITRI onto the Pueblo of Isleta. Although known nitrate levels do not exceed state or federal drinking-water standards, the Governor of the Pueblo of Isleta wrote a letter recently to NMED expressing an interest in discussing an additional ground-water monitoring well on Isleta Pueblo lands.



Photo by Jeanne-Marie Crockett
DOE Oversight Bureau staff members William McDonald on left and Art Montoya in center, and ITRI staff member Jack Lackey are pictured collecting ground-water samples in June 1996 from a NMED monitoring well located on Isleta Pueblo land near the Kirland Air Force Base/Isleta fence.

Environmental Surveillance Program

When one hears the term “environmental surveillance” it invokes images of undercover agents, using field glasses to look for polluters. In reality, it is not quite so dramatic. The undercover agents are actually environmental scientists collecting samples to be analyzed for potentially hazardous substances. Environmental surveillance, especially at a nuclear facility, has certain fundamental objectives:

- To ascertain whether the operation of the facility is causing detectable contamination of the environment.



- If contamination does exist, to determine its extent and estimate the dose received by humans.

These objectives are accomplished by performing environmental monitoring, which is the practice of collecting samples of various media such as airborne dust, soil, sediments, water, and plants. Analysis of such media for known pollutants provides data which will yield estimates of dose to the surrounding population.

Sandia National Laboratories (SNL) and the Inhalation Toxicology Research Institute (ITRI) have implemented extensive environmental management and monitoring programs to ensure the public that respective facility operations are not exposing them to undue risk. These programs are required by DOE Order 5400, to characterize environmental management, and confirm compliance with federal, state and local environmental requirements.

The bureau has implemented an independent environmental surveillance program for the purpose of verifying the accuracy of the SNL's surveillance systems, evaluating the performance of SNL's control measures, or simply for detecting environmental contamination. This program provides the DOE, SNL, ITRI and the general public with additional information on the impact DOE facilities have on the surrounding community and the environment.

The approach the bureau uses to evaluate the environmental monitoring and surveillance activities and techniques is fourfold:

- To observe pertinent operations by SNL and ITRI personnel in the field.
- To provide quality control by splitting samples with the facility.
- To perform independent environmental monitoring of various media.
- To compare the results, including split sampling events, to appropriate regulatory or technical standards.

Bureau staff members accompany SNL and ITRI personnel during sampling events on- and off-site to observe and evaluate sample acquisition and handling techniques. For some of SNL's sampling events, based on appropriate quality control measures, bureau personnel split samples with the facility and have them independently analyzed.

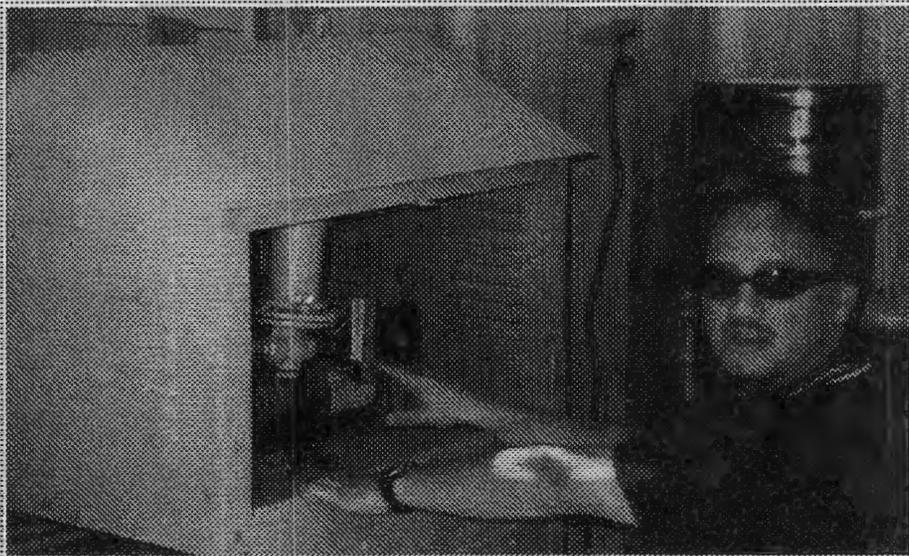
Currently, the bureau's environmental surveillance program has limited its independent monitoring efforts to radionuclide analysis of air particulate, water vapor, terrestrial media (soil, sediment, vegetation and surface water), wastewater, storm water and a network of gamma radiation detectors. All sampling events occur at selected locations both on-site and in the surrounding community.

The results of analysis, where applicable, are compared to results obtained by the facility and, as guidance, the concentrations established in DOE, U. S. Nuclear Regulatory Commission, U.S. Environmental Protection Agency and state regulatory standards. The results of monitoring and analysis by the bureau are used as a quality control indicator to alert the facility of pos-

sible compliance problems. To date, bureau sampling results have been consistent with results obtained by SNL, verifying that no regulatory standard has been exceeded.

AMBIENT AIR MONITORING

As part of the routine environmental surveillance activities by the DOE Oversight Bureau, air samplers are operated continuously to collect airborne particulate matter, precipitation and water vapor. Samples collected from the air monitoring stations are analyzed for radioactivity by an independent analytical laboratory. Air particles are collected by the low volume method, which consists of collecting minute "dust" particles on a glass fiber filter. The filters are then analyzed for both gross and isotopic radioactivity. By passing a known volume of air through the filter, the concentration of radioactivity in air can be determined and compared to the relevant regulatory standards. For years, this method has been employed to monitor the emissions from nuclear facilities and has proven to be an effective technique.



Precipitation and water vapor are collected by passing a known volume of air through a silica gel cartridge, a hydrophilic compound which traps the moisture. After a period of time, typically three months, the silica gel cartridges are removed from the samplers and sent to an analytical laboratory for tritium analysis.

During 1996, the bureau has operated six air monitoring stations, shown in Figure 4. Four air monitoring stations were located at sites on the perimeter of Kirtland Air Force Base

Photo by Jeanne-Marie Crockett
Art Montoya displays one of the NMED DOE Oversight Bureau's new ambient air monitoring stations, with twice the air flow of the old stations and the added capability of monitoring for tritium.

and two at community locations (see Table 1). During the third quarter of the year, the air monitoring stations were upgraded using new equipment, and two monitoring stations were retired while a new location was established. The flow rate on each of the stations was increased to provide a greater collection of particulate matter, thereby increasing the sensitivity of analysis. Also during the third quarter, silica gel cartridges were installed in the air monitoring stations to collect precipitation and water vapor which could be analyzed for tritium. To date, the results of analysis have shown that SNL has not exceeded applicable standards for radionuclides in air.

Figure 4

Ambient Air Monitoring and Tritium Sampler Locations

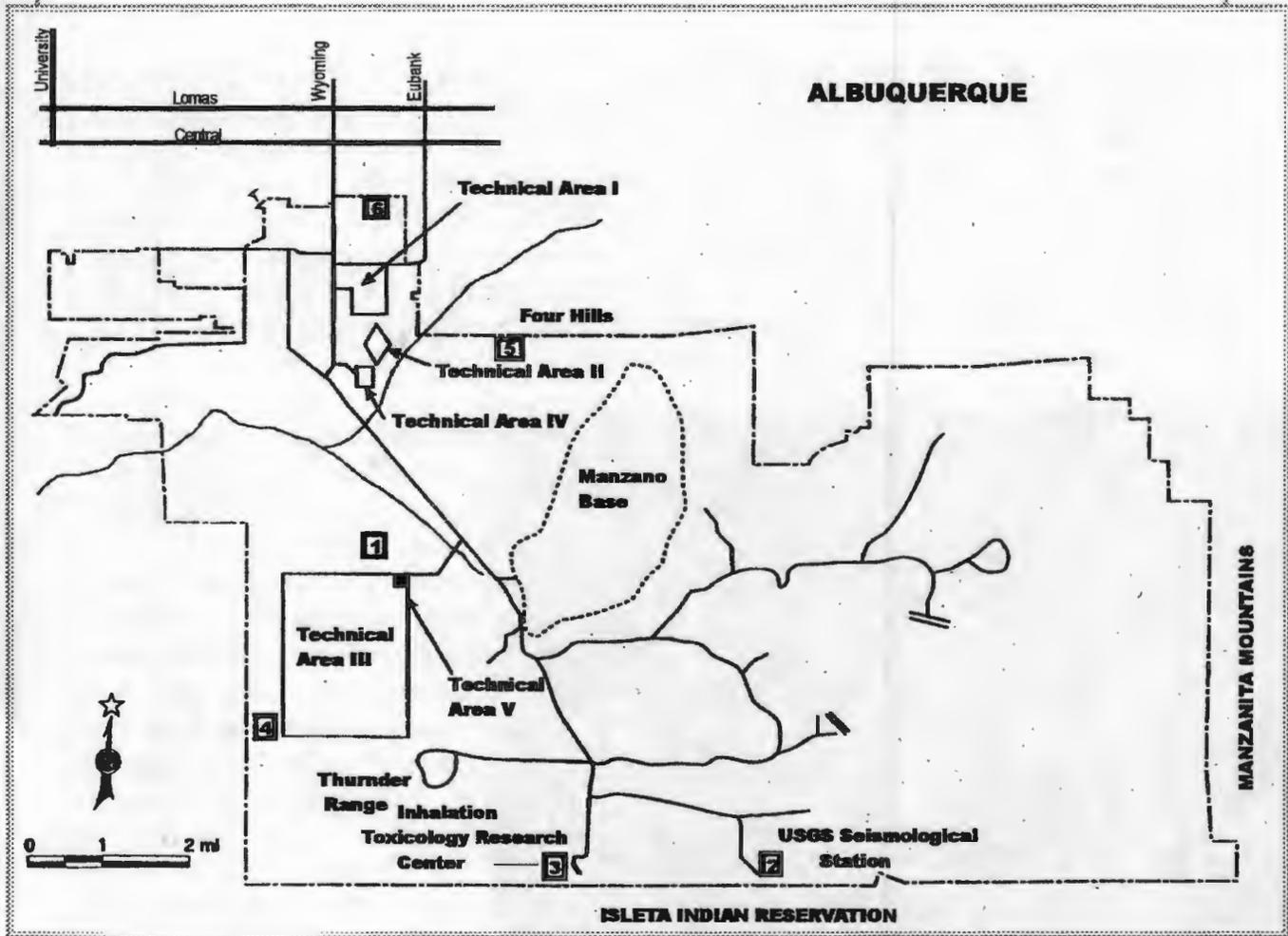


Table 1

NMED	Location #:	Description of location:	Type
1 *	KAFB-01	Four Hills Golf Course	Community
1A**	KAFB-01A	Fours Hills Perimeter	Perimeter
2	KAFB-02	USGS Seismic Center.	Perimeter
3	KAFB-03	Southwest Base Fire Station.	Perimeter
4*	KAFB-04	KAFB Bio-environmental Office	Perimeter
5	KAFB-05	University of New Mexico, Occupational Health	Community

*Retired air monitoring station after the second quarter of 1996.

**New air monitoring station implemented at the beginning of the third quarter of 1996.

ENVIRONMENTAL DOSIMETRY

During 1996, the bureau continued the Thermoluminescence Dosimetry (TLD) program at SNL and ITRI. The TLD program is in place to provide an estimate of the total external gamma radiation from both natural and man-made sources. The placement of the bureau's TLD locations is a subset of the three location groups (on-site, perimeter and community) chosen by SNL. The locations of the TLD gamma detectors are shown in Figures 5 and 6.

Twelve TLDs, approximately thirty percent of the number SNL deploys, are used in the DOE Oversight Bureau's environmental dosimetry program. All of the bureau's TLDs, listed in Table 2, are located with those deployed by SNL, except for one dosimeter, which is located with a TLD deployed by ITRI. The purpose of this effort is threefold:

- To conduct and maintain a TLD program which will measure environmental exposure doses of radiation at given locations on or near SNL on a quarterly basis.
- To collect data for trend analysis at the selected sites.
- To validate data produced by the SNL and ITRI TLD programs.

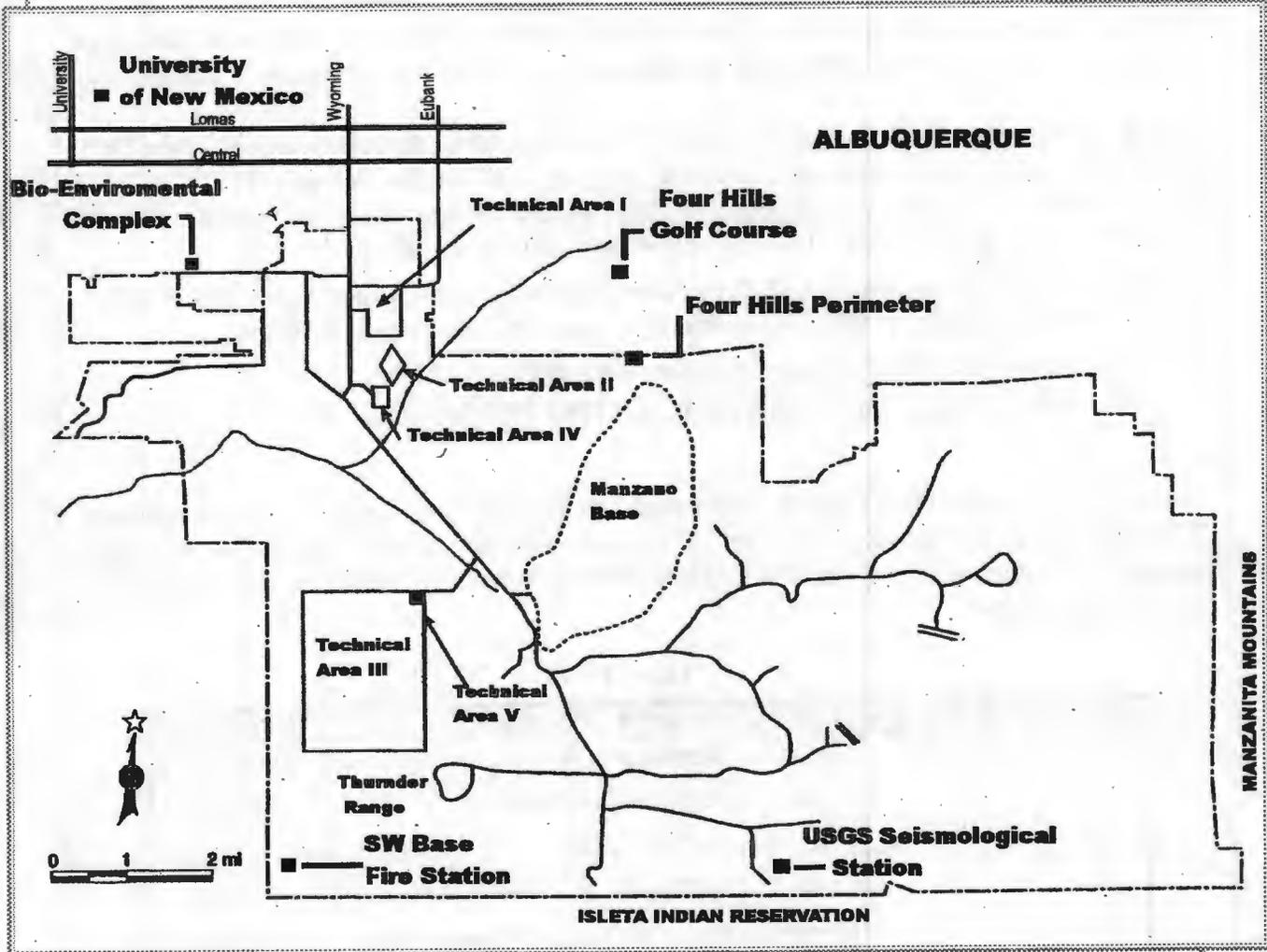
During 1996, bureau and SNL personnel coordinated to carry out deployment of unexposed TLDs and to collect currently deployed TLDs on the first day of each quarter in the months January, April, July, and October. The collected TLDs were then returned to the contract laboratory for processing.

Table 2

NMED #	SNL Location	Facility	Description of location	Type
1	(7)	E8004	North of area V, 100 ft. North of Road	On-site
2	(19)	E8032	USGS Seismic Center Gate.	Perimeter
3	-	D2	ITRI South Gate.	Perimeter
4	(5)	E8007	McCormick Gate, West on Magazine Rd.	Perimeter
5	(16)	E8009	Four Hills, North of Manzano Area	Perimeter
6	(18)	E8014	Officer Club Area, at Fence	Perimeter
7	(27)	E9016	Albuquerque Fire Station #11, 5403 Southern	Community
8	(22)	E9027	Los Lunas Fire Station	Community
9	(25)	E9019	Placitas Fire Station	Community
10	(24)	E9021	Corrales Fire Station	Community
11	(10)	E9010	Oak Flats Picnic Area	Community
12	(21)	E9012	Bernalillo County Fire Station #10, Tijeras, NM	Community

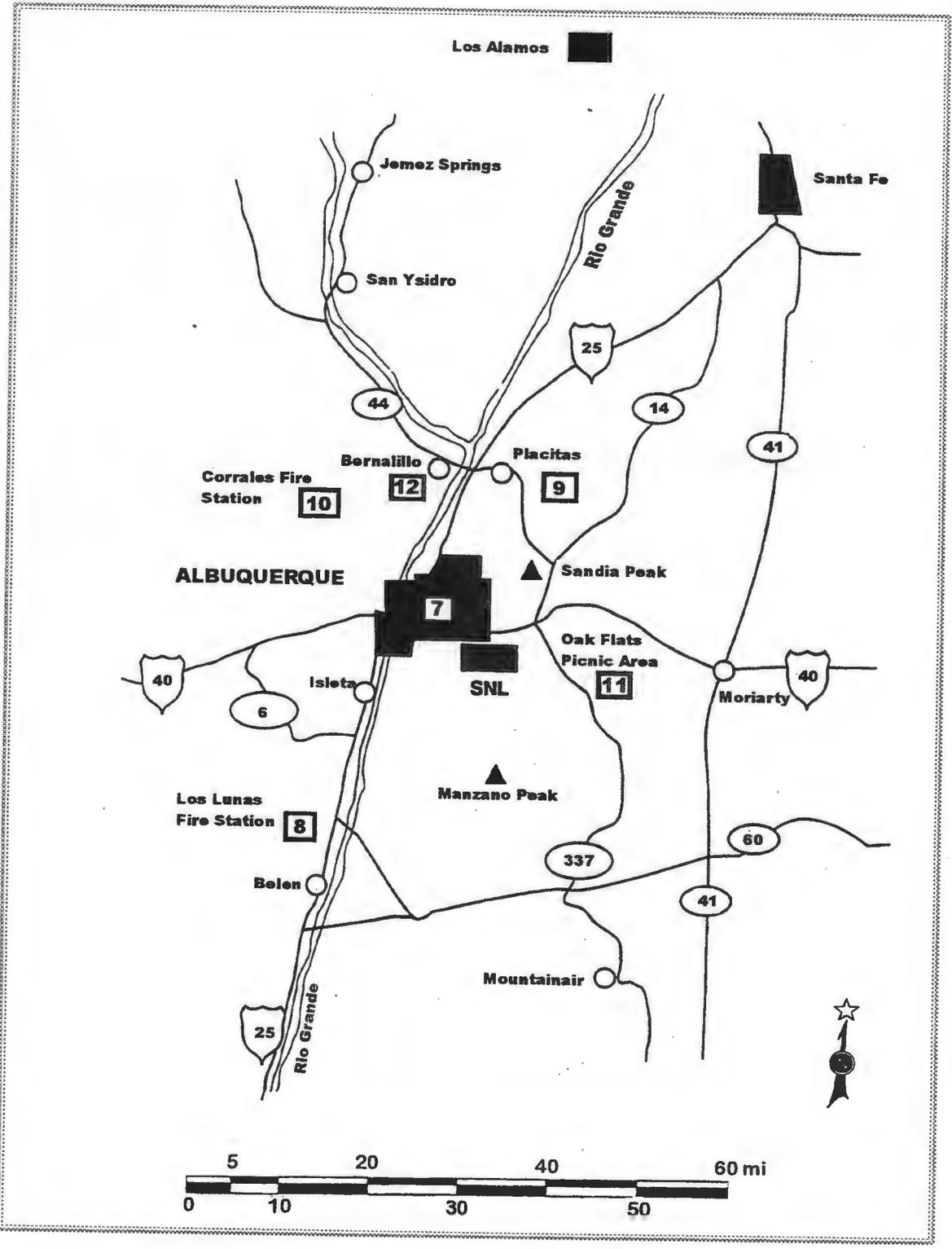
Figure 5

On-site and Perimeter Thermoluminescent Dosimeter Locations



The annual dose equivalent estimates determined by the DOE Oversight Bureau TLD program are consistent with the SNL and ITRI data. The annual external dose-equivalent readings from the background (community) locations are not statistically different from readings at the on-site or perimeter locations. Indicating that the external gamma radiation contribution by man-made sources including SNL and ITRI could not be distinguished from the relatively large contributions of natural sources.

Figure 6
Thermoluminescent Dosimeter Regional Locations



TERRESTRIAL SURVEILLANCE

Terrestrial surveillance monitoring includes the sampling of soil, sediment, vegetation and surface waters to detect any possible migration of contaminated material from the facility to community locations. During a two-week period in July and August of 1996, the DOE Oversight Bureau surveillance program coordinated with SNL personnel to sample at various perimeter and community locations.

Bureau staff members accompanied SNL personnel during the sampling phase of the terrestrial surveillance project and split samples at designated locations (see Table 3). To obtain a sufficient amount of data for validation of SNL data, the bureau sampled approximately ten percent of the number of locations and media types that SNL sampled. Various media, including soils, sediments, vegetation, and water were sampled. The samples were submitted to an independent laboratory and analyzed for radionuclide constituents. All of the radiological data were consistent with SNL historical data reported in the Sandia report *1995 Site Environmental Report, Sandia National Laboratories, Albuquerque, NM*.

Table 3

SNL DESCRIPTION					ANALYSIS			
NMED SAMPLE #	TYPE	NO	DESC	MEDIA	GAMMA SPEC	TOTAL U	GROSS A/B	TRI-TIUM
TS-1	ON-SITE	45	RMWMF, TA-III	Soil	/	/		/
TS-2	ON-SITE	7	North of TA-V	Soil	/	/		/
TS-3	PER	5	McCormick Gate	Veg.	/			/
TS-4	ON-SITE	33	Coyote Springs	Soil	/	/		/
TS-5	ON-SITE	33	Coyote Springs	Veg.	/			/
TS-6	ON-SITE	34	Lurance Canyon (Burn-Site)	Veg	/			/
TS-7	PER	16	Four Hills	Soil	/	/		/
TS-8	COM.	25	Placitas Old Fire Station	Veg.	/			/
TS-9	COM	10	Oak Flats	Soil	/	/		/
TS-10	COM	68	Las Huertas	Sediment	/	/		/
TS-11	COM	11	Isleta Pueblo, Rio Grande	Water	/	/	/	/
TOTALS								
11	-	-	-		11	7	1	11

WASTEWATER MONITORING

During 1996, the DOE Oversight Bureau surveillance program coordinated with SNL personnel to observe the routine sampling at various permitted wastewater monitoring locations.

Bureau staff accompanied SNL staff during the monitoring station setup and sampling events. On two occasions bureau staff members split samples with SNL personnel. The bureau samples were sent to an independent laboratory for radiological analysis. The results of analysis were consistent with results obtained by SNL and are below regulatory limits.

Waste Isolation Pilot Plant Oversight

Lead Found in Water Samples

Routine water samples taken during the summer from a sump near the base of the exhaust shaft at the Waste Isolation Pilot Plant revealed concentrations of lead which exceeded the U.S. Environmental Protection Agency's established level above which fluids must be handled as hazardous wastes. DOE Oversight Bureau staff at the WIPP site participated in the ensuing investigation into the source of the lead. The first goal of the investigation was to determine the source of the water itself. The primary source of water seems to be leakage, first noted in the spring of 1995, from the concrete liner covering the upper 850 feet of the shaft. Another possible source is thought to be condensation of moisture carried in air through the exhaust shaft. This is probably only significant during the summer months when relative humidity is high on the surface. Oversight staff observed the emplacement of a new well adjacent to the shaft which will provide additional information on the source of water.

A number of theories have been discussed regarding the source of the lead. The galvanized plating on the chain link fencing bolted to the shaft below the concrete liner was thought to be a possible source. Oversight staff inquiries with a chain link manufacturer found that the galvanizing process utilizes zinc, which is known to occur in nature with lead. Trace amounts of lead may therefore have been leached from the fencing by water seeping down the shaft. In addition, during the construction of the shaft, small holes were purportedly plugged with a material known as lead wool — another possible source.

The oversight bureau continues to be interested in any new findings regarding the source of the water and the lead. The DOE maintains that neither is significant with regard to repository performance. There is however a potential operational impact in that the additional moisture is thought to be contributing to periodic plugging of the continuous air monitor, which draws samples of air from shaft emissions in order to detect any release of radioactivity.

Boreholes Assessed

This investigation was initiated to address stakeholder concerns that boreholes within the WIPP Land Withdrawal Boundary were connecting ground-water aquifers, creating a potential pathway for fluid migration. This concern received more weight given the observed rise in water levels in boreholes throughout the site. Of the thirty-five wells measured periodically, 71% recorded a rise over the past few years, a strong indication that unnatural recharge is occurring



from an unknown source, given that weather patterns have remained constant throughout the life of these boreholes.

The purpose of the investigation was to evaluate the potential of boreholes to serve as a pathway for fluid migration from the underground waste repository to the environment. Industry standard cementing and cement evaluation methods were used as examples to apply to on site boreholes, since wells within the Land Withdrawal Boundary had not been logged to evaluate the cement's integrity. Existing data regarding the cementing and casing practices used for these wells were reviewed and compared to regulatory standards and guidance issued by the State Engineer Office and the Oil Conservation Division of the New Mexico Energy, Minerals and Natural Resources Department.

A technical report was issued by the DOE Oversight Bureau detailing the findings of the assessment. The investigation concluded that 15 of 74 boreholes were probably not in compliance with the referenced regulations. An additional 49 of 74 boreholes had inadequate information available to assess compliance. The report recommended the plugging of all wells in accordance with the current standards and practices and thereby eliminating any concerns regarding the effects of existing boreholes on repository performance. To date, all steps for protecting the environment in boreholes have been taken.

Please note that this investigation did not address the long term stability of these boreholes. The materials used in these boreholes may degrade in as little as one hundred years, but in theory the self-healing processes of salt will restrict movement of ground water or hazardous materials.

Environmental Surveillance

The objective of the environmental surveillance program conducted by the DOE Oversight Bureau at the WIPP site is to verify environmental baseline data for radiological and non-radiological parameters published by the DOE. A subset of sampling events is selected each year in which the oversight bureau wishes to participate. Typically this will lead to the procurement of a "split" or "duplicate" sample that will be sent to an independent laboratory for analysis. Environmental media sampled by oversight staff at the WIPP site in 1996 includes biotic tissue (e.g., beef, rabbit, quail and fish), ground water, surface water and sediments. In addition, an array of thermoluminescent dosimeters (TLDs) is deployed at select locations around the WIPP site. The TLDs monitor ambient levels of radiation in the environment surrounding WIPP. It is an independent program as WIPP canceled their TLD program after establishing a radiological baseline in the 1980s.

The WIPP oversight office has developed an environmental surveillance report for 1995. It should be available for public distribution in the spring of 1997.

WIPP Site Office Closed

Technical staff from the DOE Oversight Bureau in Santa Fe traveled to the WIPP site on several occasions to transition responsibilities of on-site staff to Santa Fe with the closing of the WIPP oversight office. Meetings were conducted with WIPP project personnel to better understand environmental programs conducted by the WIPP project. In addition, staff was briefed on the scope and status of all the oversight projects conducted by the oversight bureau's WIPP oversight office. Santa Fe staff members are in the process of determining which site activities will be carried forward.

Oversight bureau equipment and supplies maintained by the WIPP oversight office were removed and transported to Santa Fe. Files and documents from the WIPP oversight office were incorporated into the records maintained by the Santa Fe Office.

Emergency Response Planning and Oversight

There were no noteworthy accomplishments in emergency response planning during 1996. Barring the expression of interest from the public in this objective, bureau resources will continue to be applied elsewhere.

Public Information and Public Outreach

Efforts to increase public awareness and understanding of environmental matters about the DOE facilities were greatly increased during 1995. Ongoing programs were enhanced and new initiatives were undertaken. The *Environmental Report*, the bureau's newsletter, was produced on a quarterly basis, and the circulation has nearly doubled. The bureau successfully launched a website on the Internet, accessible through the New Mexico Environment Department's home page at <http://nmenv.state.nm.us>. This exciting new medium for accessing timely information regarding the DOE Oversight Bureau's activities includes such features as abstracts of the bureau's technical reports, an online version of the *Environmental Report* and an electronic version of this *Annual Performance Report*.

Technical Reports Produced in 1996

Reports produced by the DOE Oversight Bureau continue to be a source of reliable technical information for the writers of facility proposals, decision makers at regulatory agencies and members of the community. More than 375 copies of reports were distributed throughout 1996. Four reports were released in 1996 including: *Background Ground Water Quality of Kirtland Air Force Base Area, Bernalillo County NM*; *Summary Report of Ground Water*

Monitoring at SNL Liquid Waste Disposal System; Ground-Water Oversight at Los Alamos National Laboratory and Surrounding Areas, 1994 Through 1995; and Waste Isolation Pilot Plant Environmental Borehole Report, 1996. Additionally, a report entitled *Surface Water Quality Monitoring at Department of Energy Facilities in New Mexico, 1992 - 1993* was completed. All reports released by the bureau are available to view at public repositories throughout the state.

Community Radiation Monitoring Project

The *Community Radiation Monitoring Project* is a cooperative effort that employs radiation monitors developed by LANL for their Neighborhood Environmental Watch Network (NEWNET). The monitors are deployed in community locations where they are maintained by citizen station managers. The project grew out of concerns raised in a public meeting sponsored by the DOE Oversight Bureau.



Photo by Jeanne-Marie Crockett
Dr. Anthony Sena, Station Manager for the NEWNET station located at Northern New Mexico Community College, and LANL contract support staff inspect the solar-charged battery that powers the station.

These stations offer real time viewing of the data over the Internet or on the display panel on the monitoring station. The data are transmitted to LANL from each station via a satellite link. Five stations have been placed in the following communities surrounding Los Alamos: San Ildefonso, Española, Santa Fe, Cochiti, and El Rito. In addition to gamma radiation detection, the stations are equipped with meteorological instrumentation to measure wind speed, wind direction, temperature and barometric pressure.

One new station was deployed and two of the stations were relocated during 1996. The Cochiti station was deployed in the summer after members of Cochiti Pueblo expressed to NMED and LANL their interest in hosting a NEWNET monitoring station. The Santa Fe station at Santa Fe Prep School was relocated to the Santa Fe Indian School after evaluating other candidate sites and soliciting public input. The station at San Ildefonso was relocated to a more secure, yet equally conspicuous location after it had been vandalized.



Speakers Bureau

EDUCATIONAL OUTREACH

The educational outreach component of the speakers bureau was expanded to include technical workshops for the public. The first full-day workshop, *Basic Radiation Training*, proved so successful that it may be repeated in the Spring of 1997 in Albuquerque. Efforts are underway to offer additional topics such as *Making an Impact through Effective NEPA Document Review*. Technical staff members made presentations to science students at Artesia Intermediate school regarding the geology of southeastern New Mexico and the NMED oversight role in assuring the public is adequately protected by environmental programs at DOE facilities.

TECHNICAL PRESENTATIONS

NEW MEXICO GEOLOGICAL SOCIETY FALL FIELD CONFERENCE

The 47th fall field conference of the New Mexico Geological Society focused on the Jemez Mountains region where Los Alamos National Laboratory is located, providing an excellent forum for highlighting recent hydrologic and environmental work by bureau staff members. Bureau personnel contributed three full-length papers and one minipaper to the 484-page, hard-cover guidebook for the conference.

One paper, entitled *Some Fundamental Hydrologic Issues Pertinent to Environmental Activities at Los Alamos National Laboratory, New Mexico*, was intended to give an overview of hydrogeologic concerns at the facility.

Off-site, storm-water transport of radionuclides, was quantified in another paper entitled *Preliminary Assessment of Radionuclide Transport via Storm-water Runoff in Los Alamos Canyon, New Mexico*. Studies such as this one point out the need to address erosion and subsequent contaminant transport from potential release sites and in the canyon systems at LANL.

Another paper, entitled *Reference Conditions for Los Alamos National Laboratory Streams Using Benthic Macroinvertebrate Assessment in Upper Pajarito Canyon* summarizes studies of the aquatic insect populations of several perennial stream reaches at LANL. Unlike a water sample which shows a "snapshot" of water quality at the time of collection, studies of aquatic insects provide a long-term indication of the water quality found in the stream.

A minipaper entitled *Characteristics of Springs in the Western Pajarito Plateau, Los Alamos National Laboratory, New Mexico*, reported on the discovery of 12 perennial springs, their flow rates and chemistry. The presence of volatile-organic and high-explosive compounds in some spring waters indicates the water came in contact with anthropogenic materials along their flow paths.

NEW MEXICO CONFERENCE ON THE ENVIRONMENT

A paper entitled, *Community Radiation Monitoring Project* was presented by an oversight bureau staff member at the *1996 NM Conference on the Environment*. The paper was co-authored by NMED and LANL scientists and a member of the public. This joint project employs radiation monitors developed by LANL to help address community concerns in northern New Mexico regarding impacts from LANL.

A staff member presented a paper entitled, *Characterization of Environmental Radiation and Radioactivity near Albuquerque, NM* at the *1996 NM Conference on the Environment*. The primary objective of this study was to characterize the relative contributions of natural and man-made radioactivity at a variety of locations near Albuquerque, NM.

OTHER TECHNICAL PRESENTATIONS

A presentation of *Reference Conditions for Los Alamos National Laboratory Streams Using Benthic Macroinvertebrate Assessment in Upper Pajarito Canyon* was made at the *Symposium of Biological Research in the Jemez Mountains, New Mexico* on October 23, 1996. The study incorporated a multi-metric assessment approach to determine available habitat and water quality, and the benthic macroinvertebrate community condition in Upper Pajarito Canyon and two perennial tributaries. The study establishes reference conditions for future comparison with other LANL streams.

Bureau staff members attended and provided testimony at the NMED public hearings regarding the Interstate Nuclear Services license extension in Santa Fe.

Bureau staff participated in the Inter-Governmental Meeting hosted by Tesuque Pueblo regarding issues associated with the WIPP Transportation Route. An oversight staff member presented that the bureau has no oversight role in the transportation of wastes once they leave a DOE facility, but does oversee current conditions and the state of readiness for transport of wastes from LANL.

Public Meetings, Working Groups and Tours

DOE Oversight Bureau personnel held three public meetings in 1996 covering the topics of: waste management, LANL's Watershed Management Program, current status of LANL's environmental restoration corrective action process, ground water issues, and air monitoring issues. These meetings are used to convey to the public what the DOE Oversight Bureau does at LANL, and to get much needed input from the concerned public. The bureau held an open house in March to introduce the public to the SNL/ITRI Oversight program's new offices at the base.

Bureau staff members routinely attended public meetings and hearings throughout the year hosted by organizations associated with environmental issues at the DOE facilities. At these meetings, staff members serve as independent sources of technical information, and gain valuable insight into public concerns regarding activities at the DOE facilities. Some of these meetings are included in the following list:

- LANL Citizens' Advisory Board monthly meetings.
- SNL/ITRI Citizens' Advisory Board monthly meetings.
- National Environmental Policy Act meetings concerning the DOE's Environmental Impact Statements for Los Alamos National Laboratory.
- RCRA permit modification public meetings concerning Los Alamos National Laboratory.
- LANL's Environmental Restoration Project technical and informational meetings that are open to the public.
- DOE/SNL/ITRI quarterly public information meetings.
- City of Albuquerque/Bernalillo County Air Quality Control Board public meetings and hearings.
- Responsible Environmental Action League's workshop on the Stockpile Stewardship PEIS public meetings in Los Alamos.



Photo by Jeanne-Marie Crockett

Steve Yanicak, Los Alamos Site Point-of-Contact, presents an overview of the air quality issues discussed at a January 1996 public meeting in Espanola.

WORKING GROUP PARTICIPATION

Oversight staff members regularly participate in the following working groups that bring representatives from various organizations together to collectively resolve issues related to the DOE facilities:

- The DOE-sponsored, Stakeholder Working Group for the Risk Communication, Assessment, and Management Project is intended to provide stakeholder input to the DOE for a prototype methodology to evaluate environmental restoration and waste management technologies using combined risk assessment, communication and management tools.
- The Corrective Action Management Unit (CAMU) Working Group provides stakehold-

er input to the DOE on site selection, as well as proposed activities to be conducted at the Temporary Unit and CAMU.

- The SNL Public Involvement Working Group serves as a sounding board for public involvement initiatives, provides insight and advice on public involvement efforts, and seeks to coordinate Sandia and DOE-Albuquerque related public involvement efforts.
- Kirtland Air Force Base's Environmental Working Group (SNL and ITRI are located on the Air Force base and have similar environmental issues; the base and DOE/SNL are coordinating on some environmental activities).
- DOE's Interim Fire Management Team, which was formed to assess the adequacy of present and planned fire breaks across the laboratory and on susceptible properties near the Los Alamos townsite.

PUBLIC TOURS

DOE Oversight Bureau personnel attended public tours of DOE/SNL's Temporary Unit and proposed Corrective Action Management Unit at the facility; these units are collectively designed to store, treat, and contain hazardous remediation wastes generated during SNL's environmental restoration activities.