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Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

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CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Carl Will, Permits Project Leader
Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Dear Mr. Will:

Subject: Response to Request for Supplemental Information: Technical Adequacy Review, RCRA Permit Application; TA-50 Part B, December 2000, Revision 2.0; Los Alamos National Laboratory, EPA ID No. NM0890010515

Attached please find the Department of Energy (DOE)/University of California (UC) response to the Hazardous Waste Bureau's (HWB) Request for Supplemental Information (RSI) for the TA-50 RCRA permit renewal. The request contains responses to each of the sixty (60) comments presented in the RSI by HWB and ten (10) supplemental appendices.

The permit format consists of a General Chapter, a Corrective Action Chapter and individual Chapters for each of the Technical Areas (TAs) operating a treatment, storage or disposal operation governed by the New Mexico Hazardous Waste Regulations. In order to have a complete understanding of any given chapter it is necessary to review the General and Corrective Action Chapters to have all the information pertaining to a specific TA. When the informational gathering portion of the permitting process is completed and a final revision of the TA-50 permit application is developed, references will be placed in the TA-50 permit application directing the reader to appropriate document chapters and locations for specific information related to the TA-50 operations.

Please note that much of the information that has been provided as requested should not be assimilated into this particular chapter but rather in the Corrective Action or General chapter. Additionally, in subsequent meetings with the HWB Corrective Action staff, some of the information requested has been negotiated for future submittal. Specifically, an updated Solid Waste Management Report will be submitted at a later time.

DOE/UC have agreed to make many of the changes suggested in the RSI to the permit application for TA-50. Per agreement between HWB and DOE/UC, any final revision to the application will be postponed until such time as the RSI process is concluded.

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Additionally, as a result of the settlement of the appeal of the TA-50 permit fee, DOE/UC have agreed to make certain changes to the final revision of the TA-50 permit application. Specific changes will be discussed with HWB so that they are appropriately located within the text of the application.

If you should have any questions concerning the response to the RSI, both Gene Turner, DOE, at (505) 667-5794 or Jack Ellvinger, UC, at (505) 667-0633 are available to assist you as necessary.

Sincerely,

Joseph C. Vozella
Assistant Area Manager
Office of Environment

LAAME:8JV-002

Enclosures (2)

cc:
See page 3

cc w/enclosures:
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RC/PE/PB

LA-UR-01-6020
November 2001

Response to Request For Supplemental Information: Technical Adequacy Review, RCRA Permit Application; TA-50 Part B, December 2000, Revision 2.0; Los Alamos National Laboratory, EPA ID No. NM0890010515

RCRA RECORD CENTER
Infiling Cover Sheet

Name: Allen T. Chang
Phone: 5-7541

Mail Code: 6PD-N
Date: 12/7/01

EPA ID #	FACILITY NAME	FILE TYPE
NM0890010515	Los Alamos Nat'l Lab.	Technical ( ) Permit (✓)

ROGRAM 7:24

Prepared by:

Los Alamos National Laboratory
Hazardous and Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545

Response to Request For Supplemental Information: Technical Adequacy Review, RCRA Permit Application; TA-50 Part B, December 2000, Revision 2.0; Los Alamos National Laboratory, EPA ID No. NM0890010515

LA-UR-01-6020
November 2001

Prepared by:
Los Alamos National Laboratory
Hazardous and Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James L. McAtee III
Acting Division Director for Environment, Safety, and Health Division
Los Alamos National Laboratory
Operator

11/8/01
Date Signed

Joseph C. Vozella
Assistant Area Manager, Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations
Owner/Operator

11/9/01
Date Signed

ATTACHMENT A
REQUEST FOR SUPPLEMENTAL INFORMATION
TECHNICAL ADEQUACY REVIEW

RCRA PERMIT APPLICATION
TA-50 PART B, DECEMBER 2000, REVISION 2.0

LOS ALAMOS NATIONAL LABORATORY
EPA ID NO. NM0890010515

June 25, 2001

Introduction

The following information is the response by Los Alamos National Laboratory (LANL) to a Request for Supplemental Information (RSI) sent by the New Mexico Environment Department (NMED) on June 25, 2001. The full title of the RSI is "Request for Supplemental Information: Technical Adequacy Review; RCRA Permit Application; TA-50 Part B, December 2000, Revision 2.0, Los Alamos National Laboratory, EPA ID No. NM0890010515," officially received by LANL on June 27, 2001. The RSI asked for additional information pertaining to the December 2000 Technical Area 50 (TA-50) Part B Permit Application.

This document consists of responses to the 60 comments contained in the RSI. As stated in the June 25, 2001, RSI letter to Dr. John C. Browne, Director, LANL, and Mr. David A Gurulé, Area Manager, U.S. Department of Energy (DOE) Los Alamos Area Office from Carl Will, LANL Permits Project Leader, NMED Hazardous Waste Bureau (HWB), the requested information was to be submitted to HWB within 45 days of receipt of the RSI. However, due to the broad nature of the comments in the RSI and as discussed during the July 31, 2001, meeting between the NMED, the University of California (UC), and DOE, a letter requesting a 90-day extension was submitted to Mr. Carl Will from James White, LANL's Hazardous and Solid Waste Group Leader, on August 2, 2001.

This document includes appendices with supplemental information, as referenced in the individual responses to the numbered comments. NMED's original comments are included in this document as italicized text for ease of review. A copy of the original RSI is also included as Appendix A.

Discussion

As a result of several meetings with the permitting staff at NMED assigned to LANL permit development, NMED and LANL agreed that the issues surrounding corrective action will be handled in a specific chapter dedicated to corrective action. Corrective action information will not be included in the various TA specific chapters. LANL will respond to the questions as appropriate taking this issue into consideration. NMED and LANL have agreed that the delivery of corrective action information to NMED will be postponed until the LANL Solid Waste Management (SWMU) Report can be updated.

Information Requests and Responses

1. Revise the Application to include Attachment A, Facility Description, and Attachment G, Container Management, in the Application Section 2.0, Unit Designs, Facility Operations, and Procedures to Prevent Hazards, rather than as Attachments to the Application. [270.14(b)(1)]

The information contained in Section 2.0, Attachment A, and Attachment G of the permit application satisfies the requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(1). The information provided by LANL is included as Attachments as LANL was directed in NMED correspondence dated February 5, 1998, signed Robert S. Dinwiddie. LANL proposes no changes to these sections of the TA-50 application.

2. Page 2-3, TA-50-114 Container Storage Area (CSA): The description of the storage locker configuration states "The CSA is divided into two separate lockers by a metal wall, and has a grated floor above a recessed area on which the waste containers are placed." It is not clear whether the secondary containment portion, i.e. the recessed floor, is also separated by the wall, thereby preventing the mixing of incompatible wastes. Revise the Application to specify either that secondary containment is separated or, if the secondary containment is not separated, that incompatible wastes will not be stored above it. [264.175, 270.15]

When the final revision to the application is produced, LANL will clarify that secondary containment is divided by the wall at TA-50-114, and only wastes containing no free liquids are stored in this container storage area (CSA).

3. P. 2-5, section 2.1.5, lines 4 and 5: Replace the term "solids" and "solid waste" with "wastes that do not contain free liquids" or another term describing non-liquid wastes. Because the term "solid waste" has a particular meaning under RCRA, and includes liquid wastes, use a different term in the Application to describe non-liquid waste in order to avoid confusion. Include a definition of "residual free liquids." [264.175, 270.15]

When the final revision to the application is produced, LANL will replace "solids" and "solid waste" with "wastes that do not contain free liquids" throughout the permit application. LANL will also define "free liquids" according to the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (Rev. 7) definition: (1) a liquid that readily separates from the solid portion of a waste under ambient temperature and pressure; (2) liquid that is not sorbed into a host material such that it could spill or drain from its container.

4. P. 2-5, sec. 2.1.5: Revise to correct inconsistency in the language describing where liquid waste will be stored. The third sentence states that all rooms except TA-

50-1, Room 59, will store waste containing residual free liquid. The following sentence states that TA-50-37, Room 118, will store only solid waste. See also comment 51 below. [264.175, 270.15]

When the final revision to the application is produced, LANL will clarify the information to state that no free liquids will be stored in the CSAs addressed in the permit application. For each CSA throughout the permit application, LANL will state that "only wastes containing no free liquids will be stored in the CSA."

5. P. 2-7, sec. 2.1.11: Include a citation to 40 CFR § 264.178 for closure requirements.

When the final revision to the TA-50 permit application is produced, LANL will add the following language: "..and Part 264, Subpart G [6-14-00], which is inclusive of §264.178".

6. P. 2-7, sec. 2.2: Use a consistent term throughout for the WCRRF or TA-50-69 or specify at the beginning of the section that the two are the same.

When the final revision to the TA-50 application is produced, LANL will revise the permit application to replace "WCRRF" with "TA-50-69."

7. P. 2-9, Table 2-1; P. F-16, sec. F.2.1; and P. G-16, sec. G.4.1.4: Based on NMED calculations from room dimensions provided in the Application at page 2-2, TA-50-37, Room 118, does not have a design capacity of 18,000 gallons or 327 55-gallon drums as stated in the Application at pages 2-9, F-16, and G-16. Please provide a diagram of the drum storage layout including aisle spacing and calculations for determining storage capacity. [270.15]

When LANL initially submitted the TA-50 permit application, it was envisioned that TA-50-37, Room 118, had the potential to handle very large containers. That potential led LANL to extrapolate a volume based on the size of those containers. Since the receipt of this RSI, LANL has reconsidered this position. When the final revision to the application is produced, LANL will revise the applicable sections of the permit application to indicate a storage capacity of 5,500 gallons or 100 55-gallon drums for Room 118, and to indicate that standard waste boxes and 85-gallon drums may also be stored in Room 118. LANL will revise Table 2-1 to reflect the change in storage capacity for Room 118. This change in capacity will also appear in the revised Part A for LANL, which is currently being developed. Attached as Appendix B is a schematic and calculations supporting the revised storage capacity.

8. P. 4-1, ¶ 2: Replace the SWMU definition with the following definition that NMED will include in the Permit: "Any discernible unit or area at which solid waste has been placed at any time, and from which the Secretary determines there may be a risk of a

release of hazardous constituents, irrespective of whether the unit or area was intended for the management of solid or hazardous waste. Placement of solid waste includes one-time and accidental events that were not remediated, as well as any unit or area at which solid waste has been routinely and systematically placed." [264.101, 270.14(d)]

LANL objects to including in the SWMU definition the statement that "placement of solid waste includes one time and accidental events that were not remediated". The U.S. Environmental Protection Agency (EPA) has consistently and repeatedly established their intent to address such one time and accidental events not attributable to a discernible unit or area under authorities other than Section 3004(u) of the Resource Conservation and Recovery Act (RCRA). In proposed rulemaking (July 27, 1990), EPA clarified that a "one time spill (such as a vehicle traveling across the facility) does not fall under the necessary "routine and systematic" criterion and would not be considered a SWMU." If, however, it were not cleaned up, it could be subject to enforcement under other RCRA authorities. In final rulemaking (July 15, 1985), EPA stated, "legislative history indicates that the term "SWMU" is intended to limit EPA's jurisdiction under Section 3004(u) to "discernible units". It also said it did not believe Section 3004(u) applied to spills not linked to SWMUs (e.g., "a spill from a truck traveling through a facility would not constitute a release from a SWMU").

Because implementation of LANL's corrective action program is through the RCRA permit via 3004(u) (or State equivalent), the definition of a SWMU would be only as broad as that which was envisioned by EPA within the Section 3004(u) authority. Inclusion of the requested change in the permit's SWMU definition would therefore not be the appropriate vehicle with which to compel corrective action of one time, accidental events not originating from SWMUs. If, however, such an event occurred that posed a threat to human health or the environment, necessary actions would be taken to ensure it was addressed.

9. P. 4-3, sec. 4.1.4, and P. 4-5, sec. 4.3.1, ¶3: Replace the past tense with the present tense for releases to Mortandad Canyon and analyses of the releases. Releases of contaminants are ongoing. For the effluent and for the canyon, include a summary table with Contaminants of Potential Concern (COPC's), including radioactive COPC's, perchlorate, and nitrates, with ranges of concentrations above background levels as established in Ryti et al., "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," September 22, 1998. [264.31, 264.101, 264.111, 270.14(d)]

While the Radioactive Liquid Waste Treatment Facility (RLWTF) outfall SWMU #50-006[d]) has been included in and is being addressed under the Hazardous and Solid Waste Amendents module of LANL's existing Hazardous Waste Permit, it should be noted that substances or activities subject to Acts other than RCRA are not also subject to RCRA unless an inconsistency exists between the two Acts (New Mexico Hazardous Waste Act, Section 74-4-3.1; Solid Waste Disposal Act, Section 1006). In the referenced statute, EPA established that control by another Act is presumed to have beenprotective such that subsequent control by RCRA is duplicative. The Federal Water Pollution Control Act (FWPCA), even though it no longer exists as such, is listed in the statute indicating that if activities were once subject to that Act, they had

presumably been controlled by its protectiveness. Application of RCRA would therefore be inappropriately duplicative. Because LANL has been subject to the FWPCA since 1948, historic discharges since that time would not fall under RCRA jurisdiction. EPA further focused the implementation of this principle as it applied to corrective action. At 50 *FR* 28714, it stated "consistent with Section 1006 of RCRA, EPA will implement Section 3004(u) in a manner consistent with other EPA programs. For example, where a release from a solid waste management unit is otherwise subject to regulation under Section 402 of the Clean Water Act, EPA will use the NPDES program to address such a discharge." At 55 *FR* 30808, EPA reiterated that it "does not intend to utilize the Section 3004(u) corrective action authority to supercede or routinely reevaluate such permitted releases" of discharges from industrial wastewater systems subject to other environmental laws.

RCRA regulations also approached this issue in a manner consistent with the above-mentioned statute. Industrial wastewater discharges from outfalls subject to Section 402 of the Clean Water Act (CWA) are exempt from RCRA control. Pursuant to 20.4.1 NMAC, §261.4(a)(2), such point source discharges are excluded from the definition of solid waste and hence, from the definition of hazardous waste and/or hazardous constituents. As such, application of RCRA requirements, inclusive of 3004(u) corrective action, would not be warranted unless the appropriate program office was unable to enforce its own requirements. (It should also be noted that, while this exemption may have only existed in the regulations since 1980, that which it was exempting the discharges from, [i.e., the definition of solid waste found in 20.4.1 NMAC, §261.2], only existed since then as well. If the regulations did not define solid waste prior to the exemption from it, the lack of the exemption before 1980 would not cause that which was not yet defined to then be vulnerable to restrictions placed upon it as solid waste.)

EPA also based exemptions from the mixture rule on a similar premise. Certain spent solvents that, under some conditions might otherwise be managed as listed waste under RCRA, can be considered non-hazardous if sent to a facility's CWA wastewater treatment system at low concentrations. While EPA assumed all wastewater would be treated to levels that didn't pose a threat to human health or the environment, it stated that even such untreated effluent could be discharged safely from a wastewater treatment system. It based this assumption on the likelihood of adequate concentration reduction by subsequent adsorption, biodegradation, and dilution before it could impact a receptor (46 *FR* 56585). EPA relied on effective CWA control to preclude a threat to human health and the environment to the degree that RCRA rules could be relaxed.

With regard to the requested table of concentrations above background, it is inappropriate to compare concentrations of these materials found in media other than soil, sediments, and/or tuff (e.g., effluent liquid) to background levels in soil, sediments, and/or tuff. However, concentrations found in canyon soils, sediments, and/or tuff that exceed the background levels for the same media referenced in the cited document have been included in Appendices C and D and are discussed below. In addition, the data in these appendices include the frequency of detects above background values and the frequency of non-detects above background values.

Summary tables containing analytical data upstream and downstream of the TA-50 National Pollutant Discharge Elimininination System (NPDES) permitted outfall, 051, in Mortandad Canyon are provided in Appendices C and D. No data exist for perchlorate and nitrate in sediments from Mortandad Canyon. Subsurface core samples from regional Well R-15 and intermediate Wells MCBT-4.4 and MCBT-8.1 were analyzed for perchlorate. The analytical results for perchlorate in Well R-15 were provided to NMED's HWB in the "Characterization Well R-15 Completion Report" (LANL, 2001). In addition, there are no background values for either of these constituents in "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," September 22, 1998 (Ryti et al., 1998), nor have background levels for nitrates in soils, sediments, and tuff been identified at LANL.

When the final revision to the TA-50 permit application is produced, LANL will revise the application to add to the end of Section 4.1.4 and to the end of the third paragraph of Section 4.3.1 the following language: "This active effluent discharge is subject to regulation under the Clean Water Act. Parameters prescribed by the National Pollutant Discharge Elimination System (NPDES) permit are sampled in accordance with that permit's requirements."

10. P. 4-5, sec. 4.3.1, ¶ 2: Include information about other waste lines removed and an explanation of why chemical contaminants were not analyzed for at the time of decommissioning. [264.101, 270.14(d)]

Five Potential Release Sites (PRSs) at TA-50 involve waste lines. These are PRSs 50-001(b), 50-004(a), 50-004(c), 50-006(d), and 50-011(a). Of these, the following have been removed or rerouted:

- PRS 50-004(a)—these decommissioned waste lines are part of consolidated PRS 50-004(a)-00. Approximately 520 feet of line were removed in 1975. However, a few sections of line were left in place because of the safety hazards involved in removing them (LANL, 1996).
- PRS 50-004(c)—these decommissioned waste lines are part of consolidated PRS 50-004(a)-00. All of these lines and associated manholes were removed between 1981 and 1989, with the exception of line No. 56 (see Appendix E), which is still in service (LANL, 1996). The locations of these waste lines are shown on Figure 2-3 of the RCRA Facility Investigation (RFI) Work Plan for Operable Unit 1147 (LANL, 1992), which was submitted to NMED in May 1992 and approved by the EPA in April 1993.
- PRS 50-006(d)—this PRS consists of line No. 64 (see Appendix E), a permitted NPDES outfall to Mortandad Canyon. In 1983, the line was rerouted to accommodate construction activities. In 1985, the line was extended to address bank erosion problems (LANL, 1992).
- PRS 50-011(a)—this is a historical septic system, which included an effluent line that was rerouted from building TA-50-1 to manhole TA-50-9 and onto septic tank TA-50-10. The effluent line from the distribution box was rerouted from a leachfield to a seepage pit in 1978. This system was removed in 1983 (LANL, 1996) except for the seepage pit.

Lines associated with PRS 50-004(a) were decommissioned before enactment of RCRA and thus, no confirmation sampling for hazardous waste or constituents was conducted at the time of decommissioning. However, soil samples collected during the 1994 RFI from PRSs 50-004(a) and (c) and 50-011(a) were analyzed for inorganic, organic, and radioactive constituents (LANL, 1996). The RFI report was submitted to NMED in 1996. The following summarizes the report findings:

- At PRS 50-004(a), beryllium, plutonium-238, and plutonium-239 were detected at concentrations above background, but not at concentrations high enough to pose a human health risk, based on the screening assessment results.
- At PRS 50-004(c), beryllium, copper, chromium, lead, mercury, calcium, potassium, nickel, zinc, plutonium-238, plutonium-239, and uranium-235 were detected at concentrations above background, but not at concentrations high enough to pose a human health risk, based on the screening assessment results.
- At PRS 50-011(a), no contaminants were found at concentrations exceeding background except for two compounds, acetone and 2-butanone, which were detected but at concentrations several orders of magnitude below the screening action levels. There is no evidence that this septic system ever received industrial wastes, but there were surface spills of liquid waste from the TA-50 tank farm, which have been cited as a potential source of contamination at this PRS.

11. P. 4-5, sec. 4.3.1, ¶ 3: Include more specific information about releases to Upper Ten Site Canyon, including dates of releases, control and remedial activities undertaken to address releases, and a summary table of the COPC's and their ranges of contamination above background levels. [264.101, 270.14(d)]

Two accidental releases of radioactive and chemical contaminants occurred to Upper Ten Site Canyon [PRS 50-006(a)] when the sump at building TA-50-2 [PRS 50-002(a)] overflowed. These releases occurred in July and September 1974. One of the two drain lines leading to outfalls at the site was plugged in 1975. In 1981, both of the drain lines were completely removed and a partial soil removal action was conducted (LANL, 1992). As discussed with Carl Will of NMED on August 28, 2001, updated SWMU Report information will be provided to NMED separately in lieu of the chemicals of potential concern (COPC) summary table.

The Environmental Restoration (ER) Project conducted an RFI at PRS 50-006(a) in 1993. A total of 134 samples were collected from 53 locations. Elevated levels of polyaromatic hydrocarbons, polychlorinated biphenyls, lead, mercury, nickel, silver, thallium, thorium-232, cesium-137, cobalt-60, plutonium-238, plutonium-239/240, and strontium-90 were detected (LANL, 1995). The RFI report was submitted to NMED in October 1995.

The ER Project conducted an interim action in November 1996 to remove a hummock in the stream channel at PRS 50-006(a), where the highest level of radionuclides had been detected. Approximately 0.72 yards of contaminated soil were removed, and confirmatory sampling for gross alpha/beta verified that cleanup levels had been achieved by the interim action (LANL, 1997). The interim action report is provided as

Appendix F. Summary tables containing analytical data obtained for Ten Site Canyon are included in Appendices C and G.

12. P. 4-5, sec. 4.3.1, ¶ 3: Include more specific information on the airborne releases from stack emissions and their resulting contamination, including whether or not releases are ongoing, the frequency of releases, area potentially affected by releases, control and remedial activities undertaken to address releases, whether releases are permitted and, if so, a reference to the permit and permit emission limitations, a summary table of the COPC's and their ranges of concentrations above background levels. [264.101, 270.14(d)]

As discussed with Carl Will of NMED on August 28, 2001, updated SWMU Report information will be provided to NMED separately in lieu of the summary table of the COPCs. The only stack emission at TA-50 that has an Air Quality Permit is the Portable Flash Evaporation System. That permit is not held by LANL but by an independent firm called HydoChem Industrial Services. The permit number is: Air Quality Permit 2310-REV-1. Buildings TA-50-1, TA-50-37 and TA-50-69 are all monitored for radioactive emissions and the resulting data are reported to EPA Region VI. The most recent update of that information can be found in LANL document LA-13839-MS. That document is available upon request from LANL's Air Quality Group or it can be accessed on the web at the following address: http://lib-www.lanl.gov/pubs/la13839.htm. A copy of that report has also been attached as Appendix H.

13. P. 4-6, sec. 4.3.1, ¶ 4: Include a summary table with COPC's and ranges of concentrations above background levels for MDA C. The terms "low-level" and "above background," though technically accurate, are misleading. Clarify the term "in and near its perimeter." Detections at depth are not near the perimeter. For example, tritium was detected at 23,300,000 pci/L of soil moisture at 60 feet below ground surface. [264.101, 270.14(d)]

As discussed with Carl Will of NMED on August 28, 2001, updated SWMU Report information will be provided to NMED separately in lieu of the COPC summary table. In plan view, detects fall within the perimeter of Material Disposal Area (MDA) C. However, there are detects at depths greater than the vertical extent of waste disposal. When the final revision to the application is prepared, LANL proposes to change the sentence to "Several sampling efforts at MDA C (SWMU No. 50-009) have confirmed the presence of radionuclides within or directly below MDA C."

14. P. 4-6, sec. 4.3.2: Delete "potential" and "if any." There are known releases from SWMU's at TA-50. Delete the reference to the RFI Work plan for Operable Unit 1148, which consists of TA's 51 and 54. Update the Application to include a summary of sampling results and other information obtained since the 1990 SWMU Report and 1992 RFI Work plan. The 1990 Report section on releases from MDA C states only "above background levels of radioactivity were found adjacent to the site." [264.101, 270.14(d)]

As discussed with Carl Will of NMED on August 28, 2001, updated SWMU Report information will be provided to NMED separately in lieu of the COPC summary table. In plan view, detects fall within the perimeter of MDA C. However, there are detects at depths greater than the vertical extent of waste disposal. When the final revision to the application is prepared, LANL will make the following language replacement: "Information regarding releases from SWMUs is contained in the SWMU characterization sheets included in Appendix 4A of this application and in the RFI Work Plan for Operable Unit 1147 (LANL, 1992)."

15. P. 4-6, sec. 4.3.3: Include a schedule for investigation and remediation of releases from all SWMU's. The fact that SWMU's are "located in areas where waste historically has been and currently is managed" does not affect the requirement to investigate and remediate the SWMU's under 40 CFR § 264.101. [264.101, 270.14(d)]

A schedule for investigation and remediation of releases from all SWMUs at LANL, including those at TA-50, is negotiated with NMED and is incorporated into an Annual Work Schedule as required in the Laboratory's Hazardous Waste Facility Permit, Module VIII, Section 8. The summary schedule taken from the approved ER Project Baseline for fiscal year (FY) 2000 regarding SWMUs at TA-50 is included as Appendix I. Individual schedules are contained in the approved FY 2000 ER Project baseline submitted to NMED as Appendix H of the March 1, 2001, "Response to Request for Information Pursuant to the New Mexico Hazardous Waste Act and the Resource Conservation and Recovery Act, Los Alamos National Laboratory, EPA ID No. 0890010515".

16. P. 4-6, sec. 4.3.3: Address releases from operating units. Include a schedule for determination of risk from releases from operating units, including those described at page 4-3, section 4.1.4, and for corrective action for unacceptable risks. [264.31, 264.101, 264.111, 270.14(d)]

There are no previous known releases from the container storage units at TA-50. Should a spill occur during their operational life, it will be dealt with immediately. Upon RCRA closure of TA-50, the site will be subject to the corrective action process to ensure that any residual contamination from historical activities is handled appropriately. See Appendix I for a schedule of when corrective action is planned for TA-50.

Attachment A, Facility Description

17. P. A-5, sec. A.1.6.1, ¶ 2: Address surface runoff to Ten-Site and Mortandad Canyons. [264.31, 264.101, 264.111, 270.14(b)(8), 270.14(d)]

There is no potential for surface runoff to Ten-Site and Mortandad canyons from the storage units at TA-50. Each unit is self-contained in a building or a structure and, therefore, is not impacted by precipitation events.

18. P. A-6, sec. A.2.1.1: For hazardous waste management units that are not existing units, submit a demonstration of compliance with seismic standards that meets the requirements of 270.14(b)(11)(ii)(A) and (B). [264.18(a), 270.14(b)(11)(ii)]

20.4.1 NMAC §264.18 requires that portions of new facilities must not be located within 61 meters of a fault. LANL meets the definition of an existing facility contained in 20.4.1 NMAC §260.10 and, therefore, the requirement cited is not applicable to TA-50.

19. P. A-7, sec. A.3: The Application must address groundwater monitoring requirements for all units at TA-50, including MDA C and all other SWMU's. Groundwater monitoring requirements under 40 CFR § 264.91 through § 264.100 apply to land disposal units where hazardous waste was placed C after July 26, 1982. Specify in this section the last date of disposal for MDA C and any other land disposal units at TA-50. If 40 CFR § 264.91 through § 264.100 are not applicable, groundwater monitoring may be required at SWMU's under 40 CFR § 264.101 and must be addressed in the Application. The vertical extent of contamination has not been determined at MDA C, and high levels of contamination have been detected at the the deepest sampling points in several boreholes submitted to NMED. If MDA C is not a "regulated unit" under 40 CFR § 264.90(a)(2), include an explanation of why groundwater monitoring is not necessary under 40 CFR § 264.101 to determine if releases from MDA C have reached groundwater, or include a schedule for monitoring groundwater potentially affected by releases from MDA C or other SWMU's at TA-50. [264 Subpart F, 264.101, 270.14(d)]

MDA C received wastes from May 1948 to April 1974, but received waste only intermittently from 1968 to 1974. The last shaft was plugged with concrete April 8, 1974, and MDA C was officially decommissioned at that time (LANL, 1992). There are no regulated units at TA-50. Groundwater monitoring needs for MDA C have not yet been determined and will be assessed as part of the corrective measures study process once the RFI is complete.

20. P. A-7, sec. A.3: Contaminants have reached groundwater from the TA-50 RWTF effluent. Include a groundwater monitoring program to assess impacts to groundwater from the RWTF or other off-site releases from TA-50. [264.101, 270.14(d)]

Groundwater monitoring as well as characterization programs to assess impacts to groundwater from the RLWTF or other off-site releases from TA-50 are identified in Appendix J.

21. P. A-8, sec. A.4: Correct the discrepancy between this Section and Section A.5 titled Security. In Section A.4 the main access gate is described as "...the open northern gate." In Section A.5, this gate is described as ". . . closed and locked unless authorized access is necessary." [264.14, 270.14(b)(4)]

When the final revision of the application is produced, LANL will revise Section A.4, paragraph 2, of the permit application to accurately describe updated access through the two northern gates as follows: "During normal business hours, the traffic pattern consists of personal and government-owned passenger vehicles entering the area through the open western gate, going to a parking area, and parking. After normal business hours, access through this western gate is by badge-reader only. Throughout normal business hours, the eastern gate may remain open to receive deliveries. After normal business hours, this eastern gate is padlocked. Throughout the workday, the average flow of traffic is approximately 160 vehicles per day. Authorized government vehicles only are permitted on the road leading around the southern end of TA-50-1 and in the area to the southeast of TA-50-1. Figure A-9 depicts the gates and areas discussed."

22. P. A-9, sec. A-5: Revise the Application to clarify the discussion of access gates. The Application mentions three entry gates but discusses only two. Based on site visits, NMED is not aware of an access gate on Pecos Drive that is closed and locked. [264.14, 270.14(b)(4)]

When the final revision of the application is produced, LANL will revise Section A.5, paragraph 2, of the permit application to accurately describe updated access into the area as follows: "There are four entry gates into TA-50. Two entry gates are located north of TA-50-1. During normal business hours, the easternmost of these two gates may remain open to receive deliveries. After normal business hours, this gate is padlocked. The westernmost of these two gates is the main access gate and remains open during normal business hours for personal and government-owned passenger vehicles. After normal business hours, access through this gate is by badge-reader only. A fire access and shipping gate is located west of TA-50-69 and is routinely kept closed and locked. When this gate is opened for shipments of materials or waste, facility personnel are present in the yard west of TA-50-69 to limit egress by unauthorized persons. A fourth gate to the south of TA-50-1 is locked except when authorized access is necessary. TA-50 is patrolled by Protection Technology Los Alamos security personnel during non-operational hours to ensure that unauthorized entry has not occurred. In accordance with 20.4.1 NMAC §270.14(b)(19)(viii) [6-14-00], the locations of the security fences and entry gates at TA-50 are shown on Figure A-10."

Attachment B, Waste Analysis Plan

23. P. B-1, ¶ 1: To clarify why waste analysis requirements for TA-50 are addressed in the General Permit, include the following or an equivalent statement here: "The only waste management operation at TA-50 authorized under this Permit is container storage. Waste analysis requirements for container storage units at the LANL Facility are described in the facility-wide Waste Analysis Plan in Appendix B of the Los Alamos National Laboratory General Part B Application." [264.13, 270.14(b)(3)]

When the final revision of the application is produced, LANL will replace the second sentence with the following: "The only waste management operation at TA-50 addressed in this permit application is container storage. Waste analysis requirements for container storage units at the LANL Facility are described in the facility-wide Waste Analysis Plan in Appendix B of the Los Alamos National Laboratory General Part B Permit Application."

Attachment F, Closure Plan

Closure Plan General Comments

24. Include in the Closure Plan procedures to comply with all requirements of 40 CFR § 264.112(b) at partial and final closure, including removal or decontamination of all hazardous waste residues from all sources. The necessary elements of 40 CFR § 264.112(b) have not been addressed. For example, detailed descriptions of procedures for removing contaminated soils, criteria for determining extent of contamination, and a detailed description of how closure will satisfy performance standards for all releases from all sources must be included. [264.112, 270.14(b)(13)]

LANL does not anticipate soil contamination resulting from storage activities because all of the storage locations at TA-50 are in self-contained structures or buildings, and the waste form does not contain liquids. As part of the RCRA closure, LANL will review inspection records and other documentation to ascertain if there has been a release to the soil that would require cleanup. LANL conducts inspections at all of its TA-50 container storage sites.

Section F.1.10 of the TA-50 closure plan details the procedures to be undertaken at closure to meet the closure performance standard. As discussed earlier, the TA-50 storage units are all in self-contained structures or buildings and the waste form contains no free liquids. Therefore, there is no mechanism for the soils surrounding these container storage areas to become contaminated because of waste storage activities. If any hazardous waste is spilled, LANL will follow local standard operating procedures and conduct an immediate cleanup. Section F.1.11.1 and F.1.11.2 were included in the closure plan to illustrate how LANL would collect soil samples if it became necessary through some unforeseen circumstance.

The closure plan is intended to address only the operational storage locations. SWMUs located at TA-50 will be addressed through the corrective action process and are not subject to this closure plan. After RCRA closure of the facility, the corrective action program will follow the RFI/Corrective Measures Study (CMS) process for addressing any releases at this TA.

All of the necessary elements of 20.4.1 NMAC §264.223(b) were provided in the closure plan. The specific requirements for the container storage units are satisfied, as follows:

- §264.112(b)(1) – A description of how each container storage unit will be closed in accordance with the closure performance standard is provided in Section F.1.1, page F-2.

- §264.112(b)(2) – A description of partial and final closure activities is provided in Section F.1.2, page F-3. Final RCRA closure of the LANL facility is addressed in the General Closure Plan submitted as Appendix I in LANL's "Response to Request for Supplemental Information: Technical Adequacy Review; RCRA Permit Application; General Part A, April 1998, Revision 0.0; General Part B, October 1998, Revision 1.0, Los Alamos National Laboratory, EPA ID No. NM0890010515."

- §264.112(b)(3) – An estimate of the maximum inventory of hazardous wastes ever on-site over the active life of the facility is not addressed in the closure plan for the TA-50 container storage areas because this is a requirement for final RCRA closure of the entire LANL facility. A description of the methods to be used during partial closure (i.e., closure) of the TA-50 container storage areas is presented in Sections F.1.1, F.1.10, and F.2 through F.6. Because methods for transporting, treating (if necessary), storing, or disposing of the hazardous wastes will be determined at the time of closure based on contracts and business practices then in effect, specific details on these methods will be provided in the closure report, as appropriate.

- §264.112(b)(4) – A detailed description of the steps necessary to remove, decontaminate, reclaim, recycle, or dispose of hazardous waste residues and contaminated equipment is provided in Sections F.1.1 and F.1.10. A description of procedures for cleaning equipment and sampling and analytical procedures is presented in Sections F.1.11.3 and F.1.11.5.

  LANL has a contingency plan that is activated if any hazardous waste is spilled. Therefore, if during the active life of a storage area a waste material is spilled, cleanup is implemented immediately. There is no reason to assume that the soils surrounding any of the storage structures would be contaminated with hazardous waste resulting from storage activities. The criteria for decontamination verification to satisfy the closure performance standard are provided in Section F.1.13.

- §264.112(b)(5) – Because the TA-50 CSAs are not land-based units, they are not subject to groundwater monitoring and/or leachate collection. As stated above, the CSAs are located within self-contained buildings or structures and are used only to store solid wastes that do not contain free liquids. All of the buildings and structures are substantially above ground level, eliminating the potential of meteoric water gaining access to the storage areas. There is no potential impact from run-on or run-off into or from the buildings or structures because the wastes are stored inside, thereby reducing the likelihood of contaminant transport from the storage areas.

- §264.112(b)(6) – A schedule for closure of the TA-50 CSAs is provided in Table F-1. Final closure of the facility is presented in the General Closure Plan submitted as Appendix I in LANL's "Response to Request for Supplemental Information: Technical Adequacy Review; RCRA Permit Application; General Part A, April 1998, Revision 0.0; General Part B, October 1998, Revision 1.0, Los Alamos National Laboratory, EPA ID No. NM0890010515."

- §264.112(b)(7) – As stated in Section F.1.5, LANL is a federal facility and, as such, is exempt from the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart H.

- §264.112(b)(8) - Because the TA-50 CSAs are not land-based units and are intended to be clean closed, this requirement is not applicable.

25. P. F-2, sec. F.1.1 and throughout: Replace "may be decontaminated, reclaimed or recycled, or disposed of, as appropriate" with "will either be sampled and determined to be below applicable standards or will be removed or decontaminated to meet applicable standards." Revise the Application throughout to state that at closure of container storage areas hazardous waste and hazardous waste residues will be removed or decontaminated. [264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, the following language will be added: "..will either be sampled and determined to be below applicable standards or will be removed or decontaminated to meet applicable standards which is inclusive of the closure performance standard; 20.4.1 NMAC Part 264, Subpart G; and 20.4.1 NMAC §264.178. All waste may be subsequently reclaimed, recycled, or disposed of as appropriate after closure activities are completed.

"Closure Plan Specific Comments"

26. P. F-1, ¶ 3: Replace "meet the closure requirements" with "are intended to meet the closure requirements."

The closure plan for the CSAs at TA-50 was specifically developed "to meet" the closure requirements. This plan will meet the regulatory requirements of the closure performance standard. No changes are proposed for this text.

27. P. F-1, ¶ 3: Include a citation to 40 CFR § 264.178. [270.14(b)(13)]

When the final revision to the TA-50 application is produced, LANL will add the following language: "...and Part 264, Subpart G [6-14-00], which is inclusive of §264.178".

28. P. F-1, ¶ 4: Insert after "Closure will include" "removal or decontamination of all hazardous waste residues and contaminated structures, soil, and groundwater." [264.112, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, LANL will change the language to read: "Closure will include removal or decontamination of all hazardous waste residues and contaminated structures, soil, and groundwater resulting from the container storage operations permitted at TA-50."

29. P. F-1, ¶ 4: Delete "through normal RCRA-regulated container storage operations." Contamination from all sources must be investigated and remediated at closure. [264.112, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, LANL will add the following language: "...through normal RCRA-regulated storage operations. After closure of the facility, the corrective action program will follow the RFI/CMS process for addressing any releases at TA-50.*30. P. F-2, sec. F.1: Include a citation to 40 CFR § 264.178. [270.14(b)(13)]*

30. P. F-2, sec. F.1: Include a citation to 40 CFR § 264.178. [270.14(b)(13)]

When the final revision to the TA-50 application is produced, LANL will add the following language: "...and Part 264, Subpart G [6-14-00], which is inclusive of §264.178".

31. P. F-2, sec. F.1.1: Revise the second bullet to include post-closure escape to groundwater. [264.111, 264.112, 270.14(b)(13)]

When the final revision to the permit application is produced, this section of the closure plan will be revised to read the same as the closure performance standard in 20.4.1 NMAC §264.111.

32. P. F-2, sec. F.1.1, bullet 3: Include "and closure" after "container management." [264.111, 270.14(b)(13)]

When the final revision to the permit application is produced, this section of the closure plan will be revised to read the same as the closure performance standard in 20.4.1 NMAC §264.111.

33. P. F-2 and F-3, sec. F.1.1 and F.1.2: Address investigation and remediation at closure of contamination from all TA-50 units, not only container storage units, for example from SWMU's or from air emissions. [264.111, 264.112, 270.14(b)(13)]

When the final revision to the permit application is produced, LANL will add the following language: "...through normal RCRA-regulated container storage operations. After

RCRA closure of the facility, the corrective action program will follow the RFI/CMS process for addressing any releases at TA-50.

34. P. F-2, sec. F.1.1: Replace "all equipment . . . recycled, or disposed of" with "removal or decontamination of hazardous waste and hazardous waste residues has been completed in accordance with this Closure Plan, closure performance standards, and the requirements of 40 CFR Subpart G and § 264.178." [264.112, 264.113, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, the following language will be added: "...will either be sampled and determined to be below applicable standards or will be removed or decontaminated to meet applicable standards which is inclusive of the closure performance standard; 20.4.1 NMAC Part 264, Subpart G; and 20.4.1 NMAC §264.178. All waste may be either subsequently reclaimed, recycled, or disposed of as appropriate after closure activities are completed."

35. P. F-2, sec. F.1.1: Include a provision for submittal of a Closure Report within 60 days after completion of closure activities and approval of the Report by NMED.

Section F.1.6 of the closure plan discusses the submittal of a closure certification to be provided to NMED within 60 days after completion of closure activities. The certification will be attested to by an independent professional engineer and certified by the appropriate UC and DOE officials. Section F.1.8 of the closure plan discusses the information that will be maintained at the facility supporting the closure and available to the Secretary upon his/her request, per 20.4.1 NMAC §264.115. There is no need to duplicate that language in Section F.1. LANL proposes no change to this text.

36. P. F-3, sec. F.1.2: Replace "the unit and related equipment . . . as appropriate" with "hazardous waste and hazardous waste residues have been removed or decontaminated." [264.112, 264.113, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, the following language will be added: "...All waste may be either subsequently reclaimed, recycled, or disposed of as appropriate after closure activities are completed."

37. P. F-3, sec. F.1.3: Replace "dismantling" with "removing." [264.178, 270.14(b)(13)]

When the final revision to the TA-50 permit application is prepared, LANL will insert "and removing" after the word "dismantling".

38. P. F-3, sec. F.1.3: Replace "treatment, removal, or disposal" with "removal or decontamination." [264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, LANL will change the language to say: "Treatment, removal, or disposal of any hazardous waste in the

storage area will take place prior to the initiation of removal and/or decontamination of equipment and facilities..."

39. P. F-3, sec. F.1.3, line 9: Insert "storage," before "treatment."

When the final revision to the permit application is produced, LANL will insert the word "storage" before "treatment".

40. P. F-5, sec. F.1.8 and Table F-1: Include a time-period of 60 days after completion of closure activities for submittal of the Closure Report.

See LANL's response to NMED Comment No. 35. LANL proposes no change to this text.

41. P. F-6, sec. F.1.9: Either identify units at TA-50 subject to post-closure care or delete this section. Post-closure care requirements do not apply to container storage units. [264.117, 264.118, 264.178]

LANL plans to "clean close" all storage units at TA-50. Therefore, none of those units will be subject to the post-closure care requirements, provided "clean closure" is achieved. When the final revision to the permit application is produced, LANL will delete the above referenced section.

42. P. F-6, sec. F.1.10, item 3: Replace "Decontamination, recycling, removal, and/or disposal" with "Decontamination or removal." [264.112, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, the following language will be added: "...will either be sampled and determined to be below applicable standards or will be removed or decontaminated to meet applicable standards which is inclusive of the closure performance standard, 20.4.1 NMAC §264, Subpart G and §264.178. All waste may be either subsequently reclaimed, recycled, or disposed of as appropriate after closure activities are completed."

43. P. F-7, sec. F.1.10, item 6: Delete "from the unit (if applicable)." [264.112, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, LANL will revise the sixth bullet to read "Removal or remediation of contaminated soils resulting from storage activities, if appropriate".

44. P. F-7 sec. F.1.10, ¶ 4, last sentence: Replace "hazardous and radioactive" with "hazardous and/or radioactive."

The phrase "hazardous and radioactive" addresses mixed waste, which NMED has authority to regulate the hazardous component. NMED's proposed phrase "hazardous

and/or radioactive" would broaden that authority to include strictly low-level and transuranic wastes. Therefore, LANL proposes no change to this text.

45. P. F-8, sec. F.1.10, ¶ 6: "...soil samples will be collected from areas showing evidence of contamination...." In addition, include sampling of areas of potential contamination and areas of deteriorated or failed containment system. [264.112, 264.178, 270.14(b)(13)]

The storage locations at TA-50 are all in self-contained structures or buildings. The waste form in the containers has no free liquids. As a result, LANL does not anticipate soil being contaminated as a result of storage activities. The existing language addresses the contingency that should contamination be discovered, it would be handled as part of the closure activities. Because the wastes stored contain no free liquids and therefore require no secondary containment systems per 20.4.1 NMAC §264.175(c), "deteriorated or failed containment systems" are not an issue. Also, any spills that occur in the storage areas during their operational life will be cleaned up immediately. LANL proposes no change to this text.

46. P. F-8, sec. F.1.11: Delete the sampling and analytical procedures. Replace with a new sec. F.1.11 providing for submittal for NMED approval of an updated Sampling Plan at least 90 days prior to implementation of partial or final closure to determine levels of contamination at the unit from all sources to demonstrate attainment of closure and other applicable standards, including 40 CFR § 112(b)(4) and (5), using methods in accordance with HWB and EPA guidance. [264.112, 264.178, 270.14(b)(13)]

20.4.1 NMAC §264.112(a)(1) requires a closure plan be submitted and approved by NMED containing those elements listed in 20.4.1 NMAC §264.112(b). 20.4.1 NMAC §264.112(b)(4) requires sampling and analytical procedures. The regulations do not require the submittal of an updated sampling plan at least 90 days prior to closure plan implementation. Therefore, LANL proposes no change to this text. The regulations do require that a facility submit a permit modification no later than 60 days after an event has occurred that requires the closure plan be amended per 20.4.1 NMAC §264.112(c). LANL will do this if circumstances require it at that time.

47. P. F-14, sec. F.1.13: Add language regarding the collection of analytical evidence. As part of the decontamination verification process, collection of analytical samples will be required. Wipe samples or other sampling methods, for example radioactive materials sampling or sand blasting and sampling of the residue, shall be collected from floors, walls, sumps and areas with records or evidence of a release. [264.112, 264.178, 270.14(b)(13)]

Section F.1.13 of the closure plan discusses the decontamination process where a storage area is washed and then rinsed. The rinse water is then analyzed for specific contaminants. Radioactive monitoring will also be conducted at those sites where

mixed waste was stored to verify successful decontamination. The criteria to be used to verify that decontamination has been achieved are presented on page F-15. These criteria have been approved by NMED for numerous RCRA closures at LANL. LANL proposes no change to this text.

48. P. F-15, ¶ 2: Delete items 3, 4, and 5 of the decontamination criteria. Replace with the following: 1) For surfaces such as container storage area floors and walls, submit proposed cleanup standards. 2) For soils, use HWB soil screening, ecological risk, or risk assessment methods as appropriate to calculate cleanup levels as established by NMED or applicable law. 3) For groundwater, use the lower of New Mexico Water Quality Control Commission regulations or Maximum Contaminant Levels under the Safe Drinking Water Act. Do not include technical or administrative control measures. Hazardous waste and residues must be removed or decontaminated at closure. [264.112, 264.178, 270.14(b)(13)]

The five criteria identified as means of achieving successful decontamination have been approved by NMED in past closure plans. These criteria provide a spectrum of methods that allow the necessary flexibility in the closure plan for conducting a closure. In the past, inordinate amounts of time have been spent modifying closure plans due to unforeseen circumstances that only allowed a single-option approach to successfully demonstrate decontamination. The multi-option approach has proven to be a successful and expedient approach to conducting closures. As discussed in LANL's response to NMED Comment No. 24, contamination of soil or groundwater is not anticipated. Therefore, LANL proposes no changes to this text.

49. P. F-16, sec. F.2.2; p. F-16, sec. F.3.2; p. F-I7, sec. F.4.2; P. F-18, sec. F.5.2: Replace with "At final or partial closure all hazardous waste and residues will be removed or decontaminated in accordance with the requirements of 40 CFR 264 Subpart G and § 264.178, this Closure Plan, and the updated Sampling Plan." [264.112, 264.178, 270.14(b)(13)]

When the final revision to the permit application is produced, the following language will be added: "..will either be sampled and determined to be below applicable standards or will be removed or decontaminated to meet applicable standards which is inclusive of the closure performance standard, 20.4.1 NMAC §264, Subpart G and §264.178. All waste may be either subsequently reclaimed, recycled, or disposed of as appropriate after closure activities are completed."

50. P. F-20, last paragraph: The application states that "Records review and visual inspection of the soils along the margins of the WCRRF Outdoor CSA will be used to identify areas where soil contamination from RCRA-regulated waste management activities could have occurred." Insert language providing for collection of samples from the soil surrounding the CSA and in likely accumulation areas (along drainages) in order to confirm the presence or absence of hazardous constituents. [264.112, 264.178, 270.14(b)(13)]

LANL does not anticipate soil contamination resulting from storage activities because all of the storage locations at TA-50 are in self-contained structures or buildings, and the waste form does not contain liquids. Also, any spills that occur in the storage areas during their operational life would have been cleaned up immediately. LANL will review inspection records and other documentation to ascertain if there has been a release to the soil that would require cleanup. LANL conducts inspections at all of its TA-50 storage sites.

There is no mechanism for the soils surrounding these container storage areas to become contaminated because of waste storage activities. If any hazardous waste is spilled, LANL will follow local standard operating procedures and conduct an immediate cleanup. There is no reason to assume soils surrounding any of the storage structures would be contaminated with hazardous waste resulting from storage activities. Therefore, LANL proposes no changes to this text.

51. Tables F-2 through F-7: Delete. Address in the updated Sampling Plan submitted at the time of partial or final closure required under Comment No. 46 above.

See LANL's response to NMED Comment No. 46. Because an updated sampling plan is not a regulatory requirement for closure plans, LANL will keep tables F-2 through F-7 in the closure plan.

Attachment G, Container Management

52. P. G-2, sec. G.1.2.2 and P. G-5 sec. G.2: Discuss loading and unloading (L/UL) operations. Because the L/UL areas do not have a containment system, discuss how prevention and clean up of accidental spills are handled. For example, does L/UL operations occur during precipitation events, are temporary berms used, and is spill control equipment present during L/UL events? [270.14(b)(8)(i)]

When the final revision to the application is prepared, LANL will add the following text to Section G.1.2.2: "Waste management personnel at TA-50 do not perform loading/unloading operations during precipitation events. The waste stored in the TA-50 CSAs is WIPP-certifiable and does not contain free liquids; therefore, if a drum is opened and the contents spilled, it is easily contained. In the case of spills, personnel follow site procedures and emergency response plans and implement the LANL Contingency Plan if necessary. Because the waste does not contain free liquids, secondary containment and temporary berms are not necessary during loading/unloading operations."

53. P. G-5, sec. G.1.4: Describe the secondary containment pallet and other devices in order to demonstrate the secondary containment capacity of these devices. [264.175, 270.15]

When the final revision to the application is prepared, LANL will clarify the permit application to state that only wastes with no free liquids are stored in the TA-50 CSAs. Therefore, secondary containment requirements do not apply. In addition, LANL will remove all references to secondary containment requirements (e.g., pallets) in the permit application.

54. P. G-7, sec. G.2.2, ¶ 2: Delete the paragraph beginning "Because the moisture content is insufficient . . .." The protection of groundwater from container storage areas is dependant on prevention of releases, not a geologic conditions serving as a barrier. High levels of contaminants have been detected at the deepest sampling points submitted to NMED. Depths to perched zones of groundwater are unknown under TA-50. [264.31, 264 Subpart I, 270.14(b)(8), 270.15]

When the final revision to the permit application is produced, the above language will be changed to read: "No impact to groundwater is expected due to the operation of the hazardous waste container storage areas at TA-50."

55. P. G-14 through G-18, sec. G.4: For all rooms requiring secondary containment specify the containment capacity and container storage capacity in order to demonstrate sufficient capacities of the containment system. In addition, include the calculations that demonstrate the capacity of the secondary containment systems. [264.175, 270.15]

See LANL's response to NMED Comment No. 53

56. P. G-16, sec. G.4.1.1: The information provided conflicts with what is stated in Chapter 2 of the application. Chapter 2 states that only solid waste (i.e. non liquid bearing) is stored in TA-50-1 Room 59 and TA-50-37 Room 118. Attachment G.4, states that TA-50-37 Room 112 is designated to store solid waste only and that Room 118 may store waste with residual liquids. Please correct this discrepancy. [264.175, 270.15]

See LANL's response to NMED's Comment No. 53.

57. P. G-15, sec. G.4.1.1; P. G-16, sec. G.4.1.4; P. G-16, sec. G.4.2; P. G-I8, Sec. G.4.5: Replace "solid waste" with "waste not containing free liquids" or an equivalent. [264.175, 270.15]

See LANL's response to NMED Comment No. 3.

58. P. G-16, sec. G.4.1.4: The secondary containment system does not have 10 percent capacity of the design capacity of 18,000 gallons. [264.175, 270.15]

See LANL's response to NMED Comment Nos. 7 and 53.

59. P. G-16, sec. G.4.3: Provide dimensions and calculations for the secondary containment system. Also, provide a description of the secondary containment that demonstrates that it is liquid tight. [264.175, 270.15]

See LANL's response to NMED Comments Nos. 3 and 53.

Attachment H, Authorized Waste

60. Update the Part A to include all hazardous waste management units being permitted and to delete all units not being permitted. See the RSI for the General Part A and Part B Permit Application dated June 25, 2001. [270.13]

LANL will address this issue in the next revision of the LANL Part A, as discussed with Carl Will and Steve Jetter of the NMED HWB in a meeting on July 31, 2001. At that time, it was decided that the appropriate approach to dealing with the Part A revision was not through the RSI but rather through a separate action based on the outcome of the Annual Unit Audit process.

APPENDIX A

COPY OF "REQUEST FOR SUPPLEMENTAL INFORMATION: TECHNICAL ADEQUACY REVIEW; RCRA PERMIT APPLICATION; TA-50 PART B, DECEMBER 2000, REVISION 2.0; LOS ALAMOS NATIONAL LABORATORY EPA ID NO. NM0890010515"

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June 25, 2001

Dr. John C. Browne, Director
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Los Alamos, NM 87545

Mr. David A. Gurule, Area Manager
Los Alamos Area Office
Department of Energy
528 35th Street, MS A316
Los Alamos, NM 87544

SUBJECT: REQUEST FOR SUPPLEMENTAL INFORMATION
TA-50 PART B PERMIT APPLICATION
DECEMBER 2000, REVISION 2.0
LOS ALAMOS NATIONAL LABORATORY EPA ID# NM0890010515
HWB-LANL-99-048

Dear Dr. Browne and Mr. Gurule:

The Hazardous Waste Bureau (HWB) of the New Mexico Environment Department (NMED) has reviewed for technical adequacy the above-referenced Application, as required under 20.4.2.201.3 NMAC.

After reviewing the Application, HWB requests additional information. The information that must be addressed is described in Attachment A.

The requested information must be submitted to HWB within forty-five days of receipt of this Request for Supplemental Information. Failure to respond within this time period will result in issuance of a Notice of Deficiency.

If you have any questions or need additional information please contact me at 505-428-2542.

Sincerely,

Carl Will

Carl Will
LANL Permits Project Leader

attachment

cc: S. Jetter, NMED HWB
P. Allen, NMED HWB
A. Ortiz, NMED OGC
D. Neleigh, EPA 6PD-N
J. Ellvinger, LANL ESH-19, MS K490
G. Bacigalupa, LANL ESH-19, MS K490
G. Turner, DOE LAAO, MS A316

file: Reading and LANL red file

ATTACHMENT A
REQUEST FOR SUPPLEMENTAL INFORMATION
TECHNICAL ADEQUACY REVIEW

RCRA PERMIT APPLICATION
TA-50 PART B, DECEMBER, 2000, REVISION 2.0

LOS ALAMOS NATIONAL LABORATORY
EPA ID NO. NM0890010515

June 25, 2001

1. Revise the Application to include Attachment A, Facility Description, and Attachment G, Container Management, in the Application Section 2.0, Unit Designs, Facility Operations, and Procedures to Prevent Hazards, rather than as Attachments to the Application. [270.14(b)(1)]

2. Page 2-3, TA-50-114 Container Storage Area (CSA): The description of the storage locker configuration states "The CSA is divided into two separate lockers by a metal wall, and has a grated floor above a recessed area on which the waste containers are placed." It is not clear whether the secondary containment portion, i.e. the recessed floor, is also separated by the wall, thereby preventing the mixing of incompatible wastes. Revise the Application to specify either that secondary containment is separated or, if the secondary containment is not separated, that incompatible wastes will not be stored above it. [264.175, 270.15]

3. P. 2-5, section 2.1.5, lines 4 and 5: Replace the term "solids" and "solid waste" with "wastes that do not contain free liquids" or another term describing non-liquid wastes. Because the term "solid waste" has a particular meaning under RCRA, and includes liquid wastes, use a different term in the Application to describe non-liquid waste in order to avoid confusion. Include a definition of "residual free liquids." [264.175, 270.15]

4. P. 2-5, sec. 2.1.5: Revise to correct inconsistency in the language describing where liquid waste will be stored. The third sentence states that all rooms except TA-50-1, Room 59, will store waste containing residual free liquid. The following sentence states that TA-50-37, Room 118, will store only solid waste. See also comment 51 below. [264.175, 270.15]

5. P. 2-7, sec. 2.1.11: Include a citation to 40 CFR § 264.178 for closure requirements.

6. P. 2-7, sec. 2.2: Use a consistent term throughout for the WCRRF or TA-50-69 or specify at the beginning of the section that the two are the same.

7. P. 2-9, Table 2-1; p. F-16, sec. F.2.1; and p. G-16, sec. G.4.1.4: Based on NMED calculations from room dimensions provided in the Application at page 2-2, TA-50-37, Room 118, does not have a design capacity of 18,000 gallons or 327 55-gallon drums as stated in the Application at pages 2-9, F-16, and G-16. Please provide a diagram of the drum storage layout including aisle spacing and calculations for determining storage capacity. [270.15]

8. P. 4-1, ¶ 2: Replace the SWMU definition with the following definition that NMED will include in the Permit: "Any discernible unit or area at which solid waste has been placed at any time, and from which the Secretary determines there may be a risk of a release of hazardous constituents, irrespective of whether the unit or area was intended for the management of solid or hazardous waste. Placement of solid waste includes one-time and accidental events that were not remediated, as well as any unit or area at which solid waste has been routinely and systematically placed." [264.101, 270.14(d)]

9. P. 4-3, sec. 4.1.4, and p. 4-5, sec. 4.3.1, ¶ 3: Replace the past tense with the present tense for releases to Mortandad Canyon and analyses of the releases. Releases of contaminants are ongoing. For the effluent and for the canyon, include a summary table with Contaminants of Potential Concern (COPC's), including radioactive COPC's, perchlorate, and nitrates, with ranges of concentrations above background levels as established in Ryti et al., "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," September 22, 1998. [264.31, 264.101, 264.111, 270.14(d)]

10. P. 4-5, sec. 4.3.1, ¶ 2: Include information about other waste lines removed and an explanation of why chemical contaminants were not analyzed for at the time of decommissioning. [264.101, 270.14(d)]

11. P. 4-5, sec. 4.3.1, ¶ 3: Include more specific information about releases to Upper Ten Site Canyon, including dates of releases, control and remedial activities undertaken to address releases, and a summary table of the COPC's and their ranges of contamination above background levels. [264.101, 270.14(d)]

12. P. 4-5, sec. 4.3.1, ¶ 3: Include more specific information on the airborne releases from stack emissions and their resulting contamination, including whether or not releases are ongoing, the frequency of releases, area potentially affected by releases, control and remedial activities undertaken to address releases, whether releases are permitted and, if so, a reference to the permit and permit emission limitations, a summary table of the COPC's and their ranges of concentrations above background levels. [264.101, 270.14(d)]

13. P. 4-6, sec. 4.3.1, ¶ 4: Include a summary table with COPC's and ranges of concentrations above background levels for MDA C. The terms "low-level" and "above background," though technically accurate, are misleading. Clarify the term "in and near its perimeter." Detections at depth are not near the perimeter. For example, tritium was detected at 23,300,000 pci/L of soil moisture at 60 feet below ground surface. [264.101, 270.14(d)]

14. P. 4-6, sec. 4.3.2: Delete "potential" and "if any." There are known releases from SWMU's at TA-50. Delete the reference to the RFI Workplan for Operable Unit 1148, which consists of TA's 51 and 54. Update the Application to include a summary of sampling results and other information obtained since the 1990 SWMU Report and 1992 RFI Workplan. The

1990 Report section on releases from MDA C states only that "above background levels of radioactivity were found adjacent to the site." [264.101, 270.14(d)]

15. P. 4-6, sec. 4.3.3: Include a schedule for investigation and remediation of releases from all SWMU's. The fact that SWMU's are "located in areas where waste historically has been and currently is managed" does not affect the requirement to investigate and remediate the SWMU's under 40 CFR § 264.101. [264.101, 270.14(d)]

16. P. 4-6, sec. 4.3.3: Address releases from operating units. Include a schedule for determination of risk from releases from operating units, including those described at page 4-3, section 4.1.4, and for corrective action for unacceptable risks. [264.31, 264.101, 264.111, 270.14(d)]

Attachment A, Facility Description

17. P. A-5, sec. A.1.6.1, ¶ 2: Address surface runoff to Ten-Site and Mortandad Canyons. [264.31, 264.101, 264.111, 270.14(b)(8), 270.14(d)]

18. P. A-6, sec. A.2.1.1: For hazardous waste management units that are not existing units, submit a demonstration of compliance with seismic standards that meets the requirements of 270.14(b)(11)(ii)(A) and (B). [264.18(a), 270.14(b)(11)(ii)]

19. P. A-7, sec. A.3: The Application must address groundwater monitoring requirements for all units at TA-50, including MDA C and all other SWMU's. Groundwater monitoring requirements under 40 CFR § 264.91 through § 264.100 apply to land disposal units where hazardous waste was placed C after July 26, 1982. Specify in this section the last date of disposal for MDA C and any other land disposal units at TA-50. If 40 CFR § 264.91 through § 264.100 are not applicable, groundwater monitoring may be required at SWMU's under 40 CFR § 264.101 and must be addressed in the Application. The vertical extent of contamination has not been determined at MDA C, and high levels of contamination have been detected at the the deepest sampling points in several boreholes submitted to NMED. If MDA C is not a "regulated unit" under 40 CFR § 264.90(a)(2), include an explanation of why groundwater monitoring is not necessary under 40 CFR § 264.101 to determine if releases from MDA C have reached groundwater, or include a schedule for monitoring groundwater potentially affected by releases from MDA C or other SWMU's at TA-50. [264 Subpart F, 264.101, 270.14(d)]

20. P. A-7, sec. A.3: Contaminants have reached groundwater from the TA-50 RWTF effluent. Include a groundwater monitoring program to assess impacts to groundwater from the RWTF or other off-site releases from TA-50. [264.101, 270.14(d)]

21. P. A-8, sec. A.4: Correct the discrepancy between this Section and Section A.5 titled Security. In Section A.4 the main access gate is described as "...the open northern gate." In Section A.5, this gate is described as ". . . closed and locked unless authorized access is necessary." [264.14, 270.14(b)(4)]

22. P. A-9, sec. A.5: Revise the Application to clariffy the discussion of access gates. The Application mentions three entry gates but discusses only two. Based on site visits, NMED is not aware of an access gate on Pecos Drive that is closed and locked. [264.14, 270.14(b)(4)]

Attachment B, Waste Analysis Plan

23. P. B-1, ¶ 1: To clarify why waste analysis requirements for TA-50 are addressed in the General Permit, include the following or an equivalent statement here: "The only waste management operation at TA-50 authorized under this Permit is container storage. Waste analysis requirements for container storage units at the LANL Facility are described in the facility-wide Waste Analysis Plan in Appendix B of the Los Alamos National Laboratory General Part B Application." [264.13, 270.14(b)(3)]

Attachment F, Closure Plan

Closure Plan General Comments

24. Include in the Closure Plan procedures to comply with all requirements of 40 CFR § 264.112(b) at partial and final closure, including removal or decontamination of all hazardous waste residues from all sources. The necessary elements of 40 CFR § 264.112(b) have not been addressed. For example, detailed descriptions of procedures for removing contaminated soils, criteria for determining extent of contamination, and a detailed description of how closure will satisfy performance standards for all releases from all sources must be included. [264.112, 270.14(b)(13)]

25. P. F-2, sec. F.1.1 and throughout: Replace "may be decontaminated, reclaimed or recycled, or disposed of, as appropriate" with "will either be sampled and determined to be below applicable standards or will be removed or decontaminated to meet applicable standards." Revise the Application throughout to state that at closure of container storage areas hazardous waste and hazardous waste residues will be removed or decontaminated. [264.178, 270.14(b)(13)]

Closure Plan Specific Comments

26. P. F-1, ¶ 3: Replace "meet the closure requirements" with "are intended to meet the closure requirements."

27. P. F-1, ¶ 3: Include a citation to 40 CFR § 264.178. [270.14(b)(13)]

28. P. F-1, ¶ 4: Insert after "Closure will include" "removal or decontamination of all hazardous waste residues and contaminated structures, soil, and groundwater." [264.112, 264.178, 270.14(b)(13)]

29. P. F-1, ¶ 4: Delete "through normal RCRA-regulated container storage operations." Contamination from all sources must be investigated and remediated at closure. [264.112, 264.178, 270.14(b)(13)]

30. P. F-2, sec. F.1: Include a citation to 40 CFR § 264.178. [270.14(b)(13)]

31. P. F-2, sec. F.1.1: Revise the second bullet to include post-closure escape to groundwater. [264.111, 264.112, 270.14(b)(13)]

32. P. F-2, sec. F.1.1, bullet 3: Include "and closure" after "container management." [264.111, 270.14(b)(13)]

33. P. F-2 and F-3, sec. F.1.1 and F.1.2: Address investigation and remediation at closure of contamination from all TA-50 units, not only container storage units, for example from SWMU's or from air emissions. [264.111, 264.112, 270.14(b)(13)]

34. P. F-2, sec. F.1.1: Replace "all equipment . . . recycled, or disposed of" with "removal or decontamination of hazardous waste and hazardous waste residues has been completed in accordance with this Closure Plan, closure performance standards, and the requirements of 40 CFR Subpart G and § 264.178." [264.112, 264.113, 264.178, 270.14(b)(13)]

35. P. F-2, sec. F.1.1: Include a provision for submittal of a Closure Report within 60 days after completion of closure activities and approval of the Report by NMED.

36. P. F-3, sec. F.1.2: Replace "the unit and related equipment . . . as appropriate" with "hazardous waste and hazardous waste residues have been removed or decontaminated." [264.112, 264.113, 264.178, 270.14(b)(13)]

37. P. F-3, sec. F.1.3: Replace "dismantling" with "removing." [264.178, 270.14(b)(13)]

38. P. F-3, sec. F.1. 3: Replace "treatment, removal, or disposal" with "removal or decontamination." [264.178, 270.14(b)(13)]

39. P. F-3, sec. F.1.3, line 9: Insert "storage," before "treatment."

40. P. F-5, sec. F.1.8 and Table F-1: Include a time period of 60 days after completion of closure activities for submittal of the Closure Report.

41. P. F-6, sec. F.1.9: Either identify units at TA-50 subject to post-closure care or delete this section. Post-closure care requirements do not apply to container storage units. [264.117, 264.118, 264.178]

42. P. F-6, sec. F.1.10, item 3: Replace "Decontamination, recycling, removal, and/or disposal" with "Decontamination or removal." [264.112, 264.178, 270.14(b)(13)]

43. P. F-7, sec. F.1.10, item 6: Delete "from the unit (if applicable)." [264.112, 264.178, 270.14(b)(13)]

44. P. F-7 sec. F.1.10, ¶ 4, last sentence: Replace "hazardous and radioactive" with "hazardous and/or radioactive."

45. P. F-8, sec. F.1.10, ¶ 6: "...soil samples will be collected from areas showing evidence of contamination...." In addition, include sampling of areas of potential contamination and areas of deteriorated or failed containment system. [264.112, 264.178, 270.14(b)(13)]

46. P. F-8, sec. F.1.11: Delete the sampling and analytical procedures. Replace with a new sec. F.1.11 providing for submittal for NMED approval of an updated Sampling Plan at least 90 days prior to implementation of partial or final closure to determine levels of contamination at the unit from all sources to demonstrate attainment of closure and other applicable standards, including 40 CFR § 112(b)(4) and (5), using methods in accordance with HWB and EPA guidance. [264.112, 264.178, 270.14(b)(13)]

47. P. F-14, sec. F.1.13: Add language regarding the collection of analytical evidence. As part of the decontamination verification process, collection of analytical samples will be required. Wipe samples or other sampling methods, for example radioactive materials sampling or sand blasting and sampling of the residue, shall be collected from floors, walls, sumps and areas with records or evidence of a release. [264.112, 264.178, 270.14(b)(13)]

48. P. F-15, ¶ 2: Delete items 3, 4, and 5 of the decontamination criteria. Replace with the following: 1) For surfaces such as container storage area floors and walls, submit proposed cleanup standards. 2) For soils, use HWB soil screening, ecological risk, or risk assessment methods as appropriate to calculate cleanup levels as established by NMED or applicable law. 3) For groundwater, use the lower of New Mexico Water Quality Control Commission regulations or Maximum Contaminant Levels under the Safe Drinking Water Act. Do not include technical or administrative control measures. Hazardous waste and residues must be removed or decontaminated at closure. [264.112, 264.178, 270.14(b)(13)]

49. P. F-16, sec. F.2.2; p. F-16, sec. F.3.2; p. F-17, sec. F.4.2; p. F-18, sec. F.5.2: Replace with "At final or partial closure all hazardous waste and residues will be removed or decontaminated in accordance with the requirements of 40 CFR 264 Subpart G and § 264.178, this Closure Plan, and the updated Sampling Plan." [264.112, 264.178, 270.14(b)(13)]

50. P. F-20, last paragraph: The application states that "Records review and visual inspection of the soils along the margins of the WCRRF Outdoor CSA will be used to identify areas where soil contamination from RCRA-regulated waste management activities could have occurred." Insert language providing for collection of samples from the soil surrounding the CSA and in likely accumulation areas (along drainages) in order to confirm the presence or absence of hazardous constituents. [264.112, 264.178, 270.14(b)(13)]

51. Tables F-2 through F-7: Delete. Address in the updated Sampling Plan submitted at the time of partial or final closure required under Comment No. 46 above.

Attachment G, Container Management

52. P. G-2, sec. G.1.2.2 and P. G-5 sec. G.2: Discuss loading and unloading (L/UL) operations. Because the L/UL areas do not have a containment system, discuss how prevention and clean up of accidental spills are handled. For example, does L/UL operations occur during precipitation events, are temporary berms used, and is spill control equipment present during L/UL events? [270.14(b)(8)(i)]

53. P. G-5, sec. G.1.4: Describe the secondary containment pallet and other devices in order to demonstrate the secondary containment capacity of these devices. [264.175, 270.15]

54. P. G-7, sec. G.2.2, ¶2: Delete the paragraph beginning "Because the moisture content is insufficient . . .." The protection of groundwater from container storage areas is dependant on prevention of releases, not on geologic conditions serving as a barrier. High levels of contaminants have been detected at the deepest sampling points submitted to NMED. Depths to perched zones of groundwater are unknown under TA-50. [264.31, 264 Subpart I, 270.14(b)(8), 270.15]

55. P. G-14 through G-18, sec. G.4: For all rooms requiring secondary containment specify the containment capacity and container storage capacity in order to demonstrate sufficient capacities of the containment system. In addition, include the calculations that demonstrate the capacity of the secondary containment systems. [264.175, 270.15]

56. P. G-16, sec. G.4.1.1: The information provided conflicts with what is stated in Chapter 2 of the application. Chapter 2 states that only solid waste (i.e. non liquid bearing) is stored in TA-50-1 Room 59 and TA-50-37 Room 118. Attachment G.4, states that TA-50-37 Room 112 is designated to store solid waste only and that Room 118 may store waste with residual liquids. Please correct this discrepancy. [264.175, 270.15]

57. P. G-15, sec. G.4.1.1; p. G-16, sec. G.4.1.4; p. G-16, sec. G.4.2; p. G-18, Sec. G.4.5: Replace "solid waste" with "waste not containing free liquids" or an equivalent. [264.175, 270.15]

58. P. G-16, sec. G.4.1.4: The secondary containment system does not have 10 percent capacity of the design capacity of 18,000 gallons. [264.175, 270.15]

59. P. G-16, sec. G.4.3: Provide dimensions and calculations for the secondary containment system. Also, provide a description of the secondary containment that demonstrates that it is liquid tight. [264.175, 270.15]

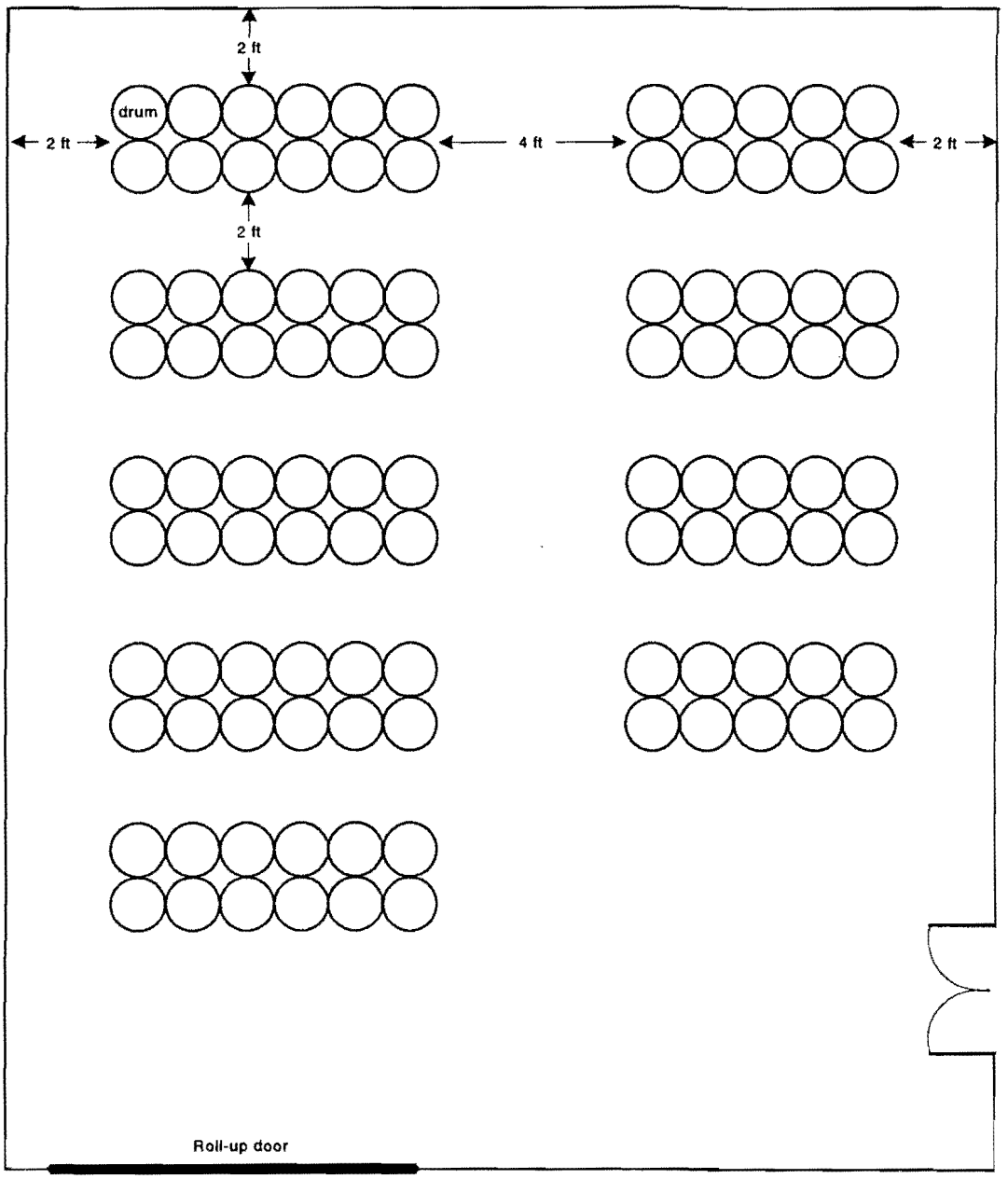
Attachment H, Authorized Waste

60. Update the Part A to include all hazardous waste management units being permitted and to delete all units not being permitted. See the RSI for the General Part A and Part B Permit Application dated June 25, 2001. [270.13]

APPENDIX B

REVISED FIGURE OF TECHNICAL AREA 50, BUILDING 37, ROOM 118

Room 118
TA-50-37 CSA*



Building dimensions:	31 feet x 40 feet (total 1,230 square feet)
Aisle space:	2 feet around each row, 4 feet in center aisle (total 632 square feet)
Drum dimensions:	24 inches in diameter x 35 inches high
Storage capacity:	100 unstacked 55-gallon drums (total 5,500 gallons, 400 square feet)

* Drawing not to scale
For information purposes only

APPENDIX C

ELECTRONIC COPY OF MORTANDAD CANYON AND TEN SITE CANYON DATA SUMMARIES, SEPTEMBER 13, 2001

Mortandad Canyon Down Stream Samples
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Acenaphthene	Sediment	74	3	0.29 to 1.8	3/74
Acetone	Sediment	39	4	0.001 to 0.038	4/39
Anthracene	Sediment	74	1	[0.33 to 0.77]	1/74
Aroclor-1260	Soil	30	3	[0.014 to 0.1]	3/30
Aroclor-1260	Sediment	58	10	[0.016 to 1]	10/58
Benzene	Sediment	39	2	0.001 to [0.006]	2/39
Benzo(a)anthracene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(a)pyrene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(b)fluoranthene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(g,h,i)perylene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(k)fluoranthene	Sediment	74	1	0.2 to [0.77]	1/74
Benzoic Acid	Sediment	74	1	[0.33 to 7.7]	1/74
Bis(2-ethylhexyl)phthalate	Sediment	74	4	0.073 to [0.77]	4/74
Bromodichloromethane	Sediment	39	1	0.004 to [0.006]	1/39
Butanone[2-]	Sediment	39	1	0.014 to [0.024]	1/39
Carbazole	Sediment	34	1	0.23 to [0.77]	1/34
Carbon, Total Organic	Sediment	15	14	[200] to 89000	14/15
Chlordane[alpha-]	Sediment	31	1	[0.0017] to 0.0095	1/31
Chlordane[gamma-]	Sediment	31	1	[0.0017] to 0.014	1/31
Chloromethane	Sediment	39	2	0.002 to [0.012]	2/39
Chrysene	Sediment	74	1	[0.33 to 0.77]	1/74
DDT[4,4'-]	Sediment	31	1	[0.0034] to 0.078	1/31
Di-n-butylphthalate	Sediment	74	1	[0.33 to 0.77]	1/74
Dichlorobenzidine[3,3'-]	Sediment	74	1	[0.33 to 1.5]	1/74
Dichloroethene[cis-1,2-]	Sediment	39	2	0.001 to [0.006]	2/39
Fluoranthene	Sediment	74	2	0.11 to 1.5	2/74
Fluorene	Sediment	74	1	0.24 to [0.77]	1/74
Indeno(1,2,3-cd)pyrene	Sediment	74	1	0.29 to [0.77]	1/74
Isopropyltoluene[4-]	Sediment	39	2	[0.005] to 0.044	2/39
Methylene Chloride	Sediment	39	1	[0.001 to 0.005]	1/39
Naphthalene	Sediment	92	3	0.001 to [0.77]	3/92
Phenanthrene	Sediment	74	2	0.087 to 1.5	2/74
Pyrene	Sediment	74	4	0.1 to 1.4	4/74
Tetrachloroethene	Sediment	39	11	0.001 to [0.006]	11/39
Toluene	Sediment	39	17	0.001 to 0.016	17/39
Trichlorofluoromethane	Soil	18	1	[0.005] to 0.022	1/18
Trichlorofluoromethane	Sediment	39	1	[0.005] to 0.019	1/39
Trimethylbenzene[1,2,4-]	Sediment	39	6	0.001 to 0.026	6/39
Trimethylbenzene[1,3,5-]	Sediment	39	1	[0.005] to 0.0082	1/39
Xylene[1,2-]	Sediment	18	1	0.002 to [0.006]	1/18
Xylene[1,3-]	Sediment	18	9	0.001 to [0.006]	9/18

Mortandad Canyon Down Stream Samples
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Aluminum	Sediment	76	76	1040 to 11000	15400	0/76	0/0
Antimony	Soil	30	2	[0.06] to 0.11	0.83	0/30	0/28
Antimony	Sediment	89	26	[0.06 to 13]	0.83	0/89	11/63
Arsenic	Soil	30	30	0.79 to 5.18	8.17	0/30	0/0
Arsenic	Sediment	103	77	[0.41] to 5.7	3.98	8/103	0/26
Barium	Soil	30	30	7 to 160	295	0/30	0/0
Barium	Sediment	103	103	8.4 to 120	127	0/103	0/0
Beryllium	Soil	30	30	0.12 to 0.83	1.83	0/30	0/0
Beryllium	Sediment	103	76	0.1 to 2	1.31	2/103	0/27
Boron	Sediment	15	0	[28 to 39]	NA	0/15	NA
Cadmium	Soil	30	0	[0.4 to 0.4]	0.4	0/30	0/30
Cadmium	Sediment	103	12	[0.01] to 2.2	0.4	3/103	14/91
Calcium	Sediment	76	76	244 to 51000	4420	10/76	0/0
Chromium, Total	Soil	30	30	0.9 to 7.7	19.3	0/30	0/0
Chromium, Total	Sediment	103	102	1.2 to 140	10.5	18/103	0/1
Cobalt	Sediment	76	61	[0.56] to 6	4.73	1/76	0/15
Copper	Sediment	76	66	[0.17] to 120	11.2	37/76	0/10
Cyanide, Total	Sediment	22	0	[0.51 to 0.78]	0.82	0/22	0/22
Iron	Sediment	76	76	2400 to 14500	13800	3/76	0/0
Lead	Soil	30	29	3 to 70	22.3	5/30	0/1
Lead	Sediment	103	101	2.6 to 50	19.7	5/103	0/2
Magnesium	Sediment	76	76	162 to 2200	2370	0/76	0/0
Manganese	Sediment	76	76	100 to 1200	543	2/76	0/0
Mercury	Sediment	78	53	0.01 to 2.7	0.1	25/78	7/25
Nickel	Soil	30	27	[2] to 7	15.4	0/30	0/3
Nickel	Sediment	103	98	1.1 to 48	9.38	6/103	0/5
Potassium	Soil	2	2	580 to 1000	3460	0/2	0/0
Potassium	Sediment	76	76	181 to 1970	2690	0/76	0/0
Selenium	Soil	30	4	[0.2] to 0.39	1.52	0/30	0/26
Selenium	Sediment	103	32	[0.11 to 1.6]	0.3	28/103	39/71
Silver	Soil	30	0	[1 to 1]	1	0/30	0/30
Silver	Sediment	103	14	[0.03] to 8	1	8/103	14/89
Sodium	Sediment	76	60	18.3 to 720	1470	0/76	0/16
Thallium	Soil	30	23	[0.04] to 0.34	0.73	0/30	0/7
Thallium	Sediment	103	27	0.03 to 1.6	0.73	2/103	2/76
Total Uranium by ICPMS	Sediment	15	15	0.37 to 4.14	2.22	3/15	0/0
Vanadium	Sediment	76	76	2.2 to 16.4	19.7	0/76	0/0
Zinc	Sediment	76	76	15.2 to 77	60.2	3/76	0/0

Mortandad Canyon Down Stream Samples
Frequency of Detected Radionuclides

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background Value (pCi/g)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Americium-241	Soil	30	2	[2.63] to 18.221	0.013	2/30	28/28
Americium-241	Sediment	87	64	[-0.01] to 642	0.04	64/87	15/23
Cesium-134	Sediment	62	1	[-0.19 to 0.46]	NA	1/62	NA
Cesium-137	Soil	30	21	[0.454] to 203.02	1.65	21/30	1/9
Cesium-137	Sediment	87	79	[-0.039] to 2530	0.9	74/87	1/8
Cobalt-60	Soil	30	5	[0.177] to 2.4397	NA	5/30	NA
Cobalt-60	Sediment	87	36	[-0.14] to 5.22	NA	36/87	NA
Europium-152	Sediment	62	1	[-1.7 to 2.9]	NA	1/62	NA
Gross Alpha Radiation	Sediment	1	1	1.32 to 1.32	NA	1/1	NA
Gross Beta Radiation	Sediment	1	1	1.41 to 1.41	NA	1/1	NA
Gross Gamma Radiation	Sediment	1	1	1.9 to 1.9	NA	1/1	NA
Plutonium-238	Soil	30	24	[0.004] to 9.513	0.023	24/30	1/6
Plutonium-238	Sediment	104	91	[-0.0017] to 88.7	0.006	91/104	5/13
Plutonium-239	Soil	30	28	[0.018] to 17.555	0.054	28/30	1/2
Plutonium-239	Sediment	104	98	[0.005] to 1110	0.068	93/104	0/6
Ruthenium-106	Sediment	60	0	[-3.8 to 2.5]	NA	0/60	NA
Sodium-22	Sediment	62	4	[-0.054] to 0.65	NA	4/62	NA
Strontium-90	Soil	30	14	[0.02] to 5.14	1.31	14/30	1/16
Strontium-90	Sediment	79	60	[-0.1] to 273	1.04	57/79	4/19
Tritium	Soil	30	30	0.13073 to 19.66192	NA	30/30	NA
Tritium	Sediment	52	47	[2.890529E-04] to 105.0239	0.093	44/52	0/5
Uranium-234	Soil	30	30	0.68 to 5.608	2.59	8/30	0/0
Uranium-234	Sediment	76	71	0.33 to 16.04	2.59	3/76	0/5
Uranium-235	Soil	30	3	[0.028] to 0.315	0.2	3/30	2/27
Uranium-235	Sediment	104	50	[-0.18] to 0.683	0.2	9/104	7/54
Uranium-238	Soil	30	30	0.758 to 7.125	2.29	8/30	0/0
Uranium-238	Sediment	76	70	0.257 to 2.349	2.29	1/76	0/6

Mortandad Canyon Up Stream Samples
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Aroclor-1260	Sediment	17	1	[0.038 to 0.31]	1/17
Total Organic Carbon	Sediment	17	17	1700 to 60000	17/17

Mortandad Canyon Up Stream Samples
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Aluminum	Sediment	17	17	2700 to 26000	15400	6/17	0/0
Antimony	Sediment	2	0	[11 to 12]	0.83	0/2	2/2
Arsenic	Sediment	17	13	[2.3] to 11	3.98	9/17	0/4
Barium	Sediment	17	17	36 to 270	127	7/17	0/0
Beryllium	Sediment	17	9	[0.57] to 2.4	1.31	3/17	0/8
Boron	Sediment	17	0	[29 to 60]	NA	0/17	NA
Cadmium	Sediment	17	0	[0.57 to 1.2]	0.4	0/17	17/17
Calcium	Sediment	17	17	1000 to 4400	4420	0/17	0/0
Chromium, Total	Sediment	17	17	3.9 to 30	10.5	9/17	0/0
Cobalt	Sediment	17	17	1.7 to 12	4.73	7/17	0/0
Copper	Sediment	17	17	3.1 to 20	11.2	7/17	0/0
Cyanide, Total	Sediment	17	0	[0.57 to 1.2]	0.82	0/17	4/17
Iron	Sediment	17	17	6400 to 25000	13800	7/17	0/0
Lead	Sediment	17	17	8.6 to 30	19.7	7/17	0/0
Magnesium	Sediment	17	17	450 to 3400	2370	5/17	0/0
Manganese	Sediment	17	17	220 to 2500	543	7/17	0/0
Mercury	Sediment	17	0	[0.11 to 0.24]	0.1	0/17	17/17
Nickel	Sediment	17	15	[2.9] to 11	9.38	6/17	0/2
Potassium	Sediment	17	17	280 to 2500	2690	0/17	0/0
Selenium	Sediment	17	0	[1.1 to 2.4]	0.3	0/17	17/17
Silver	Sediment	17	0	[2.3 to 4.8]	1	0/17	17/17
Sodium	Sediment	17	17	69 to 330	1470	0/17	0/0
Thallium	Sediment	17	0	[0.29 to 0.6]	0.73	0/17	0/17
Vanadium	Sediment	17	17	5.9 to 37	19.7	6/17	0/0
Zinc	Sediment	17	17	38 to 110	60.2	10/17	0/0

Mortandad Canyon Up Stream Samples
Frequency of Detected Radionuclides

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background Value (pCi/g)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Americium-241	Sediment	17	4	[-0.003] to 0.252	0.04	4/17	0/13
Cesium-134	Sediment	17	0	[-0.083 to 0.063]	NA	0/17	NA
Cesium-137	Sediment	17	9	[0.003] to 2.14	0.9	2/17	0/8
Cobalt-60	Sediment	17	0	[-0.14 to 0.117]	NA	0/17	NA
Europium-152	Sediment	17	0	[-0.12 to 0.15]	NA	0/17	NA
Plutonium-238	Sediment	17	10	[-0.0026] to 0.099	0.006	10/17	5/7
Plutonium-239	Sediment	17	7	[0.0094] to 5.28	0.068	4/17	0/10
Ruthenium-106	Sediment	17	0	[-0.48 to 0.75]	NA	0/17	NA
Sodium-22	Sediment	17	0	[-0.089 to 0.07]	NA	0/17	NA
Strontium-90	Sediment	17	0	[-0.19 to 0.34]	1.04	0/17	0/17
Tritium	Sediment	17	4	[0 to 0.16]	0.093	2/17	2/13
Uranium-234	Sediment	17	17	0.407 to 2.41	2.59	0/17	0/0
Uranium-235	Sediment	17	16	[0.0224] to 0.118	0.2	0/17	0/1
Uranium-238	Sediment	17	17	0.376 to 2.65	2.29	1/17	0/0

Tensite Canyon
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Acenaphthene	Sediment	125	2	0.075 to [12]	2/125
Acetone	Soil	9	1	[0.005 to 0.02]	1/9
Acetone	Sediment	104	11	[0.01 to 0.08]	11/104
Anthracene	Sediment	125	2	0.083 to [12]	2/125
Aroclor-1254	Sediment	88	1	[0.033] to 6	1/88
Aroclor-1260	Sediment	88	26	[0.033] to 1.52	26/88
Benzo(a)anthracene	Soil	9	1	0.084 to [0.4]	1/9
Benzo(a)anthracene	Sediment	125	10	[0.33 to 12]	10/125
Benzo(a)pyrene	Soil	9	1	0.14 to [0.4]	1/9
Benzo(a)pyrene	Sediment	125	13	[0.33 to 12]	13/125
Benzo(b)fluoranthene	Soil	9	1	0.11 to [0.4]	1/9
Benzo(b)fluoranthene	Sediment	125	12	[0.33 to 12]	12/125
Benzo(g,h,i)perylene	Soil	9	1	0.12 to [0.4]	1/9
Benzo(g,h,i)perylene	Sediment	125	8	0.31 to [12]	8/125
Benzo(k)fluoranthene	Soil	9	1	0.12 to [0.4]	1/9
Benzo(k)fluoranthene	Sediment	125	9	0.25 to [12]	9/125
Bis(2-ethylhexyl)phthalate	Sediment	125	5	0.046 to [12]	5/125
Butylbenzylphthalate	Sediment	125	1	[0.33 to 12]	1/125
Chrysene	Soil	9	1	0.14 to [0.4]	1/9
Chrysene	Sediment	125	13	[0.33 to 12]	13/125
Di-n-butylphthalate	Soil	9	3	[0.33] to 1.8	3/9
Di-n-butylphthalate	Sediment	125	27	0.052 to [12]	27/125
Dibenz(a,h)anthracene	Soil	9	1	0.047 to [0.4]	1/9
Dibenz(a,h)anthracene	Sediment	125	1	0.27 to [12]	1/125
Fluoranthene	Soil	9	1	0.19 to [0.4]	1/9
Fluoranthene	Sediment	125	20	[0.33 to 12]	20/125
Fluorene	Sediment	125	1	[0.33 to 12]	1/125
Hexanone[2-]	Sediment	104	1	[0.01 to 0.08]	1/104
Indeno(1,2,3-cd)pyrene	Soil	9	1	0.098 to [0.4]	1/9
Indeno(1,2,3-cd)pyrene	Sediment	125	4	[0.33 to 12]	4/125
Lubricant Range Organics	Soil	1	1	99 to 99	1/1
Lubricant Range Organics	Sediment	1	1	150 to 150	1/1
Methylene Chloride	Soil	9	1	[0.005 to 0.023]	1/9
Methylene Chloride	Sediment	104	4	[0.005 to 0.02]	4/104
Phenanthrene	Soil	9	1	0.078 to [0.4]	1/9
Phenanthrene	Sediment	125	12	[0.33 to 12]	12/125
Pyrene	Soil	9	1	0.22 to [0.4]	1/9
Pyrene	Sediment	125	25	0.16 to [12]	25/125
Toluene	Sediment	104	2	[0.005] to 0.022	2/104

Ten Site Canyon
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Aluminum	Sediment	20	20	1260 to 10500	15400	0/20	0/0
Antimony	Soil	8	1	0.48 to [11.2]	0.83	0/8	7/7
Antimony	Sediment	124	18	[0.04 to 11.2]	0.83	0/124	64/106
Arsenic	Soil	8	8	1 to 3.6	8.17	0/8	0/0
Arsenic	Sediment	124	124	0.76 to 4.7	3.98	2/124	0/0
Barium	Soil	8	8	17 to 97.5	295	0/8	0/0
Barium	Sediment	124	124	16.6 to 230	127	4/124	0/0
Beryllium	Soil	8	8	0.3 to 0.8	1.83	0/8	0/0
Beryllium	Sediment	124	119	0.15 to 2.7	1.31	2/124	0/5
Cadmium	Soil	8	4	0.4 to 1.7	0.4	3/8	4/4
Cadmium	Sediment	124	26	[0.01] to 1.4	0.4	22/124	60/98
Calcium	Sediment	20	20	378 to 3070	4420	0/20	0/0
Chromium, Total	Soil	8	8	1.2 to 5.6	19.3	0/8	0/0
Chromium, Total	Sediment	124	124	1.3 to 20	10.5	1/124	0/0
Cobalt	Sediment	20	20	1.1 to 5.9	4.73	3/20	0/0
Copper	Sediment	20	20	3 to 119	11.2	8/20	0/0
Iron	Sediment	20	20	3210 to 28800	13800	3/20	0/0
Lead	Soil	8	8	5.8 to 15.4	22.3	0/8	0/0
Lead	Sediment	124	123	3.1 to 44	19.7	9/124	0/1
Magnesium	Sediment	20	20	269 to 1760	2370	0/20	0/0
Manganese	Sediment	20	20	113 to 414	543	0/20	0/0
Mercury	Soil	8	1	[0.02 to 0.1]	0.1	0/8	0/7
Mercury	Sediment	124	34	0.01 to 2	0.1	2/124	0/90
Nickel	Soil	8	7	2.6 to 5.6	15.4	0/8	0/1
Nickel	Sediment	124	103	1.4 to 58.9	9.38	4/124	0/21
Potassium	Sediment	20	20	189 to 1300	2690	0/20	0/0
Selenium	Soil	8	1	0.4 to [3]	1.52	0/8	1/7
Selenium	Sediment	124	25	[0.2 to 3]	0.3	22/124	61/99
Silver	Soil	8	1	1 to [1.4]	1	0/8	7/7
Silver	Sediment	124	9	[0.03] to 33	1	5/124	62/115
Sodium	Sediment	20	20	26.8 to 372	1470	0/20	0/0
Thallium	Soil	8	1	0.45 to [1]	0.73	0/8	7/7
Thallium	Sediment	124	19	[0.04] to 2.3	0.73	2/124	62/105
Vanadium	Sediment	20	20	3.5 to 25.9	19.7	3/20	0/0
Zinc	Sediment	20	20	15.7 to 94	60.2	3/20	0/0

Tensite Canyon
Frequency of Detected Radionuclides

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background Value (pCi/g)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Americium-241	Soil	9	1	[0.041 to 8.65]	0.013	1/9	8/8
Americium-241	Sediment	125	42	[-0.21] to 170.9	0.04	40/125	73/83
Cesium-134	Sediment	22	0	[-0.087 to 0.3]	NA	0/22	NA
Cesium-137	Soil	9	4	[0.106] to 1.7296	1.65	4/9	0/5
Cesium-137	Sediment	125	40	[-0.016] to 72.83	0.9	26/125	3/85
Cobalt-60	Soil	9	0	[-0.042 to 0.8993]	NA	0/9	NA
Cobalt-60	Sediment	125	4	[-0.07] to 1.2991	NA	4/125	NA
Europium-152	Soil	1	0	[0.051 to 0.051]	NA	0/1	NA
Europium-152	Sediment	23	0	[-0.16 to 0.58]	NA	0/23	NA
Plutonium-238	Soil	10	7	[0.003] to 2.523	0.023	7/10	0/3
Plutonium-238	Sediment	131	122	[0.009] to 5190	0.006	122/131	9/9
Plutonium-239	Soil	10	9	[0.009] to 3.99	0.054	9/10	0/1
Plutonium-239	Sediment	131	121	[0.002] to 453	0.068	109/131	0/10
Ruthenium-106	Soil	1	0	[-0.081 to -0.081]	NA	0/1	NA
Ruthenium-106	Sediment	21	0	[-1.6 to 1.2]	NA	0/21	NA
Sodium-22	Soil	1	0	[0.059 to 0.059]	NA	0/1	NA
Sodium-22	Sediment	23	0	[-0.13 to 0.22]	NA	0/23	NA
Strontium-90	Soil	8	0	[-0.42 to 0.54]	1.31	0/8	0/8
Strontium-90	Sediment	124	14	[-0.72] to 57.7	1.04	13/124	0/110
Tritium	Soil	8	8	0.02343 to 0.10213	NA	8/8	NA
Tritium	Sediment	124	95	[-0.009] to 19.12347	0.093	41/124	0/29
Uranium-234	Soil	10	8	[1.108] to 2.468	2.59	0/10	0/2
Uranium-234	Sediment	131	124	0.249 to 5.295	2.59	2/131	0/7
Uranium-235	Soil	10	1	[0.033] to 0.255	0.2	1/10	0/9
Uranium-235	Sediment	131	17	[0.014 to 0.187]	0.2	0/131	0/114
Uranium-238	Soil	10	8	[1.137] to 3.006	2.29	4/10	0/2
Uranium-238	Sediment	131	124	0.27 to 3.049	2.29	9/131	0/7

APPENDIX D

HARDCOPIES OF MORTANDAD CANYON DOWN STREAM AND UP STREAM SAMPLES: FREQUENCY OF DETECTED INORGANIC AND ORGANIC CHEMICALS AND RADIONUCLIDES

Mortandad Cany. Down Stream Samples
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Aluminum	Sediment	76	76	1040 to 11000	15400	0/76	0/0
Antimony	Soil	30	2	[0.06] to 0.11	0.83	0/30	0/28
Antimony	Sediment	89	26	[0.06 to 13]	0.83	0/89	11/63
Arsenic	Soil	30	30	0.79 to 5.18	8.17	0/30	0/0
Arsenic	Sediment	103	77	[0.41] to 5.7	3.98	8/103	0/26
Barium	Soil	30	30	7 to 160	295	0/30	0/0
Barium	Sediment	103	103	8.4 to 120	127	0/103	0/0
Beryllium	Soil	30	30	0.12 to 0.83	1.83	0/30	0/0
Beryllium	Sediment	103	76	0.1 to 2	1.31	2/103	0/27
Boron	Sediment	15	0	[28 to 39]	NA	0/15	NA
Cadmium	Soil	30	0	[0.4 to 0.4]	0.4	0/30	0/30
Cadmium	Sediment	103	12	[0.01] to 2.2	0.4	3/103	14/91
Calcium	Sediment	76	76	244 to 51000	4420	10/76	0/0
Chromium, Total	Soil	30	30	0.9 to 7.7	19.3	0/30	0/0
Chromium, Total	Sediment	103	102	1.2 to 140	10.5	18/103	0/1
Cobalt	Sediment	76	61	[0.56] to 6	4.73	1/76	0/15
Copper	Sediment	76	66	[0.17] to 120	11.2	37/76	0/10
Cyanide, Total	Sediment	22	0	[0.51 to 0.78]	0.82	0/22	0/22
Iron	Sediment	76	76	2400 to 14500	13800	3/76	0/0
Lead	Soil	30	29	3 to 70	22.3	5/30	0/1
Lead	Sediment	103	101	2.6 to 50	19.7	5/103	0/2
Magnesium	Sediment	76	76	162 to 2200	2370	0/76	0/0
Manganese	Sediment	76	76	100 to 1200	543	2/76	0/0
Mercury	Sediment	78	53	0.01 to 2.7	0.1	25/78	7/25
Nickel	Soil	30	27	[2] to 7	15.4	0/30	0/3
Nickel	Sediment	103	98	1.1 to 48	9.38	6/103	0/5
Potassium	Soil	2	2	580 to 1000	3460	0/2	0/0
Potassium	Sediment	76	76	181 to 1970	2690	0/76	0/0
Selenium	Soil	30	4	[0.2] to 0.39	1.52	0/30	0/26
Selenium	Sediment	103	32	[0.11 to 1.6]	0.3	28/103	39/71

Mortandad Canyon Down Stream Samples
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Silver	Soil	30	0	[1 to 1]	1	0/30	0/30
Silver	Sediment	103	14	[0.03] to 8	1	8/103	14/89
Sodium	Sediment	76	60	18.3 to 720	1470	0/76	0/16
Thallium	Soil	30	23	[0.04] to 0.34	0.73	0/30	0/7
Thallium	Sediment	103	27	0.03 to 1.6	0.73	2/103	2/76
Total Uranium by ICPMS	Sediment	15	15	0.37 to 4.14	2.22	3/15	0/0
Vanadium	Sediment	76	76	2.2 to 16.4	19.7	0/76	0/0
Zinc	Sediment	76	76	15.2 to 77	60.2	3/76	0/0

Mortandad Canyon Down Stream Samples
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Acenaphthene	Sediment	74	3	0.29 to 1.8	3/74
Acetone	Sediment	39	4	0.001 to 0.038	4/39
Anthracene	Sediment	74	1	[0.33 to 0.77]	1/74
Aroclor-1260	Soil	30	3	[0.014 to 0.1]	3/30
Aroclor-1260	Sediment	58	10	[0.016 to 1]	10/58
Benzene	Sediment	39	2	0.001 to [0.006]	2/39
Benzo(a)anthracene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(a)pyrene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(b)fluoranthene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(g,h,i)perylene	Sediment	74	1	[0.33 to 0.77]	1/74
Benzo(k)fluoranthene	Sediment	74	1	0.2 to [0.77]	1/74
Benzoic Acid	Sediment	74	1	[0.33 to 7.7]	1/74
Bis(2-ethylhexyl)phthalate	Sediment	74	4	0.073 to [0.77]	4/74
Bromodichloromethane	Sediment	39	1	0.004 to [0.006]	1/39
Butanone[2-]	Sediment	39	1	0.014 to [0.024]	1/39
Carbazole	Sediment	34	1	0.23 to [0.77]	1/34
Carbon, Total Organic	Sediment	15	14	[200] to 89000	14/15
Chlordane[alpha-]	Sediment	31	1	[0.0017] to 0.0095	1/31
Chlordane[gamma-]	Sediment	31	1	[0.0017] to 0.014	1/31
Chloromethane	Sediment	39	2	0.002 to [0.012]	2/39
Chrysene	Sediment	74	1	[0.33 to 0.77]	1/74
DDT[4,4'-]	Sediment	31	1	[0.0034] to 0.078	1/31
Di-n-butylphthalate	Sediment	74	1	[0.33 to 0.77]	1/74
Dichlorobenzidine[3,3'-]	Sediment	74	1	[0.33 to 1.5]	1/74
Dichloroethene[cis-1,2-]	Sediment	39	2	0.001 to [0.006]	2/39
Fluoranthene	Sediment	74	2	0.11 to 1.5	2/74
Fluorene	Sediment	74	1	0.24 to [0.77]	1/74
Indeno(1,2,3-cd)pyrene	Sediment	74	1	0.29 to [0.77]	1/74
Isopropyltoluene[4-]	Sediment	39	2	[0.005] to 0.044	2/39
Methylene Chloride	Sediment	39	1	[0.001 to 0.005]	1/39

Mortandad Canyon Down Stream Samples
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Naphthalene	Sediment	92	3	0.001 to [0.77]	3/92
Phenanthrene	Sediment	74	2	0.087 to 1.5	2/74
Pyrene	Sediment	74	4	0.1 to 1.4	4/74
Tetrachloroethene	Sediment	39	11	0.001 to [0.006]	11/39
Toluene	Sediment	39	17	0.001 to 0.016	17/39
Trichlorofluoromethane	Soil	18	1	[0.005] to 0.022	1/18
Trichlorofluoromethane	Sediment	39	1	[0.005] to 0.019	1/39
Trimethylbenzene[1,2,4-]	Sediment	39	6	0.001 to 0.026	6/39
Trimethylbenzene[1,3,5-]	Sediment	39	1	[0.005] to 0.0082	1/39
Xylene[1,2-]	Sediment	18	1	0.002 to [0.006]	1/18
Xylene[1,3-]	Sediment	18	9	0.001 to [0.006]	9/18

Mortandad Can, Down Stream Samples
Frequency of Detected Radionuclides

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background Value (pCi/g)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Americium-241	Soil	30	2	[2.63] to 18.221	0.013	2/30	28/28
Americium-241	Sediment	87	64	[-0.01] to 642	0.04	64/87	15/23
Cesium-134	Sediment	62	1	[-0.19 to 0.46]	NA	1/62	NA
Cesium-137	Soil	30	21	[0.454] to 203.02	1.65	21/30	1/9
Cesium-137	Sediment	87	79	[-0.039] to 2530	0.9	74/87	1/8
Cobalt-60	Soil	30	5	[0.177] to 2.4397	NA	5/30	NA
Cobalt-60	Sediment	87	36	[-0.14] to 5.22	NA	36/87	NA
Europium-152	Sediment	62	1	[-1.7 to 2.9]	NA	1/62	NA
Gross Alpha Radiation	Sediment	1	1	1.32 to 1.32	NA	1/1	NA
Gross Beta Radiation	Sediment	1	1	1.41 to 1.41	NA	1/1	NA
Gross Gamma Radiation	Sediment	1	1	1.9 to 1.9	NA	1/1	NA
Plutonium-238	Soil	30	24	[0.004] to 9.513	0.023	24/30	1/6
Plutonium-238	Sediment	104	91	[-0.0017] to 88.7	0.006	91/104	5/13
Plutonium-239	Soil	30	28	[0.018] to 17.555	0.054	28/30	1/2
Plutonium-239	Sediment	104	98	[0.005] to 1110	0.068	93/104	0/6
Ruthenium-106	Sediment	60	0	[-3.8 to 2.5]	NA	0/60	NA
Sodium-22	Sediment	62	4	[-0.054] to 0.65	NA	4/62	NA
Strontium-90	Soil	30	14	[0.02] to 5.14	1.31	14/30	1/16
Strontium-90	Sediment	79	60	[-0.1] to 273	1.04	57/79	4/19
Tritium	Soil	30	30	0.13073 to 19.66192	NA	30/30	NA
Tritium	Sediment	52	47	[2.890529E-04] to 105.0239	0.093	44/52	0/5
Uranium-234	Soil	30	30	0.68 to 5.608	2.59	8/30	0/0
Uranium-234	Sediment	76	71	0.33 to 16.04	2.59	3/76	0/5
Uranium-235	Soil	30	3	[0.028] to 0.315	0.2	3/30	2/27
Uranium-235	Sediment	104	50	[-0.18] to 0.683	0.2	9/104	7/54
Uranium-238	Soil	30	30	0.758 to 7.125	2.29	8/30	0/0
Uranium-238	Sediment	76	70	0.257 to 2.349	2.29	1/76	0/6

Mortandad Ca Up Stream Samples
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Aluminum	Sediment	17	17	2700 to 26000	15400	6/17	0/0
Antimony	Sediment	2	0	[11 to 12]	0.83	0/2	2/2
Arsenic	Sediment	17	13	[2.3] to 11	3.98	9/17	0/4
Barium	Sediment	17	17	36 to 270	127	7/17	0/0
Beryllium	Sediment	17	9	[0.57] to 2.4	1.31	3/17	0/8
Boron	Sediment	17	0	[29 to 60]	NA	0/17	NA
Cadmium	Sediment	17	0	[0.57 to 1.2]	0.4	0/17	17/17
Calcium	Sediment	17	17	1000 to 4400	4420	0/17	0/0
Chromium, Total	Sediment	17	17	3.9 to 30	10.5	9/17	0/0
Cobalt	Sediment	17	17	1.7 to 12	4.73	7/17	0/0
Copper	Sediment	17	17	3.1 to 20	11.2	7/17	0/0
Cyanide, Total	Sediment	17	0	[0.57 to 1.2]	0.82	0/17	4/17
Iron	Sediment	17	17	6400 to 25000	13800	7/17	0/0
Lead	Sediment	17	17	8.6 to 30	19.7	7/17	0/0
Magnesium	Sediment	17	17	450 to 3400	2370	5/17	0/0
Manganese	Sediment	17	17	220 to 2500	543	7/17	0/0
Mercury	Sediment	17	0	[0.11 to 0.24]	0.1	0/17	17/17
Nickel	Sediment	17	15	[2.9] to 11	9.38	6/17	0/2
Potassium	Sediment	17	17	280 to 2500	2690	0/17	0/0
Selenium	Sediment	17	0	[1.1 to 2.4]	0.3	0/17	17/17
Silver	Sediment	17	0	[2.3 to 4.8]	1	0/17	17/17
Sodium	Sediment	17	17	69 to 330	1470	0/17	0/0
Thallium	Sediment	17	0	[0.29 to 0.6]	0.73	0/17	0/17
Vanadium	Sediment	17	17	5.9 to 37	19.7	6/17	0/0
Zinc	Sediment	17	17	38 to 110	60.2	10/17	0/0

Mortandad Canyon Up Stream Samples
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Aroclor-1260	Sediment	17	1	[0.038 to 0.31]	1/17
Total Organic Carbon	Sediment	17	17	1700 to 60000	17/17

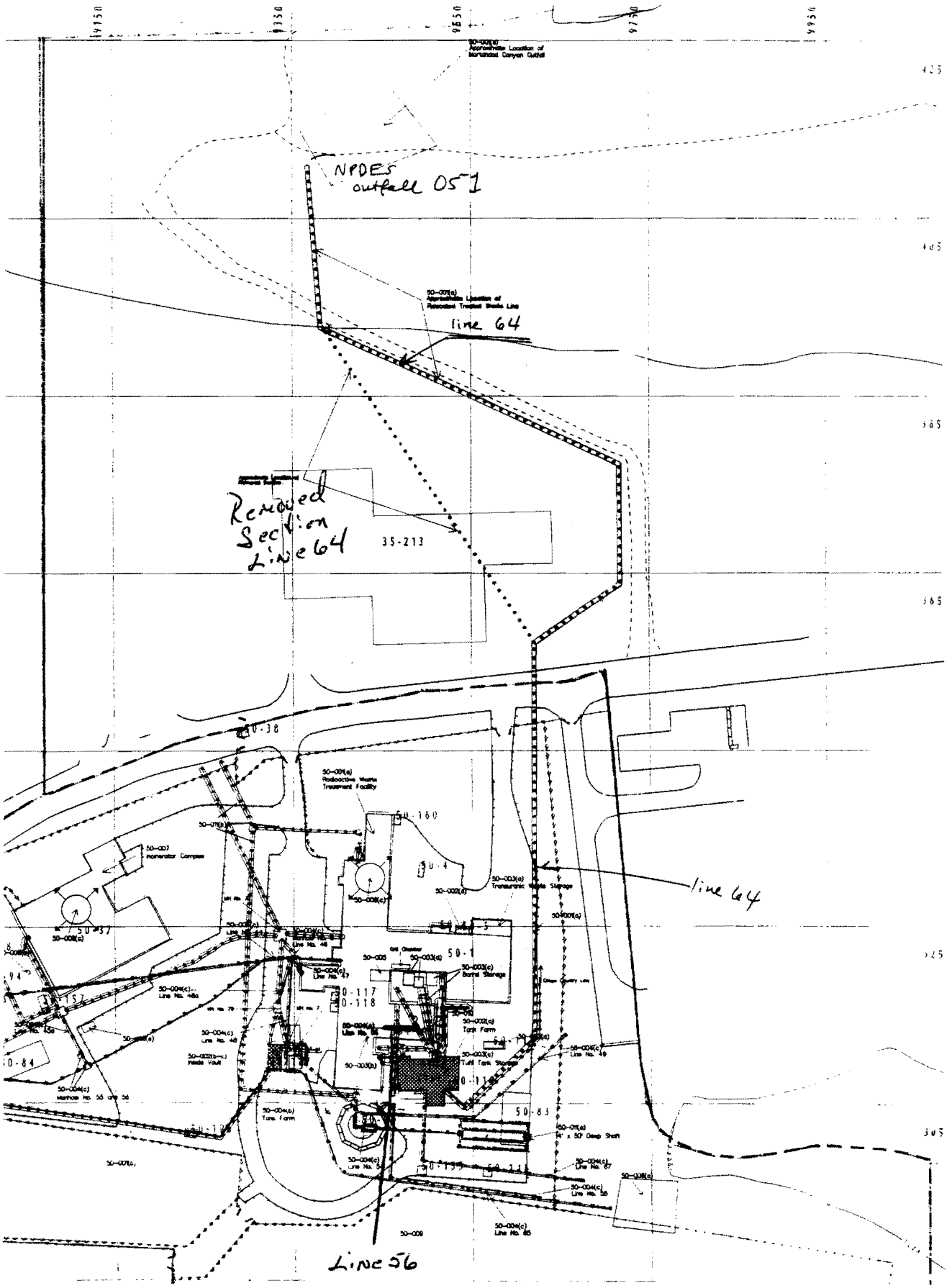
Mortandad Canyon Up Stream Samples
Frequency of Detected Radionuclides

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background Value (pCi/g)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Americium-241	Sediment	17	4	[-0.003] to 0.252	0.04	4/17	0/13
Cesium-134	Sediment	17	0	[-0.083 to 0.063]	NA	0/17	NA
Cesium-137	Sediment	17	9	[0.003] to 2.14	0.9	2/17	0/8
Cobalt-60	Sediment	17	0	[-0.14 to 0.117]	NA	0/17	NA
Europium-152	Sediment	17	0	[-0.12 to 0.15]	NA	0/17	NA
Plutonium-238	Sediment	17	10	[-0.0026] to 0.099	0.006	10/17	5/7
Plutonium-239	Sediment	17	7	[0.0094] to 5.28	0.068	4/17	0/10
Ruthenium-106	Sediment	17	0	[-0.48 to 0.75]	NA	0/17	NA
Sodium-22	Sediment	17	0	[-0.089 to 0.07]	NA	0/17	NA
Strontium-90	Sediment	17	0	[-0.19 to 0.34]	1.04	0/17	0/17
Tritium	Sediment	17	4	[0 to 0.16]	0.093	2/17	2/13
Uranium-234	Sediment	17	17	0.407 to 2.41	2.59	0/17	0/0
Uranium-235	Sediment	17	16	[0.0224] to 0.118	0.2	0/17	0/1
Uranium-238	Sediment	17	17	0.376 to 2.65	2.29	1/17	0/0

APPENDIX E

MAP SHOWING WASTE LINES 56 AND 64 AT TECHNICAL AREA 50

)U-1147 SWMUs with OUPL Data



APPENDIX F

COPY OF INTERIM ACTION REPORT: REMOVAL OF HUMMOCK LOCATED IN TEN-SITE CANYON AS PART OF PRS 50-006(a)

INTERIM ACTION REPORT
REMOVAL OF HUMMOCK LOCATED IN TEN-SITE CANYON
AS PART OF PRS 50-006(a)

1.0 Introduction

The Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project has completed the interim action (IA) described as the removal of the hummock located at TA-50 in Ten Site Canyon. In executing this IA the recommended cleanup level was achieved. This report is for the purpose of documenting the status of this IA and recommending transfer of the cleaned area to Field Unit 4 for the final remedy.

This interim action was not intended as a final cleanup of the radioactively contaminated sediments in Ten Site Canyon. The Phase 2 investigation of this canyon PRS and any permanent remedy or recommendation for no further action will come as part of the "Canyons Study" under ER Field Unit 4.

Potential release site 50-006(a) comprises the sites of two accidental releases of untreated radioactive wastes and unknown chemicals at TA-50, in July and September, 1974, to the head of Ten Site Canyon. The earlier Phase 1 investigation described in the RFI Work Plan for OU1147 (TA-50), Ten Site Canyon, included soil sampling of the drainage leading from the southeast corner of the pavement at TA-50. Three sediment samples were collected from the drainage that showed elevated concentration of plutonium isotopes. Because of the elevated plutonium concentration taken from this localized area, the hummock, the NM Environment Department requested in a letter dated August 19, 1996 that this radioactively contaminated hummock be removed. The Laboratory recognized that removal of the radioactively contaminated sediments from this localized area in the canyon bottom would preclude further dissemination of these sediments downstream by storm water runoff, thus removing a potential source of downstream contamination. An IA plan, titled Interim Action Plan for Hummock Located in Ten-Site Canyon as Part of PRS 50-006(a), was developed and executed for removal of the sediments.

2.0 Interim Action

The IA Plan called for manually removing a small volume of contaminated sediments and part of a rotten log from the side of the stream channel, both of which make up the hummock. Three trips (Nov. 8, Nov. 14, and Nov. 27, 1996) were made to the hummock area for purposes of removal. Using pick, shovel, and lined plastic buckets, a total of 0.72 cu. yd. of radioactively contaminated soil was removed from the hummock area and transported by rope and pulley to the top of the canyon. The removed soils were temporarily stored in 1-55 gal drum and 3-30 gal drums at a marked site on the north slope of Ten Site Canyon.

Photographs of the cleanup activities are included in Annex I.

3.0 Monitoring and Confirmatory Sampling

The plan called for excavation until a surface alpha meter (Ludlum Model 135) showed a count of 50 cpm or lower. The 50 cpm field screening measurement was used as an indicator that the interim cleanup level had been achieved. Because of the moisture present in the area, alpha measurements did not accurately reflect alpha contamination at the site. As a consequence, although the field screening instruments indicated that surface soils contained less than 50 cpm,

upon returning to the Lab, drying and counting the samples in the Berthold LB 770 ten-channel low-level counter, the surface soil samples taken on Nov 8, and Nov 14, 1996 were above the cleanup levels.

The soil samples taken after the third removal effort on Nov 27, 1996, exhibited 23.4 pCi/g average gross alpha and 11.2 pCi/g average gross beta, indicating interim action clean-up level had been attained. The final gross alpha/beta measurements for the soil samples taken after this third removal are included in Annex II.

4.0 Waste Management

All of the waste material removed was disposed of at TA-54 Area G on February 12, 1997.

5.0 Cost and Schedule

The estimated time to execute the cleanup of the hummock was one day ; however, because of the moisture in the area and the inability to determine that the cleanup level had been achieved using field screening instruments, it was necessary to return to the site two additional times, remove contaminated soils, and take confirmation samples for count on the Berthold LB 770.

The cleanup was accomplished in 3 days. The hummock cleanup was completed on Nov 27, 1996; waste was disposed on February 12, 1997.

The estimated cost of the cleanup was $ 9.3K; actual cost of the cleanup was $13.5K .

Annexes

Annex I: Photographs of the hummock cleanup
Annex II: Gross alpha/beta concentrations

Annex 1

Top: Transporting removed soil to canyon rim using rope/pulley system.
Bottom: Rad monitoring of removed soil.

Top: View of Hummock exclusion zone in Ten Site Canyon. View from east looking west (upstream).
Bottom: Yellow flags mark locations of conformation samples.

Top: Shoveling contaminated soil from Hummock.
Bottom: Packaging of contaminated soil in plastic lined transport bucket.

11-27-96 Berthold LB770 Control System: LB770 1 Page: 1
13:18 S A M P L E M E A S U R E M E N T

Comment: Run by Jody Armijo
LB770 Number 1 User File: BACKGROUND Sample Data File: NONE
Sample Set: Hummock Mode: Alpha/Beta
HV-Meas.Counter [V] = 1693 HV-Guard Counter [V] = 1700
Statistical Error Definition: 1 standard deviation(s)

Category List [pCi/g]:

Category	Alpha Low	Alpha High	Beta Low	Beta High
1	0.000	20.0	0.000	20.0
2	20.0	100.0	20.0	100.0
3	100.0		100.0	

Hummock
11/27/96
Samples 41-60

	1	2	3	4	5	6	7	8	9	10
BG Alpha [cpm]	0.983	0.783	1.18	0.783	0.867	1.00	0.850	0.917	0.983	0.833
BG Beta [cpm]	12.8	11.6	10.9	11.5	10.4	11.9	12.9	11.8	13.0	12.6
Eff. Alpha	0.058	0.057	0.062	0.053	0.059	0.043	0.044	0.044	0.049	0.056
Eff. Beta	0.100	0.088	0.125	0.121	0.193	0.137	0.158	0.160	0.149	0.188
Spillover	0.000	0.000	0.000	0.254	0.096	0.000	0.000	0.025	0.000	0.000
T(1/2) Alpha [days]	--	--	--	--	--	--	--	--	--	--
T(1/2) Beta [days]	--	--	--	--	--	--	--	--	--	--
Manuf. Alpha Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Manuf. Beta Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Normalization	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0

Sample Results

Measurement Date 11-27-96 Time 13:18:43
Measuring Time [min:sec] Elapsed 0016:41 Preset 0016:40 Cycle 1/1
Guard [cpm] 1187

Det#	Spl#	Spl. Name	ALPHA pCi/g	ALPHA %Error	ALPHA Cat	BETA pCi/g	BETA %Error	BETA Cat
1	21	41	10.6	29.2	1	0.392	> 100	1
2	22	42	28.4	14.6	2	26.9	20.9	2
3	23	43	20.7	18.0	2	22.5	17.8	2
4	24	44	40.9	12.2	2	9.47	41.7	1
5	25	45	13.5	23.4	1	13.8	18.2	1
6	26	46	49.9	12.6	2	11.5	30.2	1
7	27	47	80.8	9.34	2	20.8	16.4	2
8	28	48	19.2	22.6	1	1.60	> 100	1
9	29	49	17.8	22.5	1	0.000	0.000	1
10	30	50	23.9	16.5	2	7.72	33.4	1

11-27-96 Berthold LB770 Control System: LB770 1 Page: 1
13:41 S A M P L E M E A S U R E M E N T

Comment: Run by Jody Armijo
LB770 Number 1 User File: BACKGROUND Sample Data File: NONE
Sample Set: Hummock Mode: Alpha/Beta
HV-Meas.Counter [V] = 1693 HV-Guard Counter [V] = 1700
Statistical Error Definition: 1 standard deviation(s)

Category List [pCi/g]:

	Alpha		Beta	
Category	Low	High	Low	High
1	0.000	20.0	0.000	20.0
2	20.0	100.0	20.0	100.0
3	100.0		100.0	

	1	2	3	4	5	6	7	8	9	10
BG Alpha [cpm]	0.983	0.783	1.18	0.783	0.867	1.00	0.850	0.917	0.983	0.833
BG Beta [cpm]	12.8	11.6	10.9	11.5	10.4	11.9	12.9	11.8	13.0	12.6
Eff. Alpha	0.058	0.057	0.062	0.053	0.059	0.063	0.044	0.064	0.049	0.056
Eff. Beta	0.100	0.088	0.123	0.121	0.193	0.137	0.158	0.140	0.149	0.188
Spillover	0.000	0.000	0.000	0.254	0.096	0.000	0.000	0.025	0.000	0.000
T(1/2) Alpha [days]	--	--	--	--	--	--	--	--	--	--
T(1/2) Beta [days]	--	--	--	--	--	--	--	--	--	--
Manuf. Alpha Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Manuf. Beta Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Normalization	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0

Sample Results

Measurement Date 11-27-96 Time 13:41:50
Measuring Time [min:sec] Elapsed 0016:41 Preset 0016:40 Cycle 1/1
Guard [cpm] 1190

Det#	Spl#	Spl. Name	ALPHA pCi/g	ALPHA %Error	ALPHA Cat	BETA pCi/g	BETA %Error	BETA Cat
1	61	51	14.3	23.4	1	1.20	> 100	1
2	62	52	18.5	19.2	1	23.8	23.3	2
3	63	53	17.7	20.1	1	14.9	25.4	1
4	64	54	9.56	31.5	1	0.000	0.000	1
5	65	55	8.91	31.6	1	5.27	43.0	1
6	66	56	19.7	23.2	1	2.06	> 100	1
7	67	57	14.7	27.2	1	0.000	0.000	1
8	68	58	23.5	19.7	2	4.07	78.2	1
9	69	59	17.8	22.5	1	7.07	45.5	1
10	70	60	17.3	20.3	1	17.0	16.6	1

APPENDIX G

HARDCOPIES OF TEN SITE CANYON DATA: FREQUENCY OF DETECTED INORGANIC AND ORGANIC CHEMICALS AND RADIONUCLIDES

Ten Site Canyon
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Aluminum	Sediment	20	20	1260 to 10500	15400	0/20	0/0
Antimony	Soil	8	1	0.48 to [11.2]	0.83	0/8	7/7
Antimony	Sediment	124	18	[0.04 to 11.2]	0.83	0/124	64/106
Arsenic	Soil	8	8	1 to 3.6	8.17	0/8	0/0
Arsenic	Sediment	124	124	0.76 to 4.7	3.98	2/124	0/0
Barium	Soil	8	8	17 to 97.5	295	0/8	0/0
Barium	Sediment	124	124	16.6 to 230	127	4/124	0/0
Beryllium	Soil	8	8	0.3 to 0.8	1.83	0/8	0/0
Beryllium	Sediment	124	119	0.15 to 2.7	1.31	2/124	0/5
Cadmium	Soil	8	4	0.4 to 1.7	0.4	3/8	4/4
Cadmium	Sediment	124	26	[0.01] to 1.4	0.4	22/124	60/98
Calcium	Sediment	20	20	378 to 3070	4420	0/20	0/0
Chromium, Total	Soil	8	8	1.2 to 5.6	19.3	0/8	0/0
Chromium, Total	Sediment	124	124	1.3 to 20	10.5	1/124	0/0
Cobalt	Sediment	20	20	1.1 to 5.9	4.73	3/20	0/0
Copper	Sediment	20	20	3 to 119	11.2	8/20	0/0
Iron	Sediment	20	20	3210 to 28800	13800	3/20	0/0
Lead	Soil	8	8	5.8 to 15.4	22.3	0/8	0/0
Lead	Sediment	124	123	3.1 to 44	19.7	9/124	0/1
Magnesium	Sediment	20	20	269 to 1760	2370	0/20	0/0
Manganese	Sediment	20	20	113 to 414	543	0/20	0/0
Mercury	Soil	8	1	[0.02 to 0.1]	0.1	0/8	0/7
Mercury	Sediment	124	34	0.01 to 2	0.1	2/124	0/90
Nickel	Soil	8	7	2.6 to 5.6	15.4	0/8	0/1
Nickel	Sediment	124	103	1.4 to 58.9	9.38	4/124	0/21
Potassium	Sediment	20	20	189 to 1300	2690	0/20	0/0
Selenium	Soil	8	1	0.4 to [3]	1.52	0/8	1/7
Selenium	Sediment	124	25	[0.2 to 3]	0.3	22/124	61/99
Silver	Soil	8	1	1 to [1.4]	1	0/8	7/7
Silver	Sediment	124	9	[0.03] to 33	1	5/124	62/115

Ten Site Canyon
Frequency of Detected Inorganic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Sodium	Sediment	20	20	26.8 to 372	1470	0/20	0/0
Thallium	Soil	8	1	0.45 to [1]	0.73	0/8	7/7
Thallium	Sediment	124	19	[0.04] to 2.3	0.73	2/124	62/105
Vanadium	Sediment	20	20	3.5 to 25.9	19.7	3/20	0/0
Zinc	Sediment	20	20	15.7 to 94	60.2	3/20	0/0

Tensite Canyon
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Acenaphthene	Sediment	125	2	0.075 to [12]	2/125
Acetone	Soil	9	1	[0.005 to 0.02]	1/9
Acetone	Sediment	104	11	[0.01 to 0.08]	11/104
Anthracene	Sediment	125	2	0.083 to [12]	2/125
Aroclor-1254	Sediment	88	1	[0.033] to 6	1/88
Aroclor-1260	Sediment	88	26	[0.033] to 1.52	26/88
Benzo(a)anthracene	Soil	9	1	0.084 to [0.4]	1/9
Benzo(a)anthracene	Sediment	125	10	[0.33 to 12]	10/125
Benzo(a)pyrene	Soil	9	1	0.14 to [0.4]	1/9
Benzo(a)pyrene	Sediment	125	13	[0.33 to 12]	13/125
Benzo(b)fluoranthene	Soil	9	1	0.11 to [0.4]	1/9
Benzo(b)fluoranthene	Sediment	125	12	[0.33 to 12]	12/125
Benzo(g,h,i)perylene	Soil	9	1	0.12 to [0.4]	1/9
Benzo(g,h,i)perylene	Sediment	125	8	0.31 to [12]	8/125
Benzo(k)fluoranthene	Soil	9	1	0.12 to [0.4]	1/9
Benzo(k)fluoranthene	Sediment	125	9	0.25 to [12]	9/125
Bis(2-ethylhexyl)phthalate	Sediment	125	5	0.046 to [12]	5/125
Butylbenzylphthalate	Sediment	125	1	[0.33 to 12]	1/125
Chrysene	Soil	9	1	0.14 to [0.4]	1/9
Chrysene	Sediment	125	13	[0.33 to 12]	13/125
Di-n-butylphthalate	Soil	9	3	[0.33] to 1.8	3/9
Di-n-butylphthalate	Sediment	125	27	0.052 to [12]	27/125
Dibenz(a,h)anthracene	Soil	9	1	0.047 to [0.4]	1/9
Dibenz(a,h)anthracene	Sediment	125	1	0.27 to [12]	1/125
Fluoranthene	Soil	9	1	0.19 to [0.4]	1/9
Fluoranthene	Sediment	125	20	[0.33 to 12]	20/125
Fluorene	Sediment	125	1	[0.33 to 12]	1/125
Hexanone[2-]	Sediment	104	1	[0.01 to 0.08]	1/104
Indeno(1,2,3-cd)pyrene	Soil	9	1	0.098 to [0.4]	1/9
Indeno(1,2,3-cd)pyrene	Sediment	125	4	[0.33 to 12]	4/125

Tensite Canyon
Frequency of Detected Organic Chemicals

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Lubricant Range Organics	Soil	1	1	99 to 99	1/1
Lubricant Range Organics	Sediment	1	1	150 to 150	1/1
Methylene Chloride	Soil	9	1	[0.005 to 0.023]	1/9
Methylene Chloride	Sediment	104	4	[0.005 to 0.02]	4/104
Phenanthrene	Soil	9	1	0.078 to [0.4]	1/9
Phenanthrene	Sediment	125	12	[0.33 to 12]	12/125
Pyrene	Soil	9	1	0.22 to [0.4]	1/9
Pyrene	Sediment	125	25	0.16 to [12]	25/125
Toluene	Sediment	104	2	[0.005] to 0.022	2/104

Tensite Canyon
Frequency of Detected Radionuclides

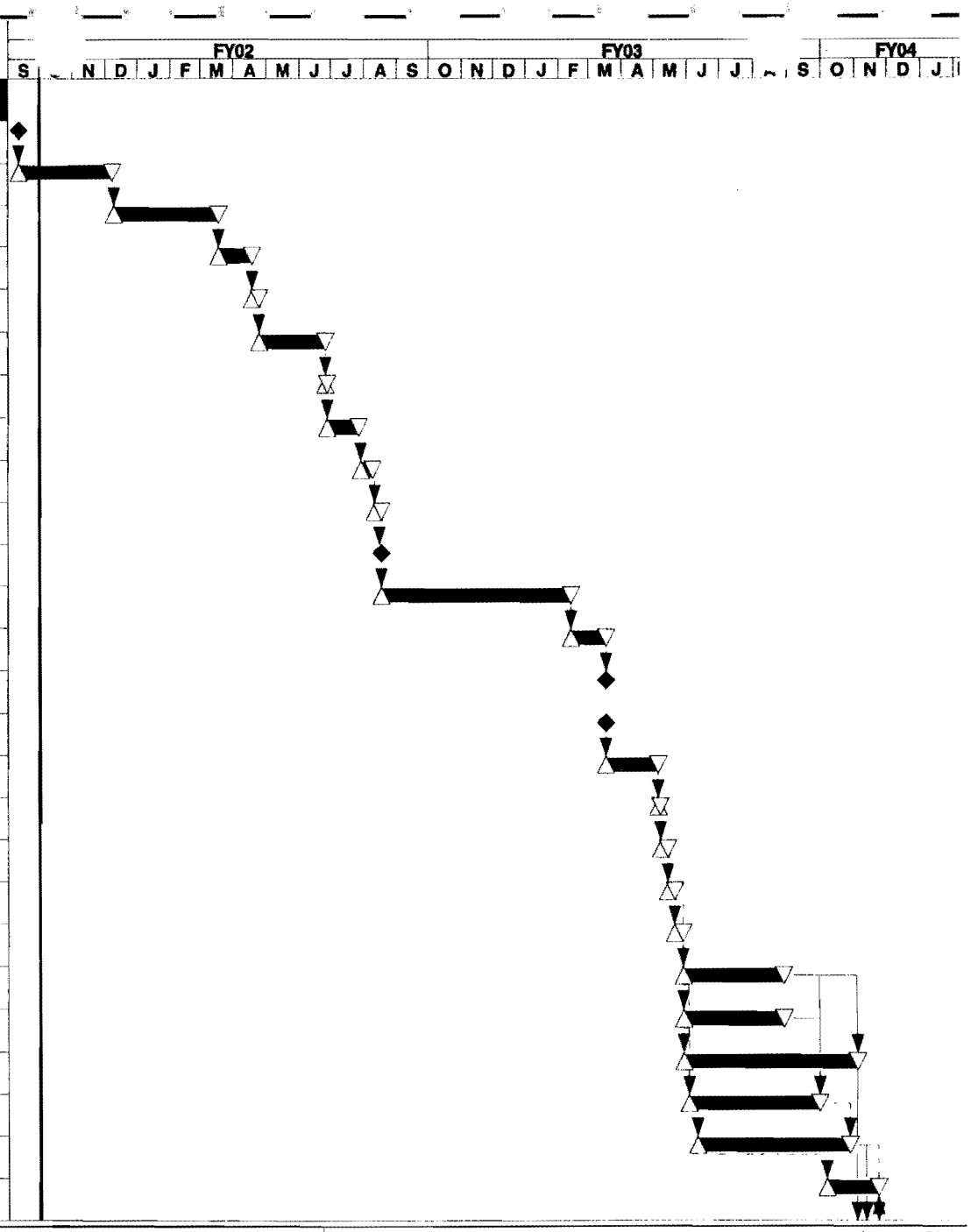
Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background Value (pCi/g)	Frequency of Detects above Background Value	Frequency of Non-detects above Background Value
Americium-241	Soil	9	1	[0.041 to 8.65]	0.013	1/9	8/8
Americium-241	Sediment	125	42	[-0.21] to 170.9	0.04	40/125	73/83
Cesium-134	Sediment	22	0	[-0.087 to 0.3]	NA	0/22	NA
Cesium-137	Soil	9	4	[0.106] to 1.7296	1.65	4/9	0/5
Cesium-137	Sediment	125	40	[-0.016] to 72.83	0.9	26/125	3/85
Cobalt-60	Soil	9	0	[-0.042 to 0.8993]	NA	0/9	NA
Cobalt-60	Sediment	125	4	[-0.07] to 1.2991	NA	4/125	NA
Europium-152	Soil	1	0	[0.051 to 0.051]	NA	0/1	NA
Europium-152	Sediment	23	0	[-0.16 to 0.58]	NA	0/23	NA
Plutonium-238	Soil	10	7	[0.003] to 2.523	0.023	7/10	0/3
Plutonium-238	Sediment	131	122	[0.009] to 5190	0.006	122/131	9/9
Plutonium-239	Soil	10	9	[0.009] to 3.99	0.054	9/10	0/1
Plutonium-239	Sediment	131	121	[0.002] to 453	0.068	109/131	0/10
Ruthenium-106	Soil	1	0	[-0.081 to -0.081]	NA	0/1	NA
Ruthenium-106	Sediment	21	0	[-1.6 to 1.2]	NA	0/21	NA
Sodium-22	Soil	1	0	[0.059 to 0.059]	NA	0/1	NA
Sodium-22	Sediment	23	0	[-0.13 to 0.22]	NA	0/23	NA
Strontium-90	Soil	8	0	[-0.42 to 0.54]	1.31	0/8	0/8
Strontium-90	Sediment	124	14	[-0.72] to 57.7	1.04	13/124	0/110
Tritium	Soil	8	8	0.02343 to 0.10213	NA	8/8	NA
Tritium	Sediment	124	95	[-0.009] to 19.12347	0.093	41/124	0/29
Uranium-234	Soil	10	8	[1.108] to 2.468	2.59	0/10	0/2
Uranium-234	Sediment	131	124	0.249 to 5.295	2.59	2/131	0/7
Uranium-235	Soil	10	1	[0.033] to 0.255	0.2	1/10	0/9
Uranium-235	Sediment	131	17	[0.014 to 0.187]	0.2	0/131	0/114
Uranium-238	Soil	10	8	[1.137] to 3.006	2.29	4/10	0/2
Uranium-238	Sediment	131	124	0.27 to 3.049	2.29	9/131	0/7

APPENDIX H

COPY OF BASELINE SCHEDULE FOR TECHNICAL AREA 50

TA-50 SAP-Construction Report

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
D211CV0202	TA 50: Start SAP	0	11SEP01	
D211CV0203	TA 50: Prep.SOW, Bid Docs & Bid Acceptance	60	11SEP01	07DEC01
D211CV0205	TA 50: Locate & Analyze Existing Data	66	10DEC01	18MAR02
D211CV0206	TA 50: Write Data Quality Objectives	22	19MAR02	17APR02
D211CV0207	TA 50: Decision Peer Review	5	18APR02	24APR02
D211CV0208	TA 50: Write SAP	44	25APR02	26JUN02
D211CV0209	TA 50: Issue Peer Review Draft	1	27JUN02	27JUN02
D211CV0210	TA 50: Peer Review And Incorporate Comments	20	28JUN02	26JUL02
D211CV0211	TA 50: DOE Review	10	29JUL02	09AUG02
D211CV0212	TA 50: Incorporate DOE Comments	5	12AUG02	16AUG02
D211CV0213	TA 50: Submit SAP To AA	0		16AUG02
D211CV0214	TA 50: AA Reviews SAP / RSI Response	180	17AUG02	12FEB03
D211CV0215	TA 50: Incorporate AA Comments	22	13FEB03	17MAR03
D211CV0216	TA 50: AA Approves SAP / Issue SAP	0		17MAR03
D211CY0318	TA 50: Start RFI Field Work	0	18MAR03	
D211CY0320	TA 50: Prepare For Readiness Review	35	18MAR03	05MAY03
D211CY0324	TA 50: Conduct Readiness-Review	1	06MAY03	06MAY03
D211CY0326	TA 50: Mobilize	5	07MAY03	13MAY03
D211CY0328	TA 50: RAD & Land Survey	5	14MAY03	20MAY03
D211CY0330	TA 50: Geophysical Survey	5	21MAY03	27MAY03
D211CY0332	TA 50: Collect & Submit Surface Samples	66	28MAY03	29AUG03
D211CY0334	TA 50: Collect & Submit Subsurface Samples	66	28MAY03	29AUG03
D211CY0336	TA 50: Waste Management	111	28MAY03	04NOV03
D211CY0338	TA 50: Analytical Turnaround Sample Analysis	85	03JUN03	01OCT03
D211CY0340	TA 50: Validate & Edit Data (CDM)	99	10JUN03	29OCT03
D211CY0342	TA 50: Write Post Field Operations Report	30	08OCT03	24NOV03



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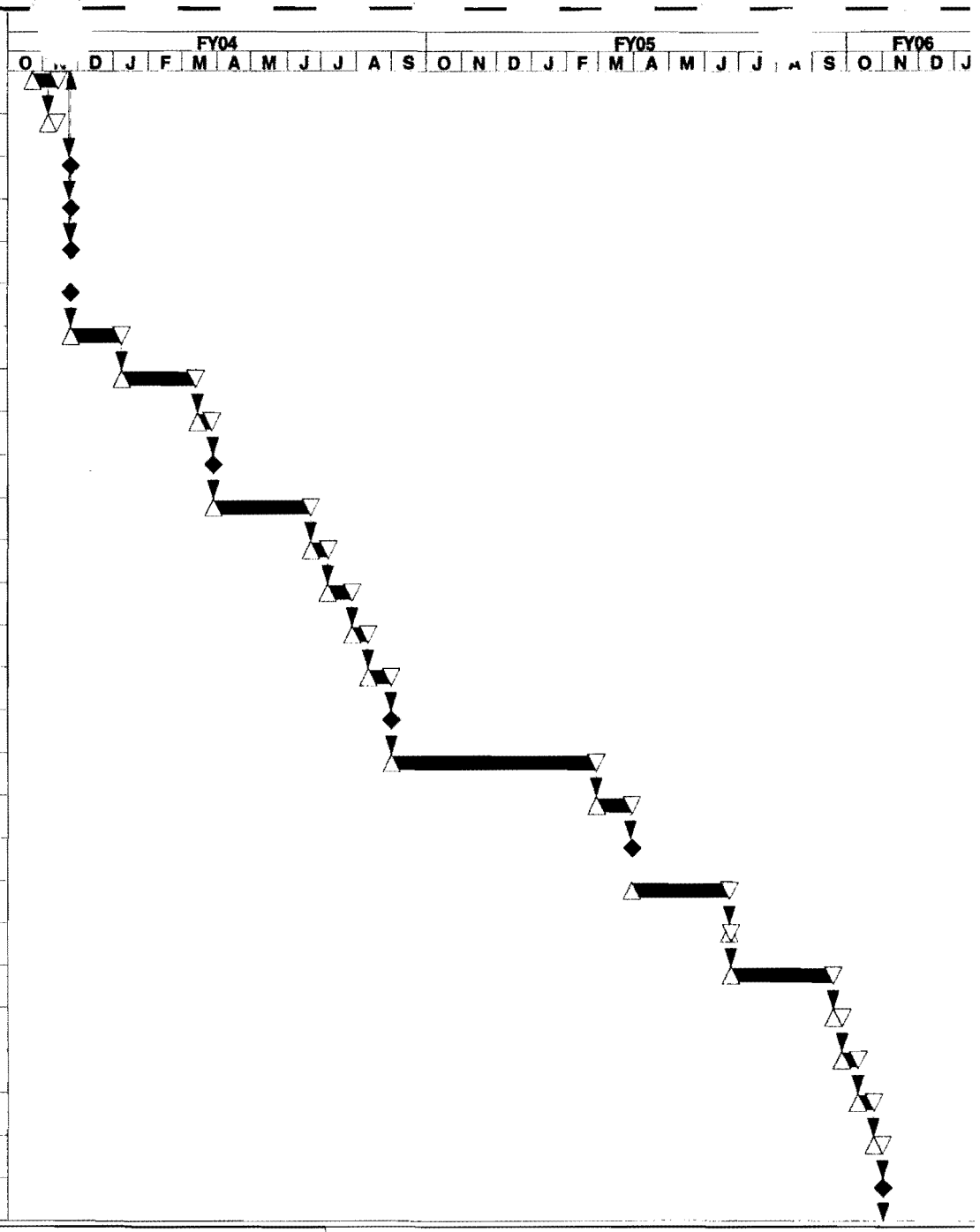
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
D211CY0344	TA 50: Focused Validation & Assessment	15	23OCT03	13NOV03
D211CY0346	TA 50: Demobilize	5	05NOV03	12NOV03
D211CY0348	TA 50: Post Field Operations Report Complete	0		24NOV03
D211CY0350	TA 50: RFI Field Work Complete	0		24NOV03
D211CY0352	TA 50: All Data In FIMAD	0		24NOV03
D211CW0440	TA 50: Start RFI Report	0	25NOV03	
D211CW0442	TA 50: Prepare SOW and Bid Docs	30	25NOV03	08JAN04
D211CW0446	TA 50: Data Analysis & Assessment	44	09JAN04	12MAR04
D211CW0448	TA 50: Report Decisions Peer Review	10	15MAR04	26MAR04
D211CW0450	TA 50: Start RFI Report Draft	0	29MAR04	
D211CW0452	TA 50: Prepare RFI Report Draft	60	29MAR04	21JUN04
D211CW0454	TA 50: Document Peer Review	10	22JUN04	06JUL04
D211CW0456	TA 50: Incorporate Peer Review Comments	15	07JUL04	27JUL04
D211CW0458	TA 50: DOE Review RFI Draft Report	10	28JUL04	10AUG04
D211CW0460	TA 50: Incorporate DOE Comments	15	11AUG04	31AUG04
D211CW0462	TA 50: Submit RFI Report To AA	0		31AUG04
D211CW0464	TA 50: AA Review Of RFI Report / RSI Response	180	01SEP04	27FEB05
D211CW0466	TA 50: Incorporate AA Comments	22	28FEB05	29MAR05
D211CW0468	TA 50: Issue Final RFI Report	0		29MAR05
D211BD0502	MDA C: Prepare SOW, Bid Docs & Bid Acceptance	60	30MAR05	22JUN05
D211BD0506	MDA C: Conduct Decision Peer Review	1	23JUN05	23JUN05
D211BD0508	MDA C: Prepare Draft CMS Plan	60	24JUN05	19SEP05
D211BD0510	MDA C: CMS Plan Peer Review	5	20SEP05	26SEP05
D211BD0512	MDA C: Incorporate Peer Review Comments	10	27SEP05	11OCT05
D211BD0514	MDA C: DOE/LANL Review Of CMS Plan	10	12OCT05	25OCT05
D211BD0516	MDA C: Incorporate DOE/LANL Comments	5	26OCT05	01NOV05
D211BD0518	MDA C: Submit CMS Plan To AA	0	02NOV05	



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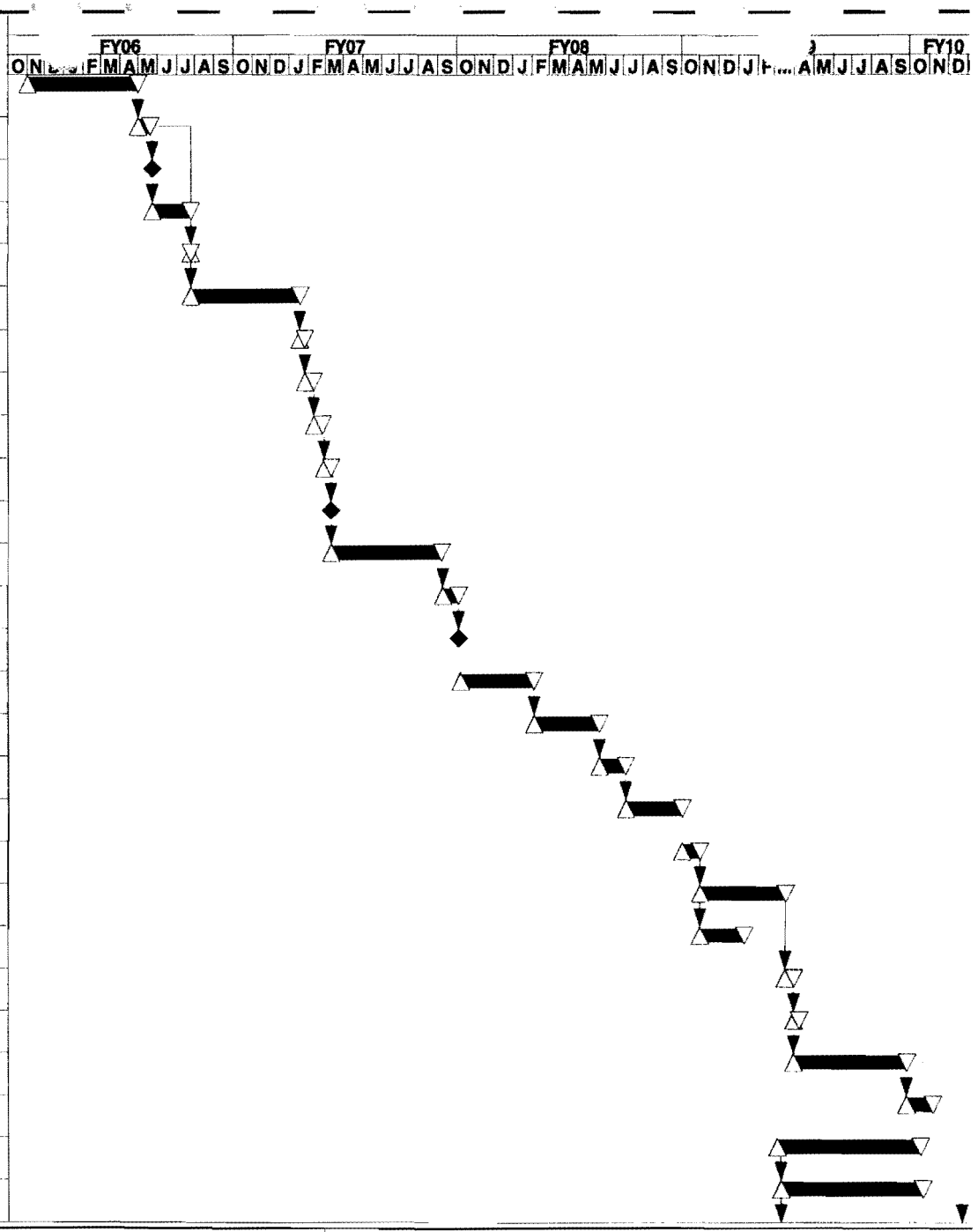
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
D211BD0520	MDA C: AA Review CMS Plan	180	02NOV05	30APR06
D211BD0522	MDA C: Address AA Comments	15	01MAY06	19MAY06
D211BD0524	MDA C: Submit Final CMS Plan	0	22MAY06	
D211BD0526	MDA C: AA Approves Final CMS Plan	44	22MAY06	24JUL06
D211DD0728	MDA C: Conduct Decision Peer Review	1	25JUL06	25JUL06
D211DD0732	MDA C: Prepare Draft CMS Report w/PIP	120	26JUL06	18JAN07
D211DD0734	MDA C: Draft CMS Report Peer Review	5	19JAN07	25JAN07
D211DD0736	MDA C: Incorporate Peer Review Comments	10	26JAN07	08FEB07
D211DD0738	MDA C: DOE Review Of Draft CMS Report	10	09FEB07	23FEB07
D211DD0740	MDA C: Incorporate DOE Comments	10	26FEB07	09MAR07
D211DD0742	MDA C: Submit Draft CMS Report To AA	0	12MAR07	
D211DD0744	MDA C: AA Review Of CMS Report	180	12MAR07	07SEP07
D211DD0746	MDA C: Address AA Comments	20	10SEP07	05OCT07
D211DD0748	MDA C: Submit Final CMS Report	0		05OCT07
D211DE0750	MDA C: Support to AA Dev SB & Draft Permit Mod	80	09OCT07	05FEB08
D211DE0754	MDA C: Suppt to AA Public Cmnt Period/PubHearing	75	06FEB08	21MAY08
D211DE0756	MDA C: Support to AA Response To Public Comments	30	22MAY08	03JUL08
D211DE0758	MDA C: AA Revises And Issues Permit Modification	90	04JUL08	01OCT08
D211DF1102	MDA C: Prepare SOW, Bid Docs & Bid Acceptance	20	02OCT08	30OCT08
D211DF1106	MDA C: Prepare Corrective Measure Design	90	31OCT08	17MAR09
D211DF1108	MDA C: Prepare CMI Plan	45	31OCT08	09JAN09
D211DF1110	MDA C: Conduct Design Review	10	18MAR09	31MAR09
D211DF1112	MDA C: Submit Plans To AA	5	01APR09	07APR09
D211DF1114	MDA C: AA Review Of Plan	180	01APR09	27SEP09
D211DF1116	MDA C: Incorp. AA Comments & Submit Final Plans	30	28SEP09	09NOV09
D211DG1120	MDA C: CMI Implementation	160	04MAR09*	19OCT09
D211DG1124	MDA C: Monitoring For Quality And Performance	160	10MAR09	23OCT09



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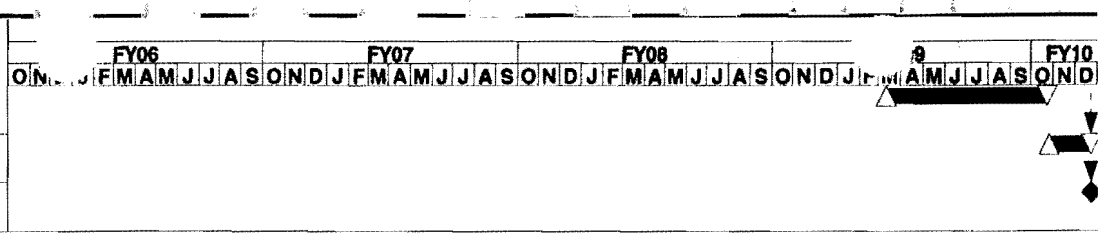
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
D211DG1126	MDA C: AA Over Sight / Progress Reports	160	10MAR09	23OCT09
D211DG1130	MDA C: Prepare Construction Completion Report	40	26OCT09	23DEC09
D211DG1134	MDA C: Constr Criteria Met/ Transfer to ESH/FM	0		23DEC09



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APPENDIX I

INFORMATION ON GROUNDWATER AND DRINKING WATER MONITORING PROGRAMS

GROUND WATER MONITORING PROGRAMS AT MORTANDAD CANYON

- Ground Water Discharge Plan Monitoring at Mortandad Canyon
- Discharge Plan DP-1132 for the RLWTF.
- Monitoring conducted at Mortandad Canyon (MCO-3, -4B, -6, -7) alluvial ground water observation wells.
    - Samples collected quarterly for nitrate, fluoride, TDS.
    - Analysis by independent, contract laboratories.
    - Results reported quarterly to the NMED-GWQB with copy to NMED-HWB.

- Annual Surveillance Monitoring at Mortandad Canyon
- Annual monitoring at alluvial and regional aquifer wells.
    - Samples collected for radiochemicals, inorganics, and metals.
    - Analysis by independent, contract laboratories.
    - Results published in the Annual Environmental Surveillance Report.

- (R-15 Groundwater Characterization)

OTHER GROUND WATER MONITORING PROGRAMS AT LANL

- Ground Water Discharge Permit Monitoring at Canada del Buey
- Discharge Permit DP-857 for the SWS Facility.
- Monitoring conducted at Canada del Buey (CDBO-6) alluvial ground water observation wells.
    - Samples collected quarterly for nitrate, chloride, TDS.
    - Analysis by independent, contract laboratories.
    - Results reported quarterly to the NMED-GWQB.

- Annual Surveillance Monitoring
- Alluvial, intermediate, and regional wells.
    - Samples collected for radiochemicals, inorganics, and metals.
    - Analysis by independent, contract laboratories.
    - Results published in the Environmental Surveillance Report.

- Annual SDWA Quality Assurance Monitoring
    - Samples collected for radiochemicals, metals, inorganics, and organics.
    - Analysis by the New Mexico Department of Health Scientific Laboratory.
    - Results reported to Los Alamos County and published in the Environmental Surveillance Report.

- Special Drinking Water Monitoring
    - Monitoring for special contaminants of concern: perchlorate, tritium, HE, and strontium-90.
    - Water supply well Otowi-1 monitored monthly for tritium and perchlorate.
    - Water supply wells PM-3, and PM-5 monitored monthly for perchlorate.
    - Water supply wells PM-2, PM-4, and PM-5 monitored quarterly for HE.
    - All water supply wells monitored quarterly for Sr-90.
    - All water supply wells monitored annually for perchlorate, tritium, HE, and perchlorate.
    - Analysis by independent, contract laboratories.
    - Results reported to Los Alamos County and NMED-Drinking Water Bureau.

- (Hydrogeologic Workplan Characterization Program)

DRINKING WATER MONITORING PROGRAMS BY LOS ALAMOS COUNTY AND NMED

- SDWA Compliance Sampling by Los Alamos County and NMED
    - Samples collected for microbiological, radiochemical, metals, inorganics, and organic constituents.
    - Results determine compliance with the Maximum Contaminant Levels (MCLs) of the SDWA.

This data is published in the Environmental Surveillance Report and in LA County's annual Consumer Confidence Report (CCR).

APPENDIX J

COPY OF THE "U.S. DEPARTMENT OF ENERGY REPORT 2000 LANL RADIONUCLIDE AIR EMISSIONS" LA-13839-MS

LA-13839-MS

Approved for public release;
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U.S. Department of Energy Report
2000 LANL Radionuclide Air Emissions

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory is operated by the University of California for the United States Department of Energy under contract W-7405-ENG-36.

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Photocomposition by Deidre´ A. Plumlee, COMFORCE, for Group IM-1
Prepared by Keith Jacobson, Group ESH-17

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LA-13839-MS

Issued: August 2001

U.S. Department of Energy Report
2000 LANL Radionuclide Air Emissions

Keith W. Jacobson

Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545

U.S. Department of Energy Report

2000 LANL Radionuclide Air Emissions

Site Name: Los Alamos National Laboratory

Location: County of Los Alamos, New Mexico

Operations Office Information:

Office: Los Alamos Area Office

Address: U.S. Department of Energy
Los Alamos Area Office
Los Alamos, NM 87544

Contact: Joseph C. Vozella

Phone: (505) 665-5027

Site Information:

Operator: University of California

Address: Los Alamos National Laboratory
PO Box 1663
Los Alamos, NM 87545

Contact: Douglas M. Stavert

Phone: (505) 665-8855

Compliance Assessment:

2000 EDE: 0.64 mrem

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LIST OF ACRONYMS

AIRNET	Los Alamos National Laboratory Air Monitoring Network
CAB	Citizens' Advisory Board
CMR	Chemistry and Metallurgy Research (building)
CR/MS	catalytic reactor and molecular sieve bed
DOE	Department of Energy
EDE	effective dose equivalent
EPA	Environmental Protection Agency
ESIDNUM	exhaust stack identification number
FFCA	Federal Facilities Compliance Agreement
GMAP	gaseous mixed activation products
HEPA	high-efficiency particulate air (filter)
ISV	in situ vitrification
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LSC	liquid scintillation counting
ND	no detectable (emissions)
NESHAP	National Emissions Standards for Hazardous Air Pollutants
P/VAP	particulate/vapor activation products
PEDE	potential effective dose equivalent
PSR	Proton Storage Ring
RAMROD	Radioactive Materials Research Operations Demonstration
TA	technical area (at Los Alamos National Laboratory)
WETF	Weapons Engineering Tritium Facility

U.S. DEPARTMENT OF ENERGY REPORT

2000 LANL RADIONUCLIDE AIR EMISSIONS

by

Keith W. Jacobson

ABSTRACT

Presented herein is the Laboratory-wide certified report regarding radioactive effluents released into the air by Los Alamos National Laboratory (LANL) in CY 2000. This information is required under the Clean Air Act and is being reported to the U.S. Environmental Protection Agency (EPA). Included in this report are the effluents released during the Cerro Grande wildfire during mid-May, an event that despite its impact on LANL operations, did not affect the Laboratory's monitoring and data-quality objectives required for National Emissions Standards for Hazardous Air Pollutants (NESHAPs) compliance. The highest effective dose equivalent (EDE) to an off-site member of the public was calculated using EPA-specified procedures described in this report. For 2000, that dose was 0.64 mrem.

PREFACE

In 1990, the Clean Air Act was amended to add radionuclides to the National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Specifically, a new subsection (H) of 40 CFR 61 established an annual limit on the impact to the public attributable to emissions of radionuclides from U.S. Department of Energy Facilities (DOE), such as the Los Alamos National Laboratory (LANL). As part of the new NESHAP regulations, LANL must also submit an annual report to the U.S. Environmental Protection Agency (EPA) headquarters and the regional office in Dallas by June 30th. This report includes results of monitoring at LANL and the dose calculations for the calendar year, 2000.

EXECUTIVE SUMMARY

Presented is the Laboratory-wide certified report regarding radioactive effluents released into the air by LANL in 2000. This information is required under the Clean Air Act and is being reported to the U.S. EPA. The highest effective dose equivalent (EDE) to an off-site member of the public was calculated using procedures specified by the U.S. EPA and described in this report. The "Rad-NESHAPs" section of LANL's Air Quality Group (ESH-17) prepared this report.

To comply with the Radionuclide-NESHAP regulation, LANL monitors radionuclide emissions at 30 release points or stacks. Also, the Air Quality group uses a network of air samplers around LANL to monitor airborne levels of radionuclides. In addition, LANL maintains and operates meteorological monitoring systems.

The highest effective dose equivalent (EDE) to any member of the public at any off-site location where there is residence, school, business or office, for CY2000, was 0.64 mrem. This location was a business office located at 2470 East Gate Drive, on the northeastern boundary of LANL. This location differs from the highest off-site dose for 1999, which was a business office at the Los Alamos County landfill. This change was due to increases in airborne effluents from a linear particle accelerator located at the Los Alamos Neutron Science Center (LANSCE) near the northeastern boundary of LANL. Doses reported to the U.S. EPA for the past six years are shown in the following table. The U.S. EPA annual dose limit is 10 mrem.

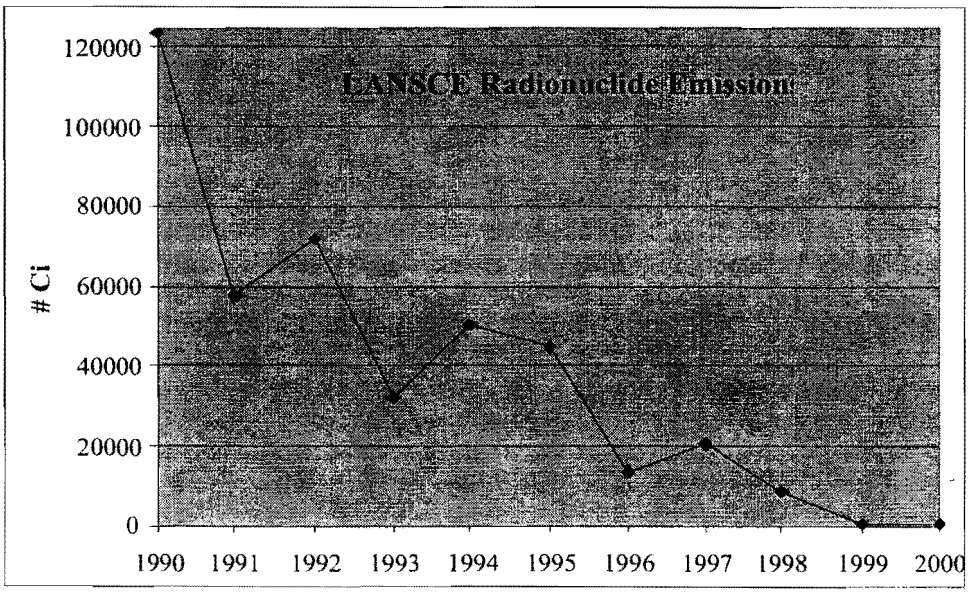
Six Year Summary of NESHAPs Dose Assessment for LANL

Year	EDE (mrem)	Highest EDE location
1995	5.05	2470 East Gate Dr
1996	1.93	2470 East Gate Dr
1997	3.51	2470 East Gate Dr
1998	1.72	2470 East Gate Dr
1999	0.32	County Landfill Office
2000	0.64	2470 East Gate Dr

Because of operational changes at the accelerator facility, radionuclide emissions have been decreasing from LANSCE for the past few years. Also in 1995, an additional emissions control system was implemented to reduce total emissions. In previous years, emissions from LANSCE (shown below) have contributed to over 90% of the total offsite dose. In 2000, the contribution was down to 60% of the total value. Future emissions from LANSCE are expected to remain near or slightly above the CY 2000 level.

In May 2000, Laboratory operations were impacted by the Cerro Grande wildfire, which began on May 4th and was not completely contained until early June. Despite the interruption caused by the fire and the subsequent general shutdown of LANL, the Laboratory's Rad-NESHAPs program was able to meet all of the monitoring and data quality objectives required for compliance.

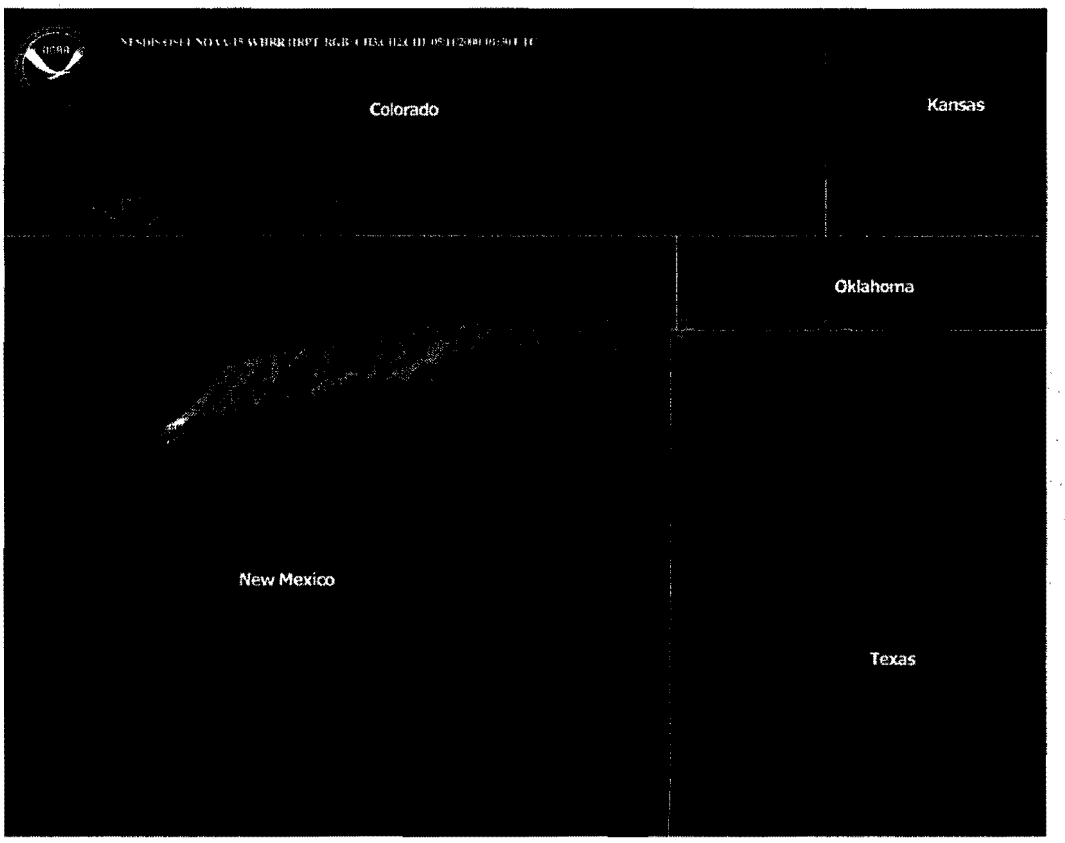
From May 10th to May 15th, the Cerro Grande wildfire burned out of control along the boundaries and into the interior of LANL. The Air Quality group conducted special sampling during this period to evaluate the potential for increased airborne emissions. Samples collected during the wildfire showed a significant increase in gross airborne alpha and beta activity. Further analysis of the samples showed that the radionuclides lead-210, bismuth-210, and polonium-210, which are radon decay products, to be the cause of the increase. Increased resuspension caused by the fire served as the enhanced source of these naturally occurring radionuclides.



Approximate LANSCE Radionuclide Emissions for the Past Ten Years

It is estimated that the wildfire (photo, below) burned on and over 7,500 to 7,700 acres on LANL. The fire burned across many old disposal sites and open ground testing sites. The Air Quality group is collecting data on those sites with suspected radionuclide contamination that were affected by the wildfire. Upon completion of the data study, the Air Quality group will calculate the potential releases, atmospheric transport, and subsequent human exposure due to radionuclides released by the Cerro Grande wildfire. It should be noted that on-site and perimeter air sampling did not detect higher than normal concentrations of man made radionuclides, such as tritium or plutonium, during or after the fire[i].

Also in 2000, the Air Quality group identified the need for a new air-sampling site for the compliance network; and the need to relocate an existing sampler to meet data quality objectives. Consequently a new sampler was added at the TA-3 Research

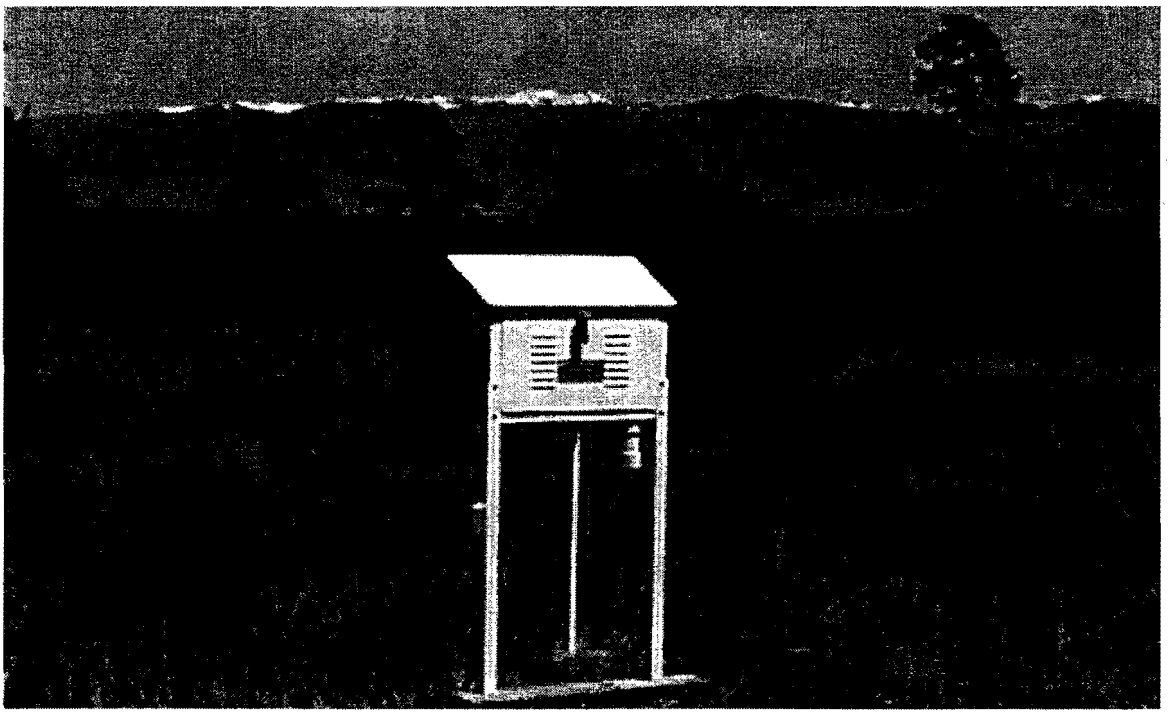


Satellite Photo of Smoke Plume from the Cerro Grande Wildfire on the Evening of May 10, 2000.

[i]LA-UR 01-1169; Measurements of Radioactive Air Contaminants during the Cerro Grande Fire using the Los Alamos National Laboratory's Air Monitoring Network (AIRNET); March 2001; Craig F. Eberhart, Ernest S. Gladney, Jean M. Dewart, David H. Kraig, Michael W. McNaughton, Alice R. Baumann, C. Jake Martinez, and Angelique M. Luedeker, Air Quality Group, Los Alamos National Laboratory, Los Alamos, NM 87545

Park, and another (similar to that shown below) was added to replace the Los Alamos Shell station site. Additional discussion of these two changes is provided in the Environmental Data section of the report that begins on page 15.

This report describes the Rad-NESHAP program and compliance activities at LANL and in addition, contains tables of data required for reporting purposes; of these, Table 16 provides doses calculated at various public locations around LANL, and Table 17 summarizes the different LANL contributions to the total highest dose for CY2000.



Air Monitoring Station on LANL Property

SECTION I. FACILITY INFORMATION

61.94(b)(1): Name and Location of Facility

Los Alamos National Laboratory (LANL or the Laboratory) and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, in north-central New Mexico, approximately 100 km (60 mi.) north-northeast of Albuquerque and 40 km (25 mi.) northwest of Santa Fe (Figure 1).

61.94(b)(2): List of Radioactive Materials Used at LANL

Since the Laboratory's inception in 1943, its primary mission has been nuclear weapons research and development. Programs include weapons development, magnetic and inertial fusion, nuclear fission, nuclear safeguards and security, and laser isotope separation. There is also basic research in the areas of physics, chemistry, and engineering that supports such programs, and in biology that complements and draws upon basic research in the physical sciences.

The primary facilities involved in emissions of radioactivity are outlined in this section. The facility locations are designated by technical area and building. For example, the facility designation TA-3-29 is Building 29 at Technical Area 3 (see Figure 2 showing the technical areas at LANL). Potential radionuclide release points are listed in several tables that follow. Some of the sources described below are characterized as nonpoint. Beginning in 1995, air-sampling results from LANL's air-sampling network (AIRNET) were used, with EPA approval, to calculate off-site impacts due to diffuse and fugitive emissions of radioactive particles and tritium oxide from nonpoint sources.

Radioactive materials used at LANL include weapons grade plutonium, heat-source plutonium, enriched uranium, depleted uranium, and tritium. Also, a variety of materials is generated through the process of activation; consequent emissions occur as gaseous mixed activation products (GMAP), and other activation products occur in particulate and vapor form (P/VAP).

The radionuclides emitted from point sources at LANL in the calendar year (CY) 2000 are listed in subsequent tables. Tritium is released as tritium oxide and elemental tritium. Plutonium contains traces of ^{241}Am, a transformation product of ^{241}Pu. Some of the uranium emissions are from open-air explosive tests involving depleted uranium. GMAP emissions include ^{41}Ar, ^{10}C, ^{11}C, ^{13}N, ^{16}N, ^{14}O, and ^{15}O. Various radionuclides such as ^{193}Hg and ^{197}Hg make up the majority of the P/VAP emissions.

61.94(b)(3): Handling and Processing of Radioactive Materials at LANL Technical Areas

The primary facilities responsible for radiological airborne emissions follow. Additional descriptions of LANL technical areas can be found in the annual site environmental report for LANL. More thorough descriptions of LANL operations can be found in the annual yearbooks published by LANL's Site-Wide Issues Program Office, the most recent being the "SWEIS 1999 Yearbook".[1]

TA-3-29: Programs conducting chemical and metallurgical research are located in this facility. Principal radionuclides are isotopes of plutonium and uranium

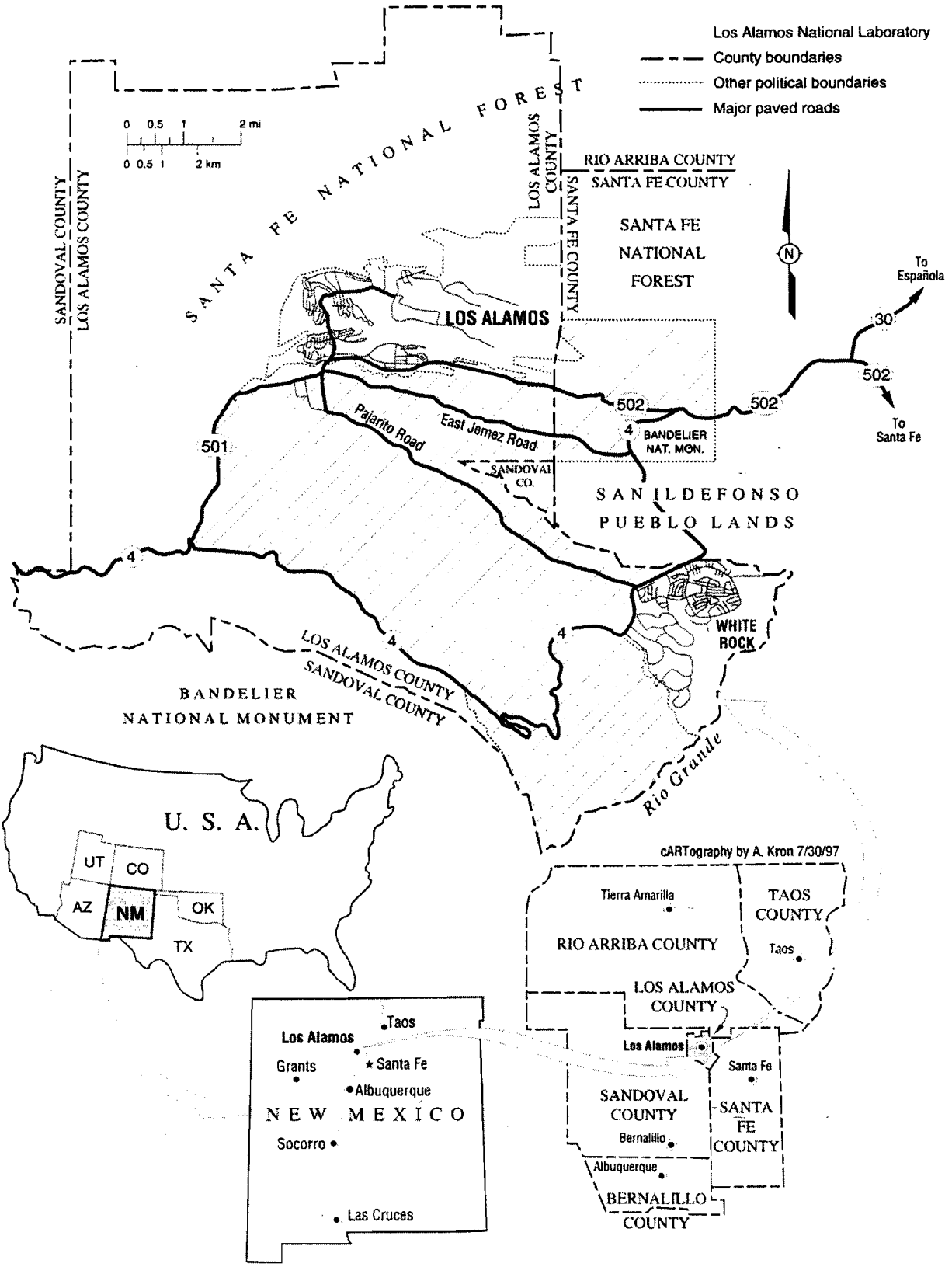


Figure 1. Location of Los Alamos National Laboratory

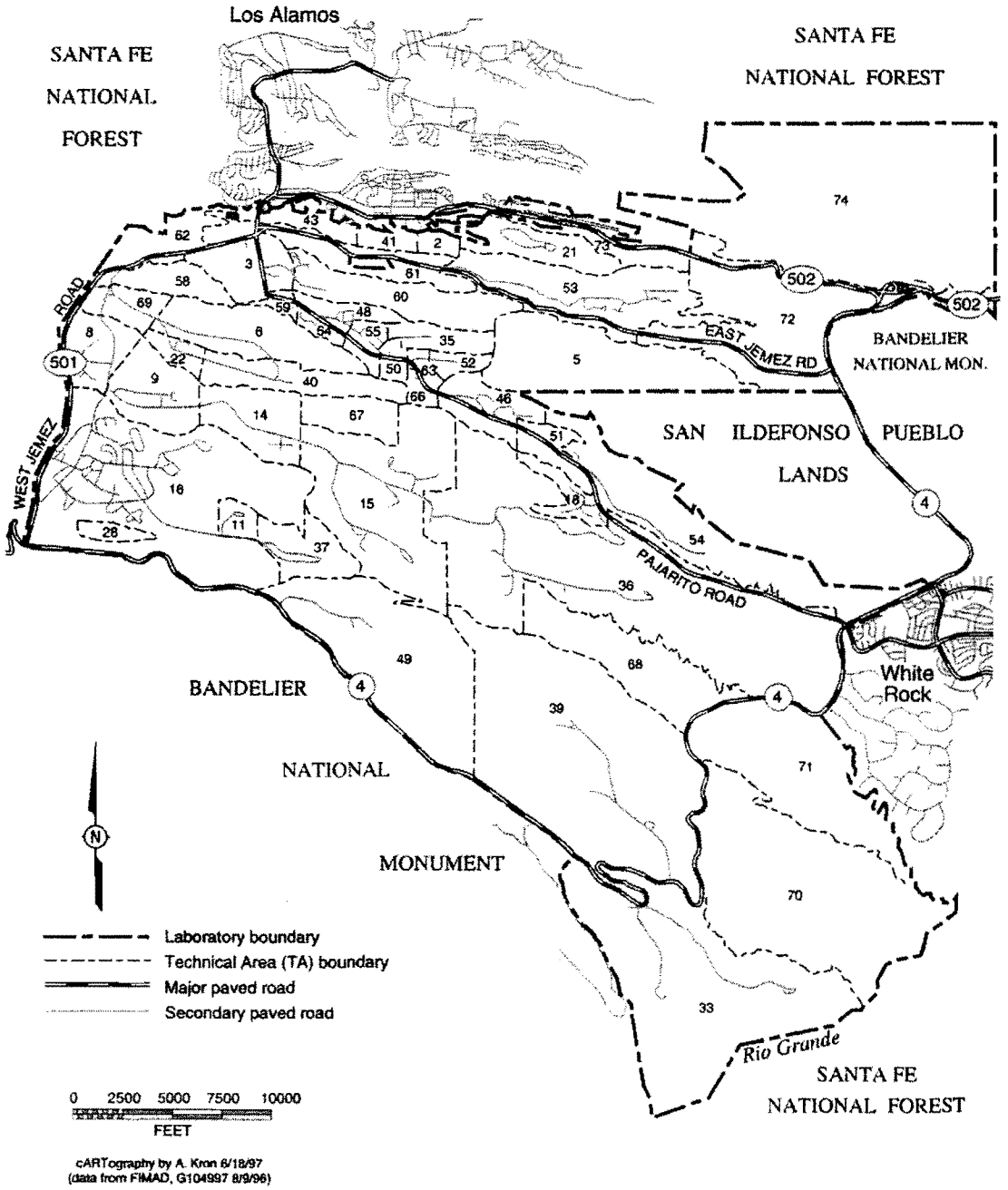


Figure 2. Location of Los Alamos National Laboratory Technical Areas, by Number

TA-3-35: The facility houses a 5,000-ton capacity press that has been used in the metalworking of radioactive materials. Note that stack monitoring at this facility was discontinued in 2000.

TA-3-102: This machine shop is used for the metalworking of radioactive materials, primarily depleted uranium.

TA-15-PHERMEX and TA-36: These facilities conduct open-air explosive tests involving depleted uranium.

TA-15-312-DAHRT: Construction on this new facility for conducting high-explosive driven experiments was recently completed.

TA-16-205-WETF: This facility is located in Buildings 205 and 205A in the southeast section of TA-16. Building 205 is specifically designed and built to process tritium safely and to meet user needs and specifications. The operations at WETF are divided into two categories: tritium processing and activities that support tritium processing. Examples of tritium-processing operations include repackaging tritium into smaller quantities and repackaging tritium and other gases to user-specified pressures. Other operations include reacting tritium with other materials to form compounds and analyzing the effects of tritium.

TA-21-155 and TA-21-209: These facilities also conduct operations involving tritium. Programs include testing of tritium control systems for the nuclear fusion program (TA-21-155), preparation of targets containing tritium for laser-fusion research, and the handling of tritium for defense programs. In addition, operations to recover tritium from old equipment are being conducted at TA-21-209.

TA-18: This nuclear facility studies the behavior of critical assemblies of nuclear materials. Some of the assemblies are used as a source of fission neutrons for experimental purposes, resulting in a diffuse source of ^{41}Ar emissions.

TA-21: Many of the facilities at this decommissioned radiochemistry site are undergoing decontamination, demolition, and disposal. Some of these operations may contribute to diffuse releases of uranium and plutonium into the air.

TA-33-86 and TA-41-4: These buildings were formerly used as tritium-handling facilities. Current emissions primarily result from residual tritium contamination and cleanup operations.

TA-48-1: The principal activities carried out in this facility are radiochemical separations in support of the medical radioisotope production program, the Yucca Mountain program, nuclear chemistry experiments, and geochemical and environmental research. These separations involve nCi to Ci (hot cell) amounts of radioactive materials and use a wide range of analytical chemical separation techniques, such as ion exchange, solvent extraction, mass spectroscopy, plasma emission spectroscopy, and ion chromatography.

TA-50-1: This waste management site consists of a low-level liquid waste treatment plant. Also, there is a wastewater outfall from TA-50-1 that results in a diffuse source of airborne tritium.

TA-50-37: This controlled air incinerator was decommissioned in 1996 and is no longer active. It has been remodeled to house

the Radioactive Materials Research Operations Demonstration (RAMROD) project.

TA-50-69: This waste management site consists of a waste characterization and reduction facility.

TA-53: This technical area houses the Los Alamos Neutron Science Center (LANSCE), a linear particle accelerator complex. The accelerator is used to conduct research in stockpile stewardship, radiobiology, materials science, and isotope production, among other areas. LANSCE consists of the Manuel Lujan Neutron Scattering Center, the Proton Storage Ring, the Weapons Neutron Research facilities, the Proton Radiography facility, and the high-intensity beam line (Line A).

The facility accelerates protons and hydrogen ions to an energy of 800 MeV into target materials such as graphite and tungsten to produce neutrons and other subatomic particles. The design current of the accelerator is approximately 1000 microamperes. The primary high-intensity beam line (Line A) and medical isotope production facility did not operate in 2000. Medium-intensity beam (100 microamp) operations to the Proton Storage Ring (PSR) and the Manuel Lujan Neutron Scattering Center were conducted from July to December of 2000. Low-intensity beam (up to 10 microamps) operations to the PSR, the Weapons Neutron Research facility and the Proton Radiography facility were conducted throughout most of 2000.

Airborne radioactive emissions result from the proton beams and secondary particles passing through and activating air molecules in the target cells, beam stop, and surrounding areas. The majority of the emissions are short-lived activation products such as ^{11}C, ^{13}N, and ^{15}O. Most of the activated air is vented through the main stacks; however, a fraction of the activated air becomes a fugitive emission from the target areas. In addition, there are three wastewater lagoons at TA-53 that have received radioactive liquid effluents from the accelerator; however, none of these lagoons received wastewater in 2000, and the old lagoon facility is being remedied. Two new solar evaporative basins were constructed and began operation in 1999 to evaporate wastewater from the accelerator. Evaporation of water from these facilities can result in a diffuse source of airborne tritium.

TA-54: This waste management site consists of active and inactive shallow land burial sites for solid waste and is the primary storage area for mixed and transuranic radioactive waste. Area G at TA-54 is a known source of diffuse emissions of tritium vapor. Resuspension of soil contaminated with low levels of plutonium/americium has also created a diffuse source. Shipments of transuranic waste for disposal at the Waste Isolation Pilot Plant began in 1999 and continued in 2000.

TA-55-4: As discussed in the January 1999 *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory*, this plutonium facility is slated for a plutonium pit production mission as well as for continuing in its traditional role of housing research-and-development applications in chemical and metallurgical processes for recovering, purifying, and converting

plutonium and other actinides.[2] A wide range of activities that include the heating, dissolution, forming, welding, etc., of special nuclear materials is conducted. Additional activities include developing the means to safely ship, receive, handle, and store nuclear materials, as well as to manage the wastes and residues produced by TA-55 operations.

SECTION II. AIR EMISSIONS DATA

61.94(b)(4): Point Sources

Sampled and unsampled point sources at LANL are listed in Table 1. The point sources are identified using an eight-digit identification number for each exhaust stack (ESIDNUM); the first two digits represent the LANL technical area, the next four digits the building area, and the last two digits the stack number. Also listed in Table 1 are type, number, and efficiency of the effluent controls used on the release points. Each stage of the high-efficiency particulate air (HEPA) exhaust filters is tested at least once every 12 months. The performance criteria for HEPA filter systems are a maximum penetration of 5×10^{-4} for one

Table 1. 40-61.94(b)(4-5) Release Point Data

ESIDNUM	Location	Control Description	Number of Effluent	Control Efficiency	Monitored
03001608	TA-03-16	none	0	0%	
03001609	TA-03-16	none	0	0%	
03001614	TA-03-16	none	0	0%	
03001616	TA-03-16	none	0	0%	
03001621	TA-03-16	none	0	0%	
03001641	TA-03-16	none	0	0%	
03002913	TA-03-29-1	unkown	0	0%	
03002914	TA-03-29-2	HEPA	2	99.95% each	√
03002915	TA-03-29-2	HEPA	2	99.95% each	√
03002919	TA-03-29-3	Aerosol 95	1	80%	√
03002920	TA-03-29-3	Aerosol 95	1	80%	√
03002921	TA-03-29-3	none	0	0%	
03002923	TA-03-29-4	FARR 30/30	1	~ 20%	√
03002924	TA-03-29-4	FARR 30/30	1	~ 20%	√
03002928	TA-03-29-5	HEPA	2	99.95% each	√
03002929	TA-03-29-5	HEPA	2	99.95% each	√
03002932	TA-03-29-7	HEPA	2	99.95% each	√
03002933	TA-03-29-7	HEPA	2	99.95% each	√
03002937	TA-03-29-V	HEPA	2	99.95% each	√
03002944	TA-03-29-9	RIGA-Flow 220	1	80%	√
03002945	TA-03-29-9	RIGA-Flow 220	1	80%	√
03002946	TA-03-29-9	RIGA-Flow 220	1	80%	√
03003401	TA-03-34	none	0	0%	
03003435	TA-03-34	none	0	0%	
03003501	TA-03-35	HEPA	1	99.95%	
03003999	TA-3-39	none	0	0%	

Table 1. 40-61.94(b)(4-5) Release Point Data (continued)

ESIDNUM	Location	Control Description	Number of Effluent	Control Efficiency	Monitored
03004025	TA-03-40	HEPA	1	99.95%	
03006601	TA-03-66	none	0	0%	
03006602	TA-03-66	none	0	0%	
03006603	TA-03-66	none	0	0%	
03006604	TA-03-66	none	0	0%	
03006605	TA-03-66	none	0	0%	
03006626	TA-03-66	HEPA	1	99.95%	
03006643	TA-03-66	none	0	0%	
03010222	TA-03-102	HEPA	1	99.95%	√
03010225	TA-03-102	HEPA	1	99.95%	
03014110	TA-03-141	none	0	0%	
03169801	TA-03-1698	none	0	0%	
09002103	TA-09-21	none	0	0%	
09003201	TA-09-32	none	0	0%	
15044699	TA-15-446	none	0	0%	
16020504	TA-16-205	CR/MS	1	>99%	√
16020599	TA-16-205	none	0	0%	
16024801	TA-16-248	none	0	0%	
18012701	TA-18-127	none	0	0%	
18016801	TA-18-168	none	0	0%	
21000507	TA-21-5	HEPA	2	99.95% each	
21002S00	TA-21-2S	HEPA	1	99.95%	
21015001	TA-21-150	HEPA	1	99.95%	
21015505	TA-21-155	CR/MS	1	>99%	
21020901	TA-21-209	CR/MS	1	>99%	
21021301	TA-21-213	none	0	0%	
21025704	TA-21-257	none	0	0%	
21041899	TA-21-418	none	0	0	

Table 1. 40-61.94(b)(4-5) Release Point Data (continued)

ESIDNUM	Location	Control Description	Number of Effluent	Control Efficiency	Monitored
33008606	TA-33-86	none	0	0%	√
35021305	TA-35-213	none	0	0%	
35021308	TA-35-213	none	0	0%	
41000104	TA-41-1	HEPA	2	99.95% each	
41000417	TA-41-4	none	0	0%	√
43000102	TA-43-1	none	0	0%	
43000109	TA-43-1	none	0	0%	
43000110	TA-43-1	none	0	0%	
43000112	TA-43-1	none	0	0%	
43000113	TA-43-1	none	0	0%	
43000134	TA-43-1	none	0	0%	
46002401	TA-46-24	none	0	0%	
46003101	TA-46-31	none	0	0%	
46003125	TA-46-31	none	0	0%	
46003141	TA-46-31	none	0	0%	
46004106	TA-46-41	none	0	0%	
46015405	TA-46-154	none	0	0%	
46015810	TA-46-158	none	0	0%	
48000107	TA-48-1	HEPA/Charcoal	2	99.95% each	√
48000111	TA-48-1	none	0	0%	
48000115	TA-48-1	none	0	0%	
48000135	TA-48-1	none	0	0%	
48000145	TA-48-1	none	0	0%	
48000154	TA-48-1	HEPA	2	99.95% each	√
48000160	TA-48-1	HEPA	1	99.95%	√
48000199	TA-48-1	HEPA	1	99.95%	
48004501	TA-48-45	none	0	0%	
50000102	TA-50-1	HEPA	1	99.95% each	√

Table 1. 40-61.94(b)(4-5) Release Point Data (continued)

ESIDNUM	Location	Control Description	Number of Effluent	Control Efficiency	Monitored
50000201	TA-50-2	none	0	0%	
50003701	TA-50-37	HEPA	2	99.95% each	√
50006901	TA-50-69	HEPA	1	99.95%	
50006902	TA-50-69	HEPA	1	99.95%	
50006903	TA-50-69	HEPA	2	99.95% each	√
50018500	TA-50-185	HEPA	1	99.95%	
53000303	TA-53-3	HEPA	1	99.95%	√
53000702	TA-53-7	HEPA	1	99.95%	√
53000799	TA-53-7	none	0	0%	
53036599	TA-53-365	none	0	0%	
53109010	TA-53-1090	none	0	0%	
54003300	TA-54-33	HEPA	1	99.95%	
54003601	TA-54-36	HEPA	1	99.95%	
54022601	TA-54-226	none	0	0%	
54028101	TA-54-281	HEPA	1	99.95%	
54100110	TA-54-1001	none	0	0%	
55000415	TA-55-4	HEPA	4	99.95% each	√
55000416	TA-55-4	HEPA	4	99.95% each	√
59000104	TA-59-1	none	0	0%	
59000114	TA-59-1	none	0	0%	
59000121	TA-59-1	none	0	0%	
59000122	TA-59-1	none	0	0%	
59000123	TA-59-1	none	0	0%	
59000124	TA-59-1	none	0	0%	
59000125	TA-59-1	none	0	0%	
59000126	TA-59-1	none	0	0%	
59000127	TA-59-1	none	0	0%	
59000130	TA-59-1	none	0	0%	

stage and 2.5×10^{-7} for two stages in series, in which penetration equals concentration of aerosol downstream of the air cleaner divided by concentration upstream.

The distance between each of 30 monitored point sources and the nearest receptor is provided in Table 2. The nearest receptor can be a residence, school, business, or office. In this report, the nearest receptor is defined as the public receptor most impacted by a given release point; that is, the air dispersion pattern is taken into account to determine the nearest or critical receptor location. The distance to the nearest milk-producing farm is 20 km east of the Laboratory's eastern boundary; the nearest farms producing meat and vegetables adjoin the Laboratory's eastern boundary, about 4 km from the main exhaust stack at LANSCE. More detailed agricultural information can be found in a supplemental LANL report.[3] At this time, LANL is not using this site-specific agricultural data in the CAP88 model; preprogrammed or default values for New Mexico are utilized for the number of beef and milk cattle and for agricultural productivity.

In addition to 30 monitored release points, approximately 40 unmonitored release points—distributed over more than 30 LANL buildings—are included in Table 1. Under 40 CFR 61.93(b)(4)(i), sampling of these release points is not required because each release point has a potential effective dose equivalent of less than 0.1 mrem/yr. at the critical receptor. However, in order to verify that emissions from unmonitored point sources remain low, LANL conducts periodic confirmatory measurements in the form of the Radioactive Materials Usage Survey. The purpose of the Usage Survey is to collect and analyze radioactive materials usage and process information for the monitored and unmonitored point sources at LANL.

Guided by Appendix D of 40 CFR 61, we have used data collected from the facilities in conjunction with engineering calculations and other methods to develop conservative emissions estimates from unmonitored point sources. Estimated potential effective dose equivalents (PEDEs) are calculated by modeling these emissions estimates using the EPA-approved CAP88 dose modeling software. A comprehensive survey of all of LANL's monitored and unmonitored point sources is conducted annually or biannually. Results of the 2000 Usage Survey can be found in the report *2000 Radioactive Materials Usage Survey for Point Sources*.[4] The Laboratory has established administrative requirements to evaluate all potential new sources. These requirements are established for the review of new Laboratory activities and projects to ensure that air quality regulatory requirements will be met before the activity or project begins.[5]

Nonpoint Sources

There are a variety of nonpoint sources within the 111 square kilometers of land occupied by LANL. Nonpoint sources can occur as diffuse or large-area sources or as leaks or fugitive emissions from facilities. Examples of nonpoint sources of airborne radionuclides include surface impoundments, shallow land burial sites, open burn sites, firing sites, outfalls, container storage areas, unvented buildings, waste-treatment areas, solid-waste management units, and tanks. The Laboratory measures annual average ambient concentrations of important airborne

Table 2. 40-61.94(b)(6) Distances from Monitored Release Points to Nearest Receptor

ESIDNUM	Nearest Receptor (m)	Receptor Direction
03002914	731	NE
03002915	732	NE
03002919	836	NNE
03002920	835	NNE
03002923	845	NE
03002924	846	NE
03002928	936	NE
03002929	937	NE
03002932	856	NNE
03002933	855	NNE
03002937	870	NE
03002944	937	NNE
03002945	939	NNE
03002946	938	NNE
03010222	1060	NE
16020504	778	SSW
21015505	680	NNW
21020901	712	NNW
33008606	977	WSW
41000417	197	N
48000107	750	NNE
48000154	751	NNE
48000160	764	NNE
50000102	1183	N
50003701	1171	N
50006903	1186	N
53000303	800	NNE
53000702	944	NNE
55000415	1016	NNE
55000416	1089	NNE

radionuclides (other than activated gases) at a number of potential receptor locations, as described below.

Beginning in 1995, LANL began summarizing the potential impacts of nonpoint sources by analyzing and reporting air concentration measurements collected at 17 ambient air-sampling sites around the Laboratory. Previously, LANL had estimated emissions from the most significant nonpoint sources and determined the impacts using EPA's dose assessment computer program. The Laboratory and EPA negotiated this new method of assessing nonpoint sources as part of a Federal Facility Compliance Agreement (FFCA).[6] Results of the air-sampling analysis are provided in Section III of this report. There were no unusual radionuclide readings measured at the air-sampling stations in 2000.

Radionuclide Emissions

Radionuclides released from sampled point sources, along with the annual release rate for each radionuclide, are documented in Table 9 (on pages 43 to 45). No detectable emissions are denoted as ND.

Pollution Controls

At Los Alamos National Laboratory, the most common type of filtration, for emission control purposes, is the high efficiency particulate air (HEPA) filter. HEPA filters are constructed of submicrometer glass fibers that are pressed and glued into a compact, paper-like, pleated media. The paper media is folded alternately over corrugated separators and mounted into a metal or wood frame in eight standard sizes and airflow capacities. A Type I nuclear grade HEPA filter is capable of removing 99.97% of 0.3 mm particles at rated airflow. Other types of filters used in ventilation systems are Aerosol 95, RIGA-FLOW 220, and FARR 30/30. These units are typically used as prefilters in HEPA filtration systems. These filters are significantly less efficient than HEPA filters and are typically used for collecting particulate matter larger than 5 μm. The above-mentioned filters are only effective for particulates. When the contaminant of concern is in the form of a gas, activated charcoal beds are used. Charcoal beds collect the gas contaminant through an adsorption process in which the gas comes in contact with the charcoal and adheres to its surface. The charcoal can be coated with different types of materials to make the adsorption process more efficient for different types of contaminants. Typically, charcoal beds can achieve an efficiency of 98% capture with a resident time of 0.25 seconds.

Tritium effluent controls are generally composed of a catalytic reactor and a molecular sieve bed (CR/MS). Tritium-contaminated effluent is passed through a catalyst that converts elemental tritium (HT) into tritium oxide (HTO). This HTO is then collected as water on a molecular sieve bed. This process can be repeated until the tritium level is at, or below, the desired level. The effluent is then vented through the stack.

SECTION III. DOSE ASSESSMENT

61.94(b)(7): Description of Dose Calculations

Effective dose equivalent (or dose) calculations for point sources, unsampled point sources, and nonpoint gaseous activation products from LANSCE and TA-18 were performed with the mainframe CAP88 version of AIRDOS. This procedure included using PREPAR to prepare the input file to AIRDOS and using the DARTAB preprocessor to prepare the dose conversion factor input file for DARTAB. The calculations used dose conversion factors taken from the RADRISK database that was distributed along with the CAP88 programs.[7] Verification of the CAP88 code was performed regularly by running the EPA test cases originally distributed with the mainframe version.[8]

Development of Source Term

Tritium Emissions

Tritium emissions from the Laboratory's tritium facilities are measured using a collection device known as a bubbler. This device enables the Laboratory to determine not only the total amount of tritium released but also whether it is in the elemental (HT) or oxide (HTO) form. The bubbler operates by pulling a continuous sample of air from the stack, which is then "bubbled" through three sequential vials containing ethylene glycol. The ethylene glycol collects the water vapor from the sample of air, including any tritium that is part of a water molecule (tritium oxide or HTO). After "bubbling" through these three vials, essentially all HTO is removed from the air, leaving elemental tritium or HT. The sample, containing the elemental tritium, is then passed through a palladium catalyst that converts the elemental tritium to HTO. The sample is pulled through three additional vials containing ethylene glycol, which collects the newly formed HTO. The amount of HTO and HT is determined by analyzing the ethylene glycol for the presence of tritium using liquid scintillation counting (LSC). Although LANL's measurement device can distinguish the presence of HTO from HT, all emissions of tritium are assumed to be HTO for modeling the off-site dose. Because HTO contributes approximately 20,000 times more dose than an equivalent amount of HT, this is a conservative measure that further ensures that the dose to an off-site receptor is not underestimated.

Tritium emissions from LANSCE (which do not require monitoring under 40 CFR 61.93(b)(4)(i)) are determined using a silica gel sampler. A sample of stack air is suctioned through a cartridge containing silica gel. The silica gel collects the water vapor from the air, including any HTO. The water is distilled from the sample, and the amount of HTO is determined by analyzing the water using LSC. Because the primary source for tritium at LANSCE is activated water, sampling for only HTO is appropriate. These results are also corrected using the absolute humidity measured in the stack.

Radioactive Particle Emissions

Emissions of radioactive particulate matter, generated by operations at facilities such as the Chemistry and Metallurgy Research (CMR) Building and TA-55, are sampled using a glass-fiber filter. A continuous sample of stack air is suctioned through the filter, where small particles of radioactive material are captured. These samples are analyzed weekly using gross

alpha/beta counting and gamma spectroscopy to identify any increase in emissions and to identify short-lived radioactive materials. Every six months, LANL combines these samples for subsequent analysis at an off-site Laboratory. These composite samples are analyzed to determine the total activity of materials such as uranium-234/235/238, plutonium-238/239/240, and americium-241. These data are then combined with estimates of sampling losses and stack and sample flows to calculate emissions. For the case of radionuclides that have short-lived daughters, LANL includes these progeny in the source term. For example, the analytical laboratory measures the parent radionuclide uranium-238, and its short-lived progeny (thorium-234 and protactinium-234m) are assumed to be in equilibrium with uranium-238.

Vapor Form Emissions

Vapor emissions, generated by LANSCE operations and by hot cell activities at CMR and TA-48, are sampled using a charcoal filter or canister. A continuous sample of stack air is pulled through a charcoal filter where vaporous emissions of radionuclides are adsorbed. The amount and identity of the radionuclide(s) present on the filter are determined through the use of gamma spectroscopy. This information is then used to calculate emissions. Radionuclides of this type include gallium-68, germanium-68, bromine-82, and mercury-197.

Gaseous Mixed Activation Products (GMAP)

GMAP emissions, resulting from activities at LANSCE, are measured using near real-time monitoring data. A sample of stack air is suctioned through an ionization chamber that measures the total amount of radioactivity in the sample. Specific radioisotopes are identified through the use of gamma spectroscopy and decay curves. This information is then used to calculate emissions. Radionuclides of this type include carbon-11, nitrogen-13, and oxygen-15.

Summary of Input Parameters

Effective dose equivalents to potential receptors were calculated for all radioactive air emissions from sampled LANL point sources. Input parameters for these point sources are provided in Table 3. The geographic locations of the release points, given in NM State Plane coordinates, are provided in Table 4. The relationships of receptor locations to the individual release points are provided in Table 5. The nearest receptor location is different for each point source. However, because the majority of the yearly dose has historically been caused by LANSCE emissions, the LANSCE critical receptor location has historically been the maximum dose location for all Laboratory emissions. This location is a business office approximately 800 meters north-northeast of the LANSCE stack. Emissions and doses from LANSCE are calculated on a monthly basis during beam operations to ensure continued compliance with the 10 mrem/yr. standard.

Other site-specific parameters and the sources of these data are provided in Table 6. The LANL Air Quality Group operates an on-site network of meteorological monitoring towers. Data gathered from the tower monitors are summarized and formatted for input to the CAP88 program. For 2000, data from four different towers were used for the air dispersion modeling; the tower data most representative of the release point is applied. Copies of the meteorological data files used for the 2000 dose assessment are provided in Table 7.

Table 3. 40-61.94(b)(7) User-Supplied Data—Monitored Stack Parameters

ESIDNUM	Height (m)	Diameter (m)	Exit Velocity (m/s)	Nearest Meteorological Tower
03002914	15.9	1.07	6.60	TA-6
03002915	15.9	1.05	24.35	TA-6
03002919	15.9	1.07	28.63	TA-6
03002920	15.9	1.07	6.76	TA-6
03002923	15.9	1.07	23.03	TA-6
03002924	15.9	1.06	15.52	TA-6
03002928	15.9	1.05	21.40	TA-6
03002929	15.9	1.07	22.91	TA-6
03002932	15.9	1.07	19.61	TA-6
03002933	15.9	1.06	18.83	TA-6
03002937	16.8	0.20	16.32	TA-6
03002944	16.5	1.52	11.29	TA-6
03002945	16.5	1.52	8.20	TA-6
03002946	16.5	1.88	5.30	TA-6
03010222	13.4	0.91	1.32	TA-6
16020504	18.3	0.46	21.35	TA-6
21015505	29.9	0.79	8.71	TA-53
21020901	22.9	1.22	11.39	TA-53
33008606	23.4	0.61	12.09	TA-49
41000417	30.8	1.52	2.34	TA-6
48000107	13.4	0.30	20.86	TA-6
48000154	13.1	0.91	7.07	TA-6
48000160	12.4	0.38	10.90	TA-6
50000102	15.5	1.82	13.03	TA-6
50003701	12.4	0.91	7.23	TA-6
50006903	10.5	0.31	4.60	TA-6
53000303	33.5	0.90	12.37	TA-53
53000702	13.1	0.91	9.58	TA-53
55000415	9.5	0.93	7.51	TA-6
55000416	9.5	0.94	11.38	TA-6

Table 4. 69.94(b)(7) User-Supplied Data—Monitored Stack Parameters—NM state Plane coordinates (NAD'83)

ESIDNUM	Easting	Northing
03002914	1,619,176	1,772,806
03002915	1,619,171	1,772,805
03002919	1,619,252	1,772,350
03002920	1,619,257	1,772,352
03002923	1,618,691	1,772,719
03002924	1,618,686	1,772,718
03002928	1,618,774	1,772,265
03002929	1,618,767	1,772,265
03002932	1,619,268	1,772,267
03002933	1,619,272	1,772,269
03002937	1,618,966	1,772,397
03002944	1,618,987	1,772,121
03002945	1,618,977	1,772,120
03002946	1,618,982	1,772,121
03010222	1,618,354	1,772,074
16020504	1,609,447	1,760,866
21015505	1,633,757	1,774,182
21020901	1,633,991	1,774,175
33008606	1,638,721	1,740,076
41000417	1,626,190	1,774,437
48000107	1,623,591	1,770,693
48000154	1,623,744	1,770,650
48000160	1,623,613	1,770,638
50000102	1,626,157	1,769,086
50003701	1,625,757	1,769,109
50006903	1,625,579	1,769,065
53000303	1,638,133	1,771,546
53000702	1,638,057	1,771,054
55000415	1,624,870	1,769,742
55000416	1,624,675	1,769,550

Table 5. User Supplied Data—Highest Offsite Dose Location for Monitored Release Points (meters)

ESIDNUM	Associated Meteorlogical	Distance to LANL Highest Dose Location	Direction to LANL Highest Dose Location
03002914	TA-06	5,981	E
03002915	TA-06	5,983	E
03002919	TA-06	5,969	E
03002920	TA-06	5,967	E
03002923	TA-06	6,130	E
03002924	TA-06	6,132	E
03002928	TA-06	6,116	E
03002929	TA-06	6,118	E
03002932	TA-06	5,966	E
03002933	TA-06	5,965	E
03002937	TA-06	6,054	E
03002944	TA-06	6,055	E
03002945	TA-06	6,057	E
03002946	TA-06	6,057	E
03010222	TA-06	6,249	E
16020504	TA-06	9,799	ENE
21015505	TA-53	1,525	E
21020901	TA-53	1,453	E
33008606	TA-54	10,362	N
41000417	TA-53	3,832	E
48000107	TA-06	4,730	ENE
48000154	TA-06	4,694	ENE
48000160	TA-06	4,733	ENE
50000102	TA-06	4,131	ENE
50003701	TA-06	4,242	ENE
50006903	TA-06	4,297	ENE
53000303	TA-53	800	NNE
53000702	TA-53	944	NNE
55000415	TA-53	4,434	ENE
55000416	TA-53	4,508	ENE

Table 6. 40-61.94(b)(7) User Supplied Data—Other Input Parameters

Description	Value	Units	CAP88 variable name	Reference
Annual rainfall rate	45.3	cm/y	RR	Bowen (1990)
Lid height	1525	m	LIPO	Holzworth (1972)
Annual median temp	281.9	K	TA	Bowen (1990)
E-vertical temperature gradient	0.02	K/m	TG	EPA (1995)
F-vertical temperature gradient	0.035	K/m	TG	EPA (1995)
G-vertical temperature gradient	0.035	K/m	TG	EPA (1995)
Food supply fraction - local vegetables	0.076		F1V	EPA (1989)
Food supply fraction - vegetable regional	0.924		F2V	EPA (1989)
Food supply fraction - vegetable imported	0		F3V	EPA (1989)
Food supply fraction - meat local	0.008		F1B	EPA (1989)
Food supply fraction - meat regional	0.992		F2B	EPA (1989)
Food supply fraction - meat imported	0		F3B	EPA (1989)
Food supply fraction - milk local	0		F1M	EPA (1989)
Food supply fraction - milk regional	1		F2M	EPA (1989)
Food supply fraction - milk imported	0		F3M	EPA (1989)
Ground surface roughness factor	0.5		GSCFAC	EPA (1989)

Brent M. Bowen, "Los Alamos Climatology," Los Alamos National Laboratory report LA-11735-MS (1990).

George C. Holzworth, "Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the Contiguous United States," U.S. Environmental Protection Agency Office of Air Programs report (1972).

U.S. Environmental Protection Agency, "User's Guide for the Industrial Source Complex (ISC3) Dispersion Models Volume II - Description of Model Algorithms," EPA-454/B-95-003b (1995).

U.S. Environmental Protection Agency, "Risk Assessments Methodology, Environmental Impact Statement, NESHAPS for Radionuclides, Background Information Document - Volume 1," EPA/520/189-005 (1989).

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays

CAP88 Input Data for 2000 TA-6 Meteorological Tower

1	1	0.000830	.000460	.000030	.000000	.000000	.00000
1	2	0.001270	.000400	.000000	.000000	.000000	.00000
1	3	0.003030	.001570	.000000	.000000	.000000	.00000
1	4	0.005930	.003550	.000030	.000000	.000000	.00000
1	5	0.008860	.005120	.000000	.000000	.000000	.00000
1	6	0.007010	.007660	.000000	.000000	.000000	.00000
1	7	0.006390	.009010	.000000	.000000	.000000	.00000
1	8	0.004540	.008710	.000190	.000000	.000000	.00000
1	9	0.002780	.004140	.000060	.000000	.000000	.00000
1	10	0.001610	.001390	.000060	.000000	.000000	.00000
1	11	0.000960	.000710	.000000	.000000	.000000	.00000
1	12	0.000560	.001020	.000060	.000000	.000000	.00000
1	13	0.000560	.000430	.000000	.000000	.000000	.00000
1	14	0.000310	.000650	.000030	.000000	.000000	.00000
1	15	0.000280	.000520	.000120	.000000	.000000	.00000
1	16	0.000560	.000990	.000060	.000000	.000000	.00000
2	1	0.000310	.000590	.000120	.000000	.000000	.00000
2	2	0.000460	.000860	.000060	.000000	.000000	.00000
2	3	0.000740	.001510	.000030	.000000	.000000	.00000
2	4	0.001640	.002900	.000000	.000000	.000000	.00000
2	5	0.002470	.004480	.000000	.000000	.000000	.00000
2	6	0.001730	.004110	.000090	.000000	.000000	.00000
2	7	0.001330	.005060	.000090	.000000	.000000	.00000
2	8	0.001570	.007350	.000710	.000000	.000000	.00000
2	9	0.001270	.006240	.001170	.000000	.000000	.00000
2	10	0.000560	.001910	.001570	.000000	.000000	.00000
2	11	0.000120	.001080	.000930	.000030	.000000	.00000
2	12	0.000120	.000710	.000620	.000090	.000000	.00000
2	13	0.000090	.000340	.000280	.000000	.000000	.00000
2	14	0.000090	.000620	.000280	.000000	.000000	.00000
2	15	0.000090	.000900	.000710	.000000	.000000	.00000
2	16	0.000190	.000710	.000490	.000030	.000000	.00000
3	1	0.000490	.001170	.000430	.000000	.000000	.00000
3	2	0.001170	.002010	.001300	.000090	.000000	.00000
3	3	0.001450	.004110	.001390	.000060	.000000	.00000
3	4	0.002100	.005530	.000340	.000000	.000000	.00000
3	5	0.002560	.005930	.000280	.000000	.000000	.00000
3	6	0.001850	.003490	.000120	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User-Supplied Data – Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-6 Meteorological Tower

3	7	0.001480	.005400	.000310	.000000	.000000	.00000
3	8	0.002560	.011640	.004010	.000030	.000000	.00000
3	9	0.001940	.017840	.015030	.000190	.000000	.00000
3	10	0.000990	.010710	.010310	.000340	.000000	.00000
3	11	0.000490	.003520	.004910	.000340	.000000	.00000
3	12	0.000400	.002840	.005990	.000560	.000000	.00000
3	13	0.000190	.001910	.002930	.000280	.000000	.00000
3	14	0.000120	.001230	.002930	.000150	.000000	.00000
3	15	0.000280	.001640	.005430	.000590	.000000	.00000
3	16	0.000340	.001610	.001850	.000060	.000000	.00000
4	1	0.007500	.006950	.001230	.000250	.000000	.00000
4	2	0.007290	.008860	.004410	.000460	.000000	.00000
4	3	0.005190	.006170	.001050	.000060	.000000	.00000
4	4	0.004850	.003610	.000190	.000000	.000000	.00000
4	5	0.004410	.002220	.000150	.000000	.000000	.00000
4	6	0.003920	.001510	.000090	.000000	.000000	.00000
4	7	0.003210	.001850	.000060	.000030	.000000	.00000
4	8	0.005620	.004570	.001570	.000090	.000000	.00000
4	9	0.009570	.019110	.006270	.000430	.000000	.00000
4	10	0.008950	.030250	.008920	.001020	.000030	.00000
4	11	0.006790	.023490	.008270	.001480	.000520	.00000
4	12	0.005680	.013980	.007690	.003890	.000090	.00000
4	13	0.004540	.010220	.014910	.007930	.000650	.00000
4	14	0.003920	.009260	.018920	.012100	.002220	.00065
4	15	0.005870	.013610	.014850	.004510	.000710	.00022
4	16	0.005590	.008610	.002220	.000250	.000000	.00000
5	1	0.005090	.003830	.000000	.000000	.000000	.00000
5	2	0.003240	.002280	.000000	.000000	.000000	.00000
5	3	0.001790	.000960	.000000	.000000	.000000	.00000
5	4	0.001200	.000340	.000000	.000000	.000000	.00000
5	5	0.001700	.000060	.000000	.000000	.000000	.00000
5	6	0.001050	.000090	.000000	.000000	.000000	.00000
5	7	0.001080	.000120	.000000	.000000	.000000	.00000
5	8	0.001790	.000280	.000000	.000000	.000000	.00000
5	9	0.003520	.002190	.000000	.000000	.000000	.00000
5	10	0.005370	.006540	.000000	.000000	.000000	.00000
5	11	0.005800	.013120	.000030	.000000	.000000	.00000
5	12	0.004540	.018000	.000030	.000000	.000000	.00000
5	13	0.003490	.013340	.000740	.000000	.000000	.00000
5	14	0.002960	.006880	.002190	.000000	.000000	.00000
5	15	0.003830	.021950	.000340	.000000	.000000	.00000
5	16	0.005800	.010680	.000000	.000000	.000000	.00000
6	1	0.007100	.001820	.000000	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User-Supplied Data – Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-6 Meteorological Tower

6	2	0.003740	.000340	.000000	.000000	.000000	.00000
6	3	0.001790	.000120	.000000	.000000	.000000	.00000
6	4	0.001230	.000000	.000000	.000000	.000000	.00000
6	5	0.000590	.000000	.000000	.000000	.000000	.00000
6	6	0.000400	.000000	.000000	.000000	.000000	.00000
6	7	0.000560	.000030	.000000	.000000	.000000	.00000
6	8	0.001080	.000030	.000000	.000000	.000000	.00000
6	9	0.002070	.000090	.000000	.000000	.000000	.00000
6	10	0.004170	.000680	.000000	.000000	.000000	.00000
6	11	0.005930	.002070	.000000	.000000	.000000	.00000
6	12	0.007380	.009110	.000000	.000000	.000000	.00000
6	13	0.006850	.023550	.000250	.000000	.000000	.00000
6	14	0.006880	.026270	.000900	.000000	.000000	.00000
6	15	0.008300	.011850	.000000	.000000	.000000	.00000
6	16	0.007720	.004070	.000000	.000000	.000000	.00000

Table 7. 61.94(b)(7) User Supplied Data—Wind Frequency Arrays–continued

CAP88 Input Data for 2000 TA-49 Meteorological Tower

1	1	0.000320	.000110	.000000	.000000	.000000	.00000
1	2	0.001030	.000170	.000000	.000000	.000000	.00000
1	3	0.000920	.000290	.000000	.000000	.000000	.00000
1	4	0.001750	.001030	.000000	.000000	.000000	.00000
1	5	0.002670	.001890	.000000	.000000	.000000	.00000
1	6	0.002070	.002470	.000000	.000000	.000000	.00000
1	7	0.002210	.002350	.000000	.000000	.000000	.00000
1	8	0.001350	.001690	.000000	.000000	.000000	.00000
1	9	0.000980	.001090	.000000	.000000	.000000	.00000
1	10	0.000460	.000800	.000000	.000000	.000000	.00000
1	11	0.000430	.000320	.000000	.000000	.000000	.00000
1	12	0.000290	.000230	.000000	.000000	.000000	.00000
1	13	0.000260	.000140	.000000	.000000	.000000	.00000
1	14	0.000170	.000170	.000030	.000000	.000000	.00000
1	15	0.000110	.000200	.000030	.000000	.000000	.00000
1	16	0.000230	.000170	.000000	.000000	.000000	.00000
2	1	0.000060	.000090	.000000	.000000	.000000	.00000
2	2	0.000140	.000260	.000000	.000000	.000000	.00000
2	3	0.000290	.000460	.000000	.000000	.000000	.00000
2	4	0.000490	.000890	.000000	.000000	.000000	.00000
2	5	0.000890	.002270	.000000	.000000	.000000	.00000
2	6	0.000400	.002470	.000000	.000000	.000000	.00000
2	7	0.000490	.002010	.000030	.000000	.000000	.00000
2	8	0.000430	.001520	.000000	.000000	.000000	.00000
2	9	0.000170	.001460	.000000	.000000	.000000	.00000
2	10	0.000170	.000720	.000000	.000000	.000000	.00000
2	11	0.000030	.000490	.000030	.000000	.000000	.00000
2	12	0.000060	.000400	.000000	.000000	.000000	.00000
2	13	0.000140	.000260	.000060	.000000	.000000	.00000
2	14	0.000030	.000370	.000060	.000000	.000000	.00000
2	15	0.000060	.000060	.000000	.000000	.000000	.00000
2	16	0.000060	.000110	.000000	.000000	.000000	.00000
3	1	0.000170	.000260	.000030	.000000	.000000	.00000
3	2	0.000260	.000490	.000110	.000000	.000000	.00000
3	3	0.000230	.001180	.000090	.000000	.000000	.00000
3	4	0.000720	.002870	.000060	.000000	.000000	.00000
3	5	0.000770	.006480	.000060	.000000	.000000	.00000
3	6	0.000660	.005140	.000090	.000000	.000000	.00000
3	7	0.000490	.004560	.000260	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-49 Meteorological Tower

3	9	0.000400	.005570	.000920	.000000	.000000	.00000
3	10	0.000430	.001950	.000720	.000000	.000000	.00000
3	11	0.000320	.000860	.000230	.000000	.000000	.00000
3	12	0.000140	.000660	.000490	.000000	.000000	.00000
3	13	0.000090	.000720	.001000	.000200	.000000	.00000
3	14	0.000060	.000830	.001690	.000110	.000000	.00000
3	15	0.000090	.000340	.000230	.000000	.000000	.00000
3	16	0.000140	.000370	.000090	.000000	.000000	.00000
4	1	0.004050	.007520	.004020	.002150	.000060	.00000
4	2	0.004020	.009040	.004330	.002270	.000090	.00000
4	3	0.003500	.011990	.005940	.000690	.000140	.00000
4	4	0.003530	.010760	.004190	.000260	.000030	.00000
4	5	0.002350	.008520	.002350	.000060	.000000	.00000
4	6	0.001980	.005390	.001610	.000260	.000030	.00000
4	7	0.002150	.005570	.002300	.000400	.000140	.00000
4	8	0.002350	.008350	.008840	.002930	.000170	.00003
4	9	0.003440	.024390	.049320	.026190	.000980	.00000
4	10	0.004050	.020080	.029580	.013400	.000980	.00014
4	11	0.002900	.011070	.014890	.007860	.001690	.00029
4	12	0.002750	.008490	.011220	.008090	.002410	.00032
4	13	0.002380	.009210	.014520	.008920	.001430	.00003
4	14	0.002470	.008290	.016070	.009640	.000980	.00020
4	15	0.003440	.006940	.009900	.007750	.000830	.00017
4	16	0.002810	.008180	.006340	.003930	.000690	.00003
5	1	0.002700	.011500	.006110	.000000	.000000	.00000
5	2	0.002730	.006020	.001920	.000000	.000000	.00000
5	3	0.001920	.003360	.000860	.000000	.000000	.00000
5	4	0.001690	.001150	.000320	.000000	.000000	.00000
5	5	0.001350	.000950	.000030	.000000	.000000	.00000
5	6	0.000920	.000920	.000090	.000000	.000000	.00000
5	7	0.000950	.000660	.000110	.000000	.000000	.00000
5	8	0.001090	.001380	.000720	.000000	.000000	.00000
5	9	0.001720	.007030	.003240	.000000	.000000	.00000
5	10	0.002900	.017820	.004500	.000000	.000000	.00000
5	11	0.002270	.018850	.008000	.000000	.000000	.00000
5	12	0.002180	.010930	.005050	.000000	.000000	.00000
5	13	0.001920	.008750	.003100	.000000	.000000	.00000
5	14	0.002440	.009750	.008350	.000000	.000000	.00000
5	15	0.002500	.010700	.005340	.000000	.000000	.00000
5	16	0.002900	.008090	.002780	.000000	.000000	.00000
6	1	0.005140	.011560	.001950	.000000	.000000	.00000
6	2	0.004330	.001780	.000090	.000000	.000000	.00000
6	3	0.002380	.000340	.000030	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-49 Meteorological Tower

6	4	0.001380	.000060	.000000	.000000	.000000	.00000
6	5	0.001030	.000140	.000000	.000000	.000000	.00000
6	6	0.000860	.000170	.000000	.000000	.000000	.00000
6	7	0.001180	.000260	.000030	.000000	.000000	.00000
6	8	0.001150	.000630	.000060	.000000	.000000	.00000
6	9	0.001920	.002180	.000140	.000000	.000000	.00000
6	10	0.002440	.004850	.000340	.000000	.000000	.00000
6	11	0.003440	.009320	.000770	.000000	.000000	.00000
6	12	0.003900	.016980	.002500	.000000	.000000	.00000
6	13	0.002520	.022260	.006770	.000000	.000000	.00000
6	14	0.003070	.013970	.007890	.000000	.000000	.00000
6	15	0.004390	.012190	.004050	.000000	.000000	.00000
6	16	0.005080	.021750	.011130	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-53 Meteorological Tower

1	1	0.000900	.000320	.000000	.000000	.000000	.00000
1	2	0.002050	.000400	.000000	.000000	.000000	.00000
1	3	0.004570	.001420	.000000	.000000	.000000	.00000
1	4	0.005760	.004170	.000000	.000000	.000000	.00000
1	5	0.005410	.005350	.000000	.000000	.000000	.00000
1	6	0.003560	.004830	.000000	.000000	.000000	.00000
1	7	0.003010	.002980	.000030	.000000	.000000	.00000
1	8	0.002810	.002340	.000030	.000000	.000000	.00000
1	9	0.001620	.001360	.000000	.000000	.000000	.00000
1	10	0.000720	.000780	.000000	.000000	.000000	.00000
1	11	0.000580	.000430	.000000	.000000	.000000	.00000
1	12	0.000320	.000380	.000000	.000000	.000000	.00000
1	13	0.000290	.000320	.000030	.000000	.000000	.00000
1	14	0.000520	.000380	.000000	.000000	.000000	.00000
1	15	0.000380	.000460	.000090	.000000	.000000	.00000
1	16	0.000520	.000320	.000000	.000000	.000000	.00000
2	1	0.000140	.000120	.000000	.000000	.000000	.00000
2	2	0.000430	.000460	.000000	.000000	.000000	.00000
2	3	0.001210	.001300	.000000	.000000	.000000	.00000
2	4	0.001420	.003530	.000000	.000000	.000000	.00000
2	5	0.001010	.004510	.000000	.000000	.000000	.00000
2	6	0.000670	.003960	.000000	.000000	.000000	.00000
2	7	0.000670	.002660	.000000	.000000	.000000	.00000
2	8	0.000610	.002050	.000000	.000000	.000000	.00000
2	9	0.000550	.001300	.000000	.000000	.000000	.00000
2	10	0.000200	.000750	.000030	.000000	.000000	.00000
2	11	0.000090	.000520	.000000	.000000	.000000	.00000
2	12	0.000030	.000400	.000030	.000000	.000000	.00000
2	13	0.000030	.000400	.000060	.000000	.000000	.00000
2	14	0.000140	.000290	.000170	.000000	.000000	.00000
2	15	0.000120	.000400	.000090	.000000	.000000	.00000
2	16	0.000140	.000140	.000000	.000000	.000000	.00000
3	1	0.000200	.000430	.000170	.000000	.000000	.00000
3	2	0.000870	.001100	.000350	.000000	.000000	.00000
3	3	0.001590	.003180	.000400	.000000	.000000	.00000
3	4	0.001790	.006880	.000200	.000000	.000000	.00000
3	5	0.000950	.007690	.000290	.000000	.000000	.00000
3	6	0.000640	.005730	.000320	.000000	.000000	.00000
3	7	0.000780	.004830	.000030	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-53 Meteorological Tower

3	8	0.000780	.005610	.000230	.000000	.000000	.00000
3	9	0.000720	.005180	.000950	.000000	.000000	.00000
3	10	0.000430	.002370	.000380	.000000	.000000	.00000
3	11	0.000170	.001100	.000460	.000030	.000000	.00000
3	12	0.000090	.001190	.000550	.000000	.000000	.00000
3	13	0.000200	.001300	.001420	.000030	.000000	.00000
3	14	0.000120	.000720	.001620	.000000	.000000	.00000
3	15	0.000140	.000400	.000840	.000030	.000000	.00000
3	16	0.000230	.000350	.000170	.000000	.000000	.00000
4	1	0.007290	.007900	.005840	.003070	.000460	.00000
4	2	0.006680	.009520	.006190	.002550	.000290	.00000
4	3	0.005580	.009890	.003270	.000430	.000030	.00000
4	4	0.004980	.009520	.001710	.000060	.000000	.00000
4	5	0.003820	.006600	.000950	.000000	.000000	.00000
4	6	0.003470	.005120	.000930	.000170	.000000	.00000
4	7	0.003010	.005060	.001680	.000200	.000000	.00000
4	8	0.003470	.011690	.008850	.002690	.000430	.00003
4	9	0.003910	.020830	.035030	.009200	.000140	.00000
4	10	0.004050	.020450	.038790	.014030	.000780	.00012
4	11	0.002690	.014960	.019790	.009340	.001240	.00035
4	12	0.002780	.008560	.014120	.007170	.001620	.00000
4	13	0.003270	.009230	.017360	.005350	.001130	.00003
4	14	0.003240	.008040	.014000	.005700	.000610	.00012
4	15	0.003410	.005580	.007230	.004450	.000720	.00014
4	16	0.005440	.004800	.004570	.002080	.000550	.00003
5	1	0.005640	.009920	.002600	.000000	.000000	.00000
5	2	0.004430	.006510	.002170	.000000	.000000	.00000
5	3	0.003500	.003070	.001010	.000000	.000000	.00000
5	4	0.002340	.001760	.000140	.000000	.000000	.00000
5	5	0.002430	.001420	.000000	.000000	.000000	.00000
5	6	0.001760	.000840	.000060	.000000	.000000	.00000
5	7	0.001620	.001330	.000030	.000000	.000000	.00000
5	8	0.001530	.002080	.000400	.000000	.000000	.00000
5	9	0.001710	.007380	.003040	.000000	.000000	.00000
5	10	0.002080	.021260	.018340	.000000	.000000	.00000
5	11	0.002490	.025950	.013940	.000000	.000000	.00000
5	12	0.002780	.015910	.013650	.000000	.000000	.00000
5	13	0.002660	.013390	.009690	.000000	.000000	.00000
5	14	0.003210	.009370	.003070	.000000	.000000	.00000
5	15	0.003620	.005870	.002720	.000000	.000000	.00000
5	16	0.004600	.008970	.002370	.000000	.000000	.00000
6	1	0.003960	.001530	.000140	.000000	.000000	.00000
6	2	0.004920	.001650	.000030	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-53 Meteorological Tower

6	3	0.003500	.001070	.000000	.000000	.000000	.00000
6	4	0.003360	.000930	.000000	.000000	.000000	.00000
6	5	0.003440	.000230	.000000	.000000	.000000	.00000
6	6	0.003210	.000290	.000000	.000000	.000000	.00000
6	7	0.003010	.000750	.000000	.000000	.000000	.00000
6	8	0.003210	.001270	.000000	.000000	.000000	.00000
6	9	0.003930	.003410	.000000	.000000	.000000	.00000
6	10	0.004600	.005440	.000140	.000000	.000000	.00000
6	11	0.003960	.003880	.000120	.000000	.000000	.00000
6	12	0.003040	.006390	.001040	.000000	.000000	.00000
6	13	0.003100	.008130	.002080	.000000	.000000	.00000
6	14	0.003070	.006250	.000290	.000000	.000000	.00000
6	15	0.004340	.002720	.000000	.000000	.000000	.00000
6	16	0.003730	.002290	.000030	.000000	.000000	.00000

Table 7. 40-61.94(b)(7) User Supplied Data—Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-54 Meteorological Tower

1	1	0.000600	.000170	.000000	.000000	.000000	.00000
1	2	0.001180	.000860	.000000	.000000	.000000	.00000
1	3	0.002210	.002520	.000000	.000000	.000000	.00000
1	4	0.005500	.005530	.000000	.000000	.000000	.00000
1	5	0.009230	.010520	.000000	.000000	.000000	.00000
1	6	0.008660	.008400	.000000	.000000	.000000	.00000
1	7	0.005880	.005130	.000000	.000000	.000000	.00000
1	8	0.003700	.004240	.000000	.000000	.000000	.00000
1	9	0.002210	.002750	.000000	.000000	.000000	.00000
1	10	0.001090	.002150	.000090	.000000	.000000	.00000
1	11	0.000860	.000460	.000000	.000000	.000000	.00000
1	12	0.000460	.000570	.000030	.000000	.000000	.00000
1	13	0.000370	.000320	.000000	.000000	.000000	.00000
1	14	0.000260	.000230	.000000	.000000	.000000	.00000
1	15	0.000230	.000170	.000030	.000000	.000000	.00000
1	16	0.000290	.000260	.000000	.000000	.000000	.00000
2	1	0.000090	.000060	.000000	.000000	.000000	.00000
2	2	0.000230	.000430	.000000	.000000	.000000	.00000
2	3	0.000800	.002440	.000000	.000000	.000000	.00000
2	4	0.000950	.004160	.000170	.000000	.000000	.00000
2	5	0.000660	.003350	.000200	.000030	.000000	.00000
2	6	0.000630	.002210	.000170	.000030	.000000	.00000
2	7	0.000600	.001890	.000000	.000000	.000000	.00000
2	8	0.000720	.002030	.000000	.000000	.000000	.00000
2	9	0.000290	.002610	.000110	.000000	.000000	.00000
2	10	0.000140	.002010	.000030	.000000	.000000	.00000
2	11	0.000110	.000370	.000000	.000000	.000000	.00000
2	12	0.000110	.000460	.000030	.000000	.000000	.00000
2	13	0.000030	.000490	.000090	.000000	.000000	.00000
2	14	0.000110	.000200	.000110	.000000	.000000	.00000
2	15	0.000110	.000110	.000030	.000000	.000000	.00000
2	16	0.000110	.000170	.000030	.000000	.000000	.00000
3	1	0.000140	.000540	.000030	.000000	.000000	.00000
3	2	0.000370	.002090	.000260	.000000	.000000	.00000
3	3	0.000830	.006880	.000720	.000000	.000000	.00000
3	4	0.001290	.005620	.001030	.000000	.000000	.00000
3	5	0.000890	.002090	.000340	.000000	.000000	.00000
3	6	0.000490	.001200	.000140	.000030	.000000	.00000

Table 7. 61.94(b)(7) User-Supplied Data – Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-54 Meteorological Tower

3	7	0.000400	.001830	.000200	.000000	.000000	.00000
3	8	0.000720	.003810	.000630	.000000	.000000	.00000
3	9	0.000630	.006680	.002440	.000000	.000000	.00000
3	10	0.000570	.005070	.001830	.000000	.000000	.00000
3	11	0.000320	.001920	.000570	.000000	.000000	.00000
3	12	0.000260	.000660	.001490	.000060	.000000	.00000
3	13	0.000110	.001180	.003350	.000200	.000000	.00000
3	14	0.000200	.000890	.004010	.000340	.000000	.00000
3	15	0.000230	.000260	.000690	.000000	.000000	.00000
3	16	0.000090	.000260	.000140	.000000	.000000	.00000
4	1	0.006420	.005070	.003270	.002780	.000140	.00000
4	2	0.006130	.010460	.006510	.002210	.000320	.00000
4	3	0.004470	.014850	.005760	.000370	.000030	.00000
4	4	0.003900	.005040	.000830	.000090	.000000	.00000
4	5	0.002120	.001230	.000060	.000000	.000000	.00000
4	6	0.002690	.000690	.000030	.000090	.000000	.00000
4	7	0.002120	.001660	.000690	.000140	.000000	.00000
4	8	0.001400	.003070	.003980	.002810	.000140	.00000
4	9	0.002780	.010370	.024390	.009630	.000200	.00000
4	10	0.002810	.022560	.051730	.019660	.000800	.00003
4	11	0.003980	.014700	.020060	.009030	.000970	.00046
4	12	0.003580	.009940	.009770	.005160	.001150	.00000
4	13	0.004670	.008170	.008600	.003380	.000320	.00000
4	14	0.005620	.006910	.009540	.002150	.000260	.00000
4	15	0.005420	.007310	.007850	.002550	.000060	.00000
4	16	0.005960	.005730	.003840	.001430	.000110	.00000
5	1	0.006190	.007370	.001230	.000000	.000000	.00000
5	2	0.003700	.004160	.002030	.000000	.000000	.00000
5	3	0.002290	.002240	.000400	.000000	.000000	.00000
5	4	0.001430	.001200	.000000	.000000	.000000	.00000
5	5	0.000830	.000200	.000000	.000000	.000000	.00000
5	6	0.000570	.000090	.000000	.000000	.000000	.00000
5	7	0.000570	.000320	.000000	.000000	.000000	.00000
5	8	0.001090	.000540	.000000	.000000	.000000	.00000
5	9	0.001150	.002550	.000430	.000000	.000000	.00000
5	10	0.001810	.010320	.007340	.000000	.000000	.00000
5	11	0.002030	.014930	.013530	.000000	.000000	.00000
5	12	0.003210	.010920	.001780	.000000	.000000	.00000
5	13	0.004900	.016140	.001200	.000000	.000000	.00000
5	14	0.008170	.017940	.000400	.000000	.000000	.00000
5	15	0.009140	.026880	.000370	.000000	.000000	.00000
5	16	0.009490	.011580	.000770	.000000	.000000	.00000
6	1	0.004840	.007620	.000170	.000000	.000000	.00000

Table 7. 61.94(b)(7) User-Supplied Data – Wind Frequency Arrays (continued)

CAP88 Input Data for 2000 TA-54 Meteorological Tower

6	2	0.003500	.003470	.000110	.000000	.000000	.00000
6	3	0.002120	.001030	.000000	.000000	.000000	.00000
6	4	0.000720	.000060	.000000	.000000	.000000	.00000
6	5	0.000230	.000000	.000000	.000000	.000000	.00000
6	6	0.000090	.000000	.000000	.000000	.000000	.00000
6	7	0.000200	.000030	.000000	.000000	.000000	.00000
6	8	0.000400	.000090	.000000	.000000	.000000	.00000
6	9	0.000520	.000690	.000060	.000000	.000000	.00000
6	10	0.001460	.004380	.000290	.000000	.000000	.00000
6	11	0.002150	.011780	.001600	.000000	.000000	.00000
6	12	0.003440	.021240	.002980	.000000	.000000	.00000
6	13	0.007570	.025450	.001400	.000000	.000000	.00000
6	14	0.010950	.015080	.000000	.000000	.000000	.00000
6	15	0.009200	.024130	.000200	.000000	.000000	.00000
6	16	0.004960	.011980	.001290	.000000	.000000	.00000

The Air Quality Group also inputs population array data to the CAP88 program. The data file represents a 16-sector polar-type array, with 20 radial distances for each sector. Population arrays are developed for each release point using U.S. Census data, updated with annual projections. An example of the population array used for the LANSCE facility is provided in Table 8. For agricultural array input, LANL is currently using the default values in CAP88. Finally, the radionuclide inputs for the point sources monitored in 2000 are provided in Table 9.

Public Receptors

Compliance with the annual dose standard is determined by calculating the highest effective dose equivalent to any member of the public at any off-site point where there is a residence, school, business, or office. Late in the calendar year, a visual tour of the laboratory vicinity was completed to identify new locations inhabited by the public; that is, new off-site public receptors that had not existed in the year previous to this assessment. Some new businesses and residences were noted in the 2000 tour. In this report, the nearest off-site point is defined to be the area of public inhabitation where the highest off-site dose occurs for a given emissions source. For the 2000 compliance assessment, LANL-wide doses were evaluated at the nearest off-site point for each monitored emissions stack, as well as at a number of additional key locations.

Point Source Emissions Modeling

The CAP88 program was used to calculate doses from both the monitored and unmonitored point sources at LANL. The CAP88 program uses on-site meteorological data to calculate atmospheric dispersion and transport of the radioactive effluents. There are a number of radionuclides monitored in LANL effluents that are not included in the dose factor database used by CAP88.[8] For the substantial GMAP effluents such as ^{10}C, ^{16}N, and ^{14}O, LANL uses a revised set of CAP88 database files to which the required dose factors have been added. For other effluents such as ^{68}Ga, ^{68}Ge, ^{82}Br, ^{197}Hg, etc., LANL uses the CAP88 code to calculate environmental concentrations of these radionuclides at the receptor locations and then applies an appropriate dose factor to estimate dose.

LANSCE Fugitive Emission Modeling

Some of the gaseous mixed activation products (GMAP) created at the accelerator target cells migrate into room air and into the environment. These fugitive sources are continuously monitored throughout the beam-operating period. In 2000, approximately 140 Ci of ^{11}C and 6 Ci of ^{41}Ar were released from LANSCE as fugitive emissions. This source was modeled as an area source, using CAP88 and meteorological data coinciding with the LANSCE run cycle. Fugitive effluents were modeled from two areas at LANSCE; additional source information is provided in Table 10.

TA-18 Nonpoint Emission Modeling

This site consists of a variety of nuclear assemblies that are operated at near-critical conditions. During the near-critical operations, neutrons are generated that, in turn, activate argon atoms in the air surrounding the assembly. Operations conducted in 2000 were evaluated for their potential to create ^{41}Ar gas. In 2000, approximately 0.8 Ci of ^{41}Ar was generated,

Table 8. 40-61.94(b)(7) User-Supplied Data – Population Array

Projected 1999-2000 Population within 80 km of Los Alamos National Laboratory

	Distance from TA53 (km)															
Direction	0.8-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-5.0	5.0-6.0	6.0-7.0	7.0-8.0	8.0-10	10-20	20-30	30-40	40-80
N	6	17	55	26	51	80	92	137	0	0	0	0	17	107	1113	1647
NNW	5	16	47	227	166	88	254	274	20	0	0	0	8	23	306	546
NW	5	11	20	56	315	379	205	669	409	388	52	0	2	28	58	1194
WNW	0	6	9	15	67	207	808	1034	1843	2581	714	0	0	29	34	2888
W	0	0	3	8	13	17	94	161	16	0	0	0	8	71	321	156
WSW	0	8	10	10	7	6	3	0	0	0	0	1	8	40	444	2622
SW	0	9	4	0	0	0	0	0	0	0	1	3	3	0	0	2643
SSW	0	5	0	0	0	0	0	0	0	0	0	32	3	944	1410	65977
S	0	5	0	0	0	0	0	0	0	0	0	18	6	18	164	3695
SSE	0	6	0	0	0	0	0	0	0	331	216	308	52	320	5829	2805
SE	0	2	0	0	0	0	0	0	0	1527	3266	556	0	1064	75112	8463
ESE	0	0	0	0	0	1	0	0	0	0	0	10	12	723	8286	3094
E	0	0	0	0	0	0	0	0	0	0	1	0	1769	4215	410	546
ENE	1	0	0	0	0	0	0	0	0	0	0	0	2327	4805	4104	3332
NE	4	9	2	0	0	0	0	0	0	0	0	0	1441	16913	2988	6898
NNE	6	17	51	7	37	31	24	23	0	0	0	0	16	2791	458	1139

Table 9. 40-61.94(b)(7) User-Supplied Data—Radionuclide Emissions

ESID Number	Nuclide	Emissions (Ci)
03002914	Pu-238	3.02E-09
03002915	Pu-239	5.02E-08
03002915	Am-241	2.61E-08
03002919	Pu-239	5.87E-07
03002919	Pu-238	1.26E-06
03002919	Am-241	7.80E-08
03002920	Pu-239	7.54E-08
03002920	Pu-238	1.13E-08
03002920	Am-241	3.27E-08
03002923	U-238	1.74E-07
03002923	U-235	1.28E-07
03002923	U-234	3.72E-06
03002923	Th-234	1.74E-07
03002923	Th-231	1.28E-07
03002923	Pu-239	1.14E-08
03002923	Pu-238	7.34E-09
03002923	Pa-234m	1.74E-07
03002923	Am-241	6.62E-09
03002924	U-234	2.72E-06
03002924	Th-228	1.26E-07
03002924	Pu-239	1.37E-08
03002924	Pu-238	9.93E-08
03002924	Am-241	1.50E-08
03002928	Pu-239	1.52E-07
03002928	Pu-238	9.57E-07
03002928	Am-241	2.65E-08
03002929	Pu-238	4.94E-09
03002932	None Detected	None
03002933	None Detected	None
03002937	None Detected	None
03002944	None Detected	None
03002945	None Detected	None
03002946	Pu-239	1.75E-08

Table 9. 40-61.94(b)(7) User-Supplied Data–Radionuclide Emissions (continued)

ESIDNUM	Nuclide	Emissions (Ci)
03010222	U-238	1.32E-09
03010222	U-235	1.91E-09
03010222	U-234	5.33E-08
03010222	Th-234	1.32E-09
03010222	Th-231	1.91E-09
03010222	Th-230	1.18E-09
03010222	Pa-234m	1.32E-09
16020504	H-3(HTO)	2.18E+02
16020504	H-3(Gas)	3.90E+01
21015505	H-3(HTO)	1.51E+02
21015505	H-3(Gas)	2.46E+01
21020901	H-3(HTO)	5.13E+02
21020901	H-3(Gas)	2.50E+02
33008606	H-3(HTO)	1.01E+03
33008606	H-3(Gas)	1.47E+02
41000417	H-3(HTO)	5.60E+00
41000417	H-3(Gas)	6.62E-01
48000107	Se-75	1.36E-04
48000107	Ge-68	8.14E-03
48000107	Ga-68	8.14E-03
48000107	Br-77	2.82E-05
48000107	As-74	2.79E-05
48000107	As-73	4.37E-05
48000154	None Detected	None
48000160	Se-75	5.33E-06
48000160	Ge-68	8.07E-06
48000160	Ga-68	8.07E-06
50000102	Th-230	5.27E-08
50000102	Pu-238	9.78E-09
50003701	None Detected	None
50006903	None Detected	None
53000303	H-3(HTO)	5.99E-01
53000303	C-11	8.32E+00
53000303	C-10	8.68E-01
53000303	Ar-41	1.01E-01

Table 9. 40-61.94(b)(7) User-Supplied Data—Radionuclide Emissions (continued)

ESIDNUM	Nuclide	Emissions (Ci)
53000702	O-15	9.11E+01
53000702	O-14	4.06E-01
53000702	N-16	1.70E-02
53000702	N-13	2.77E+01
53000702	Hg-197	1.04E-01
53000702	Hg-195m	2.01E-02
53000702	Hg-193	8.02E-01
53000702	H-3(HTO)	2.32E+00
53000702	C-11	5.40E+02
53000702	C-10	1.44E-01
53000702	Br-82	4.19E-03
53000702	Br-76	2.59E-04
53000702	As-73	2.21E-05
53000702	Ar-41	2.30E+01
55000415	Pu-239	9.52E-08
55000415	Pu-238	4.69E-09
55000416	Pu-239	2.30E-06
55000416	Pu-238	1.01E-07
55000416	H-3(HTO)	3.11E-01
55000416	H-3(Gas)	6.14E+00
55000416	Am-241	3.30E-07

Table 10. 40-61.94(b)(7) User-Supplied Data—Modeling Parameters for LANL Nonpoint Sources

LANL Air Activation Sources

Source	Radionuclide	Emission (Ci)	Area of source (m^2)	Distance to LANL Maximum Dose Location (m)	Direction to LANL Maximum Dose Location
TA-53-Switchyard	Ar-41	0.8	484	774	NNE
	C-11	19.8	484	774	NNE
TA-53-1L Service Area	Ar-41	4.9	1.0	943	NNE
	C-11	117.9	1.0	943	NNE
TA-18	Ar-41	0.8	31,400	3,894	NNE

and the dose was evaluated with CAP88. Additional source information is provided in Table 10.

Radionuclides Not Included in CAP88

Some of the radionuclides detected in LANL air effluents are not included in the CAP88 library of exposure-to-dose conversion factors. As previously mentioned, LANL added dose coefficients to the CAP88 data files for three routinely emitted radionuclides: ^{10}C, ^{16}N, and ^{14}O. Because of the unique emissions from LANSCE and other facilities, other radionuclides not included in CAP88 are emitted on an infrequent basis. Examples of such radionuclides detected in LANL air effluents during 2000 are included in Table 9 and are listed separately in Table 11.

To calculate the dose from these particular radionuclides, LANL uses several methods. LANL uses the mainframe version of CAP88 to calculate the air concentration at the receptor location of interest. In most cases, the air concentration can then be converted into a dose by applying the conversions given in Table 2 of Appendix E of 40 CFR 61, which has a more extensive list of radionuclides than CAP88.[9] In some cases, LANL obtains exposure-to-dose conversion factors from other sources, such as EPA's Federal Guidance Reports.[10,11] Dose conversion factors used for radionuclides not included in CAP88 but found in LANL air effluents during 2000 are provided in Table 12.

At the LANL-wide maximum dose location for 2000, the total estimated dose arising from emissions of radionuclides not included in the CAP88 library was about 0.01 mrem. This number is included in the total annual dose. The LANL Air Quality Group has informed the Regional Office of

Table 11. 40-61.94(b)(7) User-Supplied Data—Radionuclide Not Included in CAP88

Source	ESIDNUM	Radionuclide	Emissions (Ci)	Dose at LANL Receptor (mrem)	Dose at Facility Receptor (mrem)
TA-48-1-7	48000107	As-73	4.37E-05	3.55E-07	4.27E-06
		As-74	2.79E-05	1.14E-06	1.36E-05
		Br-77	2.82E-05	5.95E-08	7.14E-07
		Ga-68	8.14E-03	8.02E-07	9.67E-06
		Ge-68	8.14E-03	3.65E-03	4.40E-02
		Se-75	1.36E-04	7.06E-05	8.82E-04
TA48-1-60	48000160	Ga-68	8.07E-06	8.02E-10	1.03E-08
		Ge-68	8.07E-06	3.65E-06	4.70E-05
		Se-75	5.33E-06	2.82E-06	3.65E-05
TA-53-7-2	53000702	As-73	2.21E-05	1.82E-06	1.82E-06
		Br-76	2.59E-04	1.87E-06	1.87E-06
		C-10	1.44E-01	7.26E-06	7.26E-06
		Hg-193	8.02E-01	6.31E-04	6.31E-04
		Hg-195m	2.01E-02	1.87E-04	1.87E-04
		Hg-197	1.04E-01	1.12E-03	1.12E-03
		N-16	1.70E-02	1.43E-12	1.43E-12
		O-14	4.06E-01	6.06E-03	6.06E-03

the U.S. EPA of the various steps and methods used to calculate the doses from such radionuclides.[12]

Environmental Data

The net annual average ambient concentration of airborne radionuclides measured at 19 air sampling stations (Figure 3) is calculated by subtracting an appropriate background concentration value. In CY 2000 two new station locations were added to the network; these were station #66 at the Los Alamos Inn, and #67 at the TA-3 Research Park. Station 66 is a replacement for Station #7, Shell Station. In late 1999/early 2000 a three-story apartment building was constructed directly south and within 25 meters of Station #7. The apartment building prevents Station #7 from having an unrestricted airflow from the Laboratory to the station. A replacement location was selected, Station #66, approximately 250 m to the southeast, on the edge of Los Alamos canyon. This location maintains the spatial coverage provided by station #7 for Laboratory diffuse emissions. Station #66 began operation in April 2000.

Table 12. 40-61.94(b)(7) User-Supplied Data—Supplemental Dose Factors

Radionuclide	Ci per m3 per 10 mrem	Reference
As-73	1.10E-11	EPA (1989)
As-74	2.20E-12	EPA (1989)
Br-76	1.23E-10	LANL (2000)
Br-77	4.20E-11	EPA (1989)
C-10	1.13E-11	DOE (1998)
Ga-68	9.10E-10	LANL (2000)
Ge-68	2.00E-13	LANL (2000)
Hg-193	2.96E-09	LANL (2001)
Hg-195m	2.20E-10	LANL (2001)
Hg-197	8.30E-11	EPA (1989)
N-16	3.43E-12	DOE (1998)
O-14	5.29E-12	DOE (1998)
Se-75	1.70E-13	EPA (1989)

U.S. Environmental Protection Agency, "National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities," Code of Federal Regulations, Title 40, Part 61.90, Table 2 of Appendix E to Subpart H (1989).

Department of Energy, letter to Mr. George P. Brozowski, U.S. Environmental Protection Agency Region 6 from Mr. Steve Fong, DOE Los Alamos Area Office, Aug 18, 1998.

Los Alamos National Laboratory, internal memo to Mr. Dave Fuehne from Keith W. Jacobson, Air Quality Group memo ESH17:01-250, May 22, 2001.

Station #7 was operated for the entire calendar year 2000 and then was discontinued. Results from both stations are provided in this report.

A new, nonDOE facility was constructed during CY2000, the Los Alamos Research Park. This facility is on DOE property, but employs members of the public. Thus, this became a potential new MEI receptor location, requiring monitoring. No existing AIRNET station was located near this facility, and so a new station was installed and began operating during July 2000.

The net concentration at each air sampler is converted to an annual effective dose equivalent (EDE) using Table 2 of Appendix E of 40 CFR 61 and applying the valid assumption that each table value is equivalent to 10 mrem/yr. from all appropriate exposure pathways (100% occupancy assumed at the respective location).[9] Results from each air sampler are given in Table 13. The operational performance of each air sampler is provided in Table 14.

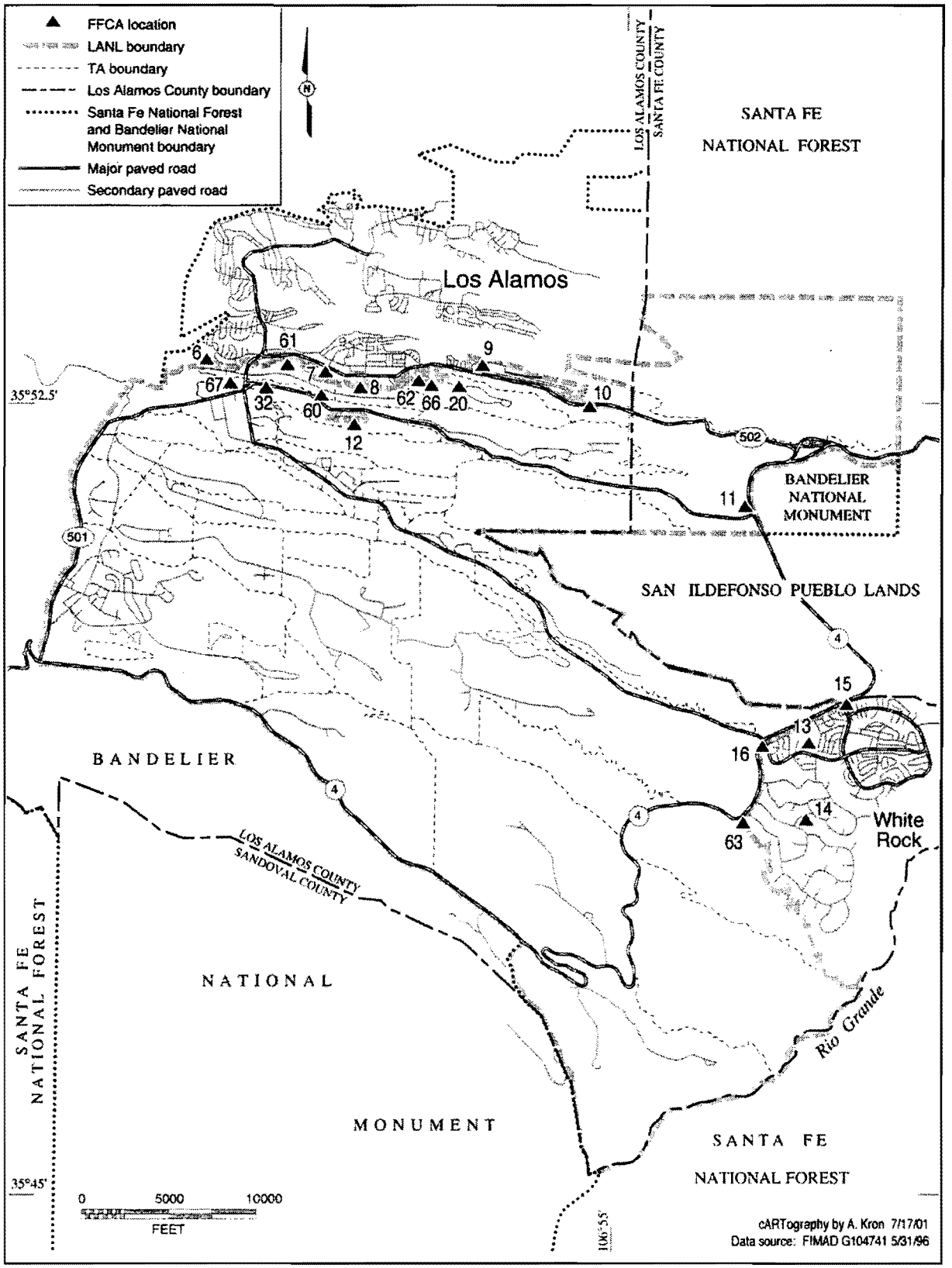


Figure 3. Locations of air sampling stations used for nonpoint source compliance

LANSCE Monthly Assessments

The Air Quality group evaluates the dose from short-lived radioactive gases released from LANSCE on a monthly basis. The monthly dose values are evaluated with the actual meteorology for the month and these doses are given in Table 15. The Air Quality group also evaluates the annual LANSCE emissions with annual average meteorology, and compares the results to the monthly values summed for the calendar year; the values for these two assessments were 0.25 mrem and 0.27 mrem respectively.

Highest EDE Determination

A major change to the procedure for determining the highest EDE was necessary for CY 1999 because of significantly reduced emissions from the LANSCE facility. Over the previous nine years, the off-site effective dose equivalent due to LANSCE operations had averaged about 5 mrem. For 1999, the highest off-site EDE from the LANSCE facility was about 0.01 mrem. The highest off-site EDE location for LANSCE effluents is a business office in the East Gate area (2470 East Gate Drive). Since the contribution from LANSCE for 1999 was greatly reduced, the location of the highest off-site dose was not as readily established as it had been in the past.

In late 1999, LANL began working on a plan to ensure that the location of the highest public dose could be determined. This plan uses a multistep approach, and the steps used were presented to the local Citizens' Advisory Board (CAB) for LANL for their review and comment. This approach was approved by the CAB for CY 1999 and was used again for the CY 2000 dose assessment determination. Table 16 shows the sites identified by LANL for the purposes of finding the location of the highest off-site dose. Also shown in the table is the AIRNET sampling station that the Air Quality Group associated with the selected public receptor location. The LANL-wide doses at these various off-site locations are provided in Table 16. The highest off-site dose location was determined to be the East Gate area, because of increased emissions from LANSCE in 2000, as compared to 1999.

61.92: Compliance Assessment

The highest effective dose equivalent to any member of the public at any off-site point where there is a residence, school, or business office was 0.64 mrem for radionuclides released by LANL in 2000. This dose was calculated by adding up the doses for each of the point sources at LANL, the diffuse and fugitive gaseous activation products from LANSCE and TA-18, and the dose measured by the ambient air sampler in the vicinity of the public receptor location. The compliance assessment also includes a potential dose contribution of 0.18 mrem from unmonitored stacks. Because the emissions estimates do not account for pollution control systems, the actual dose will be significantly less for the unmonitored point sources. Also, this dose includes an approximate 0.01 mrem contribution from radionuclides not included in CAP88. Table 17 provides the compliance assessment summary. The location of the off-site point of highest EDE for 2000 was a business office at 2470 East Gate Drive; this location is different from the location of the previous year's assessments. The 1999 highest off-site EDE location was a business office at the Los Alamos County landfill; Table 17 also lists the LANL-wide doses at this location, for comparison.

Table 13. FFCA and Air Sampler Environmental Data

2000 Effective Dose Equivalent (net in mrem) at Air Sampling Locations Around LANL

Site # and Name		Am-241	H-3	Pu-238	Pu-239	U-234	U-235	U-238	Rounded Total
06	48th Street	-0.003	0.003	0.001	0.000	0.000	0.000	0.003	0.00
07	Shell Station	0.004	0.007	-0.001	0.027	0.049	0.005	0.059	0.15
08	McDonalds	0.000	0.012	-0.001	0.005	0.008	0.001	0.009	0.03
09	Los Alamos Airport	0.002	0.033	0.001	0.009	0.005	0.002	0.007	0.06
10	Eastgate	0.002	0.026	0.001	0.003	0.009	0.000	0.013	0.05
11	Well PM-1 (E. Jemez Rd.)	-0.001	0.010	-0.002	0.001	0.001	0.000	0.005	0.02
12	Royal Crest Trailer Court	0.000	0.011	0.002	0.004	0.009	0.002	0.010	0.04
13	Rocket Park	-0.002	0.016	0.001	0.000	0.003	0.001	0.000	0.02
14	Pajarito Acres	-0.002	0.012	0.001	-0.001	0.000	0.000	0.003	0.01
15	White Rock Fire Station	-0.001	0.011	0.001	0.006	0.003	0.000	0.005	0.02
16	White Rock Nazarene Church	0.002	0.024	0.001	-0.001	0.003	0.000	0.004	0.03
20	TA-21 Area B	0.002	0.029	0.000	0.027	0.019	0.002	0.023	0.10
32	County Landfill (TA-48)	0.008	0.010	0.002	0.023	0.074	0.004	0.072	0.19
60	LA Canyon	0.001	0.007	0.000	0.001	0.005	0.001	0.008	0.02
61	LA Hospital	0.004	0.005	0.000	0.002	0.011	0.000	0.015	0.04
62	Crossroads Bible Church	0.005	0.015	0.001	0.003	0.004	0.001	0.006	0.03
63	Monte Rey South	-0.003	0.012	0.001	-0.001	0.002	0.001	0.005	0.02
66	Los Alamos Inn – South*	0.000	0.012	0.002	0.084	0.007	0.002	0.014	0.12
67	TA-3 Research Park*	-0.002	0.004	0.000	-0.003	0.045	0.003	0.031	0.08

* New stations added in 2000.

Table 14. FFCA Analytical Completeness Summary—Air Sampler Operation

Site #	Site Name	% Run Time	Analysis	% Analytical Completeness
06	48th Street	98.6		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
07	Shell Station	96.8		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
08	McDonalds	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
09	Los Alamos Airport	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0

Table 14. FFCA Analytical Completeness Summary—Air Sampler Operation (continued)

Site #	Site Name	% Run Time	Analysis	% Analytical Completeness
10	Eastgate	99.3		
			Am-241	100.0
			H-3	108.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
11	Well PM-1 (E. Jemez Road)	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
12	Royal Crest Trailer Court	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
13	Rocket Park	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0

Table 14. FFCA Analytical Completeness Summary—Air Sampler Operation (continued)

Site #	Site Name	% Run Time	Analysis	% Analytical Completeness
14	Pajarito Acres	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
15	White Rock Fire Station	98.9		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
16	White Rock Nazarene Church	99.3		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
20	TA-21 Area B	97.6		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0

Table 14. FFCA Analytical Completeness Summary—Air Sampler Operation (continued)

Site #	Site Name	% Run Time	Analysis	% Analytical Completeness
32	County Landfill (TA-48)	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
60	LA Canyon	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
61	LA Hospital	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
62	Crossroads Bible Church	98.2		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0

Table 14. FFCA Analytical Completeness Summary—Air Sampler Operation (continued)

Site #	Site Name	% Run Time	Analysis	% Analytical Completeness
63	Monte Rey South	100.0		
			Am-241	100.0
			H-3	100.0
			Pu-238	100.0
			Pu-239	100.0
			U-234	100.0
			U-235	100.0
			U-238	100.0
66	Los Alamos Inn – South*	100.0		
			Am-241	75.0
			H-3	68.0
			Pu-238	75.0
			Pu-239	75.0
			U-234	75.0
			U-235	75.0
			U-238	75.0
67	TA-3 Research Park†	100.0		
			Am-241	50.0
			H-3	32.0
			Pu-238	50.0
			Pu-239	50.0
			U-234	50.0
			U-235	50.0
			U-238	50.0

***This station began operation in April 2000.**
†This station began operation in August 2000.

Table 15. LANSCE Monthly Assessments and Summary

Description	ESIDNUM	Dose at East Gate Receptor
LANSCE-stack-January	53000303	6.85E-05
LANSCE-stack-February	53000303	1.98E-04
LANSCE-stack-March	53000303	4.54E-05
LANSCE-stack-April	53000303	3.21E-04
LANSCE stack-May	53000303	1.23E-07
LANSCE stack-June	53000303	6.34E-05
LANSCE stack-July	53000303	1.14E-04
LANSCE stack-August	53000303	1.96E-04
LANSCE stack-September	53000303	2.66E-04
LANSCE-stack-October	53000303	9.05E-05
LANSCE-stack-November	53000303	1.60E-04
LANSCE-stack-December	53000303	4.45E-05
LANSCE-stack-PVAP*	53000303	2.98E-05
LANSCE-Non-CAP88 Radionuclides*	53000303	0.00E+00
LANSCE-stack-January	53000702	1.27E-03
LANSCE-stack-February	53000702	7.97E-04
LANSCE-stack-March	53000702	3.16E-04
LANSCE-stack-April	53000702	1.83E-02
LANSCE stack-May	53000702	3.78E-03
LANSCE stack-June	53000702	1.21E-02
LANSCE stack-July	53000702	9.48E-03
LANSCE stack-August	53000702	2.94E-02
LANSCE stack-September	53000702	4.07E-02
LANSCE-stack-October	53000702	6.84E-02
LANSCE-stack-November	53000702	3.62E-02
LANSCE-stack-December	53000702	5.19E-02
LANSCE-stack-PVAP*	53000702	2.75E-04
LANSCE-Non-CAP88 Radionuclides*	53000702	8.01E-03
LANSCE-Fugitive Emissions - Switchyard*	530003sy	1.74E-02
LANSCE-Fugitive Emissions - 1L Area*	5300071L	7.01E-02
LANSCE Summary		**3.70E-01**

Table 16. 40-61.92 Effective Dose Equivalent at Selected Public Locations

	Location	Easting	Northing	Nearest AIRNET Location	AIRNET Number	LANL-Wide EDE (mrem)*
1	Barranca School	1,630,910	1,783,870	Barranca School†	04	5.41E-02
2	Residence Near Urban Park	1,618,400	1,780,000	Urban Park†	05	2.94E-02
3	Residence on Fairway Drive	1,618,602	1,776,052	48th Street	06	1.36E-02
4	Los Alamos Shell	1,623,892	1,775,889	Shell Station	07	1.62E-01
5	Los Alamos McDonald's	1,626,450	1,775,350	LA McDonald's	08	5.13E-02
6	Los Alamos Airport	1,632,902	1,776,247	Los Alamos Airport	09	1.15E-01
7	Tsankawi Visitor Center	1,648,105	1,758,380	Well PM-1	11	4.54E-02
8	Royal Crest Trailer Court - West	1,624,256	1,773,065	Royal Crest Tlr. Crt.	12	5.14E-02
9	Royal Crest Trailer Court - East	1,625,778	1,772,955	Royal Crest Trl. Crt.	12	5.38E-02
10	Residence near WR Rocket Park	1,651,950	1,755,300	Rocket Park	13	3.72E-02
11	Residence in Pajarito Acres	1,650,770	1,750,520	Pajarito Acres	14	2.84E-02
12	White Rock Fire Station	1,653,580	1,756,630	WR Fire Station	15	3.83E-02
13	Bandelier Fire Lookout	1,635,700	1,739,005	Bandelier†	17	6.68E-02
14	Residence on Nambe Loop	1,621,568	1,776,046	TA-21 Area B	20	8.52E-02
15	Ponderosa Campground	1,608,575	1,758,460	TA-49†	26	4.21E-02
16	County Landfill Office	1,620,569	1,774,763	County Landfill	32	2.02E-01
17	Los Alamos Ice Rink	1,617,852	1,775,692	LA Canyon	60	3.18E-02
18	Los Alamos Hospital	1,620,200	1,776,300	LA Hospital	61	4.79E-02
19	Cross Roads Bible Church	1,629,200	1,776,000	Cross. Bible Church	62	5.49E-02
20	Residence on Monte Rey South	1,647,976	1,750,376	Monte Rey South	63	3.53E-02
21	Los Alamos Inn	1,624,450	1,775,300	Los Alamos Inn-S	66	1.34E-01
22	Research Park	1,618,300	1,774,600	TA-3 Research Park	67	8.84E-02
23	2470 East Gate (NNE sector)	1,638,825	1,774,097	East Gate	10	4.59E-01
24	Residence at East Gate (N sector)	1,638,616	1,774,231	East Gate	10	3.61E-01
25	Business at East Gate (NE sector)	1,640,230	1,774,090	East Gate	10	2.87E-01

* Note, to allow for more meaningful comparisons, these doses do not include the estimated contribution from unmonitored point sources.
†Note, these samplers are not part of the regular NESHAPs compliance network for LANL.

Table 17. 61.92 Highest Effective Dose Equivalent Summary

ESIDNUM	Description	Dose for Release Site Receptor	Dose at Landfill Receptor	Dose at East Gate Receptor
03002914	CMR Stack	6.90E-07	6.90E-07	5.46E-08
03002915	CMR Stack	1.32E-05	1.32E-05	1.51E-06
03002919	CMR Stack	2.64E-04	2.64E-04	2.93E-05
03002920	CMR Stack	3.20E-05	3.20E-05	2.68E-06
03002923	CMR Stack	2.10E-04	2.10E-04	2.53E-05
03002924	CMR Stack	3.94E-04	3.94E-04	2.23E-05
03002928	CMR Stack	1.38E-04	1.38E-04	1.79E-05
03002929	CMR Stack	5.62E-07	5.62E-07	7.44E-08
03002932	CMR Stack	0.00E+00	0.00E+00	0.00E+00
03002933	CMR Stack	0.00E+00	0.00E+00	0.00E+00
03002937	CMR Stack	0.00E+00	0.00E+00	0.00E+00
03002944	CMR Stack	0.00E+00	0.00E+00	0.00E+00
03002945	CMR Stack	0.00E+00	0.00E+00	0.00E+00
03002946	CMR Stack	3.23E-06	3.23E-06	3.25E-07
03010222	Shops Addition Stack	4.83E-06	4.83E-06	4.29E-07
16020504	WETF Stack	1.22E-02	2.20E-03	1.27E-03
18000001	TA-18 Diffuse	4.61E-05	2.46E-06	4.61E-05
21015505	TSTA Stack	6.43E-03	9.38E-04	4.35E-03
21020901	TSFF Stack	3.06E-02	3.84E-03	2.21E-02
33008606	HP-Site Stack	2.71E-02	1.56E-03	3.48E-03
41000417	W-Site Stack	2.29E-04	8.79E-05	6.19E-05
48000107	Radiochemistry Stack/non-CAP88 radionuclides	4.49E-02	3.98E-03	3.72E-03
48000154	Radiochemsitry Stack	0.00E+00	0.00E+00	0.00E+00
48000160	Radiochemistry Stack/non CAP88 radionuclides	8.35E-05	7.12E-06	6.47E-06
50000102	Waste Management Stack	4.71E-06	4.81E-07	1.14E-06
50003701	Waste Management Stack	0.00E+00	0.00E+00	0.00E+00
50006903	Waste Management Stack	0.00E+00	0.00E+00	0.00E+00
53000303	LANSCE-Stack-Annual	1.60E-03	1.58E-05	1.60E-03
53000303	LANSCE-Stack/non CAP88 radionuclides	0.00E+00	0.00E+00	0.00E+00
53000399	LANSCE Fugitive Emissions	8.75E-02	2.63E-04	8.75E-02
53000702	LANSCE-Stack-Annual	2.73E-01	1.04E-03	2.73E-01
53000702	LANSCE-Stack/non CAP88 radionuclides	8.01E-03	4.52E-05	8.01E-03
55000415	Plutonium Facility Stack	2.10E-05	1.74E-06	2.74E-06
55000416	Plutonium Facility Stack	1.01E-03	1.04E-04	1.66E-04
99000000	Unmonited Stacks-gross	1.80E-01	1.80E-01	1.80E-01
99000010	Air-Sampler Net Dose	1.91E-02	1.91E-01	5.40E-02
	Total	**6.93E-01**	**3.86E-01**	**6.39E-01**

SECTION IV. CONSTRUCTIONS AND MODIFICATIONS

61.94(b)(8): Constructions and Modifications

A brief description of constructions and modifications that were completed and/or reviewed in 2000, but for which the requirement to apply for approval to construct or modify was waived under 61.96, is provided here. The Air Quality Group for LANL/DOE maintains the documentation developed to support the waiver.

Project #99-0191: Nontraditional In-Situ Vitrification near PRS 21-018A

Nontraditional in-situ vitrification (ISV) was evaluated to demonstrate its effectiveness for stabilization of radionuclides in contaminated soil. The demonstration involved 13,200 ft^3 of contaminated soil from an absorption bed. Using a vibrating drill, four electrodes were inserted into the contaminated soil. Then, a hood was placed over the affected area to collect any off-gas. The contaminated area was heated to melting, turned to glass, cooled, and sampled. The off-gas passed through HEPA filters, scrubbers, and a thermal oxidizer before it was exhausted to the environment.

Air-emission estimates for a number of radionuclides were based on soil characteristics and contamination data. Controlled emissions were estimated using Appendix D release factors and control factors (for HEPA filtration) to determine the applicability of Radionuclide-NESHAP preapproval requirements. In addition, the enhanced rule was applied when applicable. Dose assessments of these air emissions were calculated using CAP88. Based on the modeling results, the potential effective dose equivalent from the point source at the nearest receptor was 4.8×10^{-2} mrem/yr. and was below the permitting threshold of 0.1 mrem/yr. specified in the Radionuclide-NESHAP.

Furthermore, uncontrolled emissions were estimated based on the retention factors supplied by the contractor performing the demonstration to determine the applicability of Radionuclide-NESHAP monitoring requirements. Dose assessments of these air emissions were calculated using CAP88. Based on the modeling results, the potential effective dose equivalent from the point source at the nearest receptor was 5.3×10^{-2} mrem/yr. and was below the monitoring threshold of 0.1 mrem/yr specified in Radionuclide-NESHAP. Therefore, monitoring was not a compliance requirement. An air sampler, located approximately 50 meters from the operation, confirmed this low potential for emissions.

SECTION V. ADDITIONAL INFORMATION

This following section is provided pursuant to DOE guidance and is not required by Subpart H reporting requirements.

Unplanned Releases

During 2000, the Laboratory had no instances of increased airborne emissions of radioactive materials that required reporting to the Environmental Protection Agency. There were two instances of unplanned events. Equipment malfunction at TA-21, building 209, resulted in the release of 215 Ci of tritium during the period of March 22–28. Routine emissions at TA21-209 were typically less than 50 Ci a week during most of CY 2000. The Weapons Engineering Tritium Facility (WETF) at TA-16 had a typical release rate of about 5 to 10 Ci a week during CY 2000. However, on October 5, a release of about 90 Ci of tritium (^3H) occurred due to process problems; the release occurred over a 6-hour period.

Environmental Monitoring

The LANL Air Quality Group operates an extensive environmental monitoring network that includes several environmental monitoring stations located near the LANSCE boundary inhabited by the public. Measurement systems at these stations include LiF thermoluminescent dosimeters, continuously operated air samplers, and in situ high-pressure ion chambers. The combination of these measurement systems allows for monitoring of radionuclide air concentrations and the radiation exposure rate. Results for air sampling are published here and results for all monitoring data are published in the Annual Site Environmental Surveillance Report for DOE Order compliance.

Other Supplemental Information

- Collective effective dose equivalent for 2000 airborne releases: 1.0 person-rem;
- Compliance with Subparts Q and T of 40 CFR 6—Radon-222 Emissions;

  These regulations apply to Radon-222 emissions from DOE storage/disposal facilities that contain byproduct material. "Byproduct material" is the tailings or wastes produced by the extraction or concentration of uranium from ore. Although this regulation targets uranium mills, LANL has likely stored small amounts of byproduct material used in experiments in the TA-54 low-level waste facility, Area G, and this practice makes the Laboratory subject to this regulation. Subject facilities cannot exceed a Radon-222 emissions rate of 20 pCi/m2 s. In 1993 and 1994, LANL conducted a study to characterize emissions from the Area G disposal site.[13] This study showed an average emission rate of 0.14 pCi/m2 s for Area G. The performance assessment for Area G has determined that there will not be a significant increase in Radon-222 emissions in the future.[14]
- Potential to exceed 0.1 mrem from LANL sources of Radon-222 or Radon-220 emissions: not applicable at LANL;
- Status of compliance with EPA effluent monitoring requirements: As of June 3, 1996, LANL came into compliance with EPA effluent monitoring requirements.

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61.94(b)(9) Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment (See, 18 USC., 1001).

Signature: *Signature on File* Date: 6/27/01

David A. Gurulé, P.E., Owner
Area Manager, Los Alamos Area Office
U.S. Department of Energy

Signature: *Signature on File* Date: 6/27/01

Dennis J. Erickson, Operator
Director, Environment, Safety and Health Division
Los Alamos National Laboratory

1999 LANL Radionuclide Emissions Report Errata, as noted by K.W. Jacobson

Table 16:

The station number for the LA Canyon air sampler should have read "60" and not "61."

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