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

Mr. Carl E. Edlund, P.E.
Multimedia Planning and Permitting Division
Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Edlund:

This letter transmits the Los Alamos National Laboratory radionuclide air emissions report for Calendar Year 2001. We are submitting the report to your office pursuant to 40 CFR § 61.94. 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 1.84 mrem for radionuclides released during this period. A compact disc (CD) containing CAP88 data files is also enclosed for your use.

If you have any questions, please call Stephen Fong of my staff at (505) 665-5534.

Sincerely,

Ralph E. Erickson
Director

OPM-7SF-0002-0011

Enclosure with Report and CD

George Brozowski
Multimedia Planning and Permitting Division
EPA, Region 6
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U.S. Department of Energy Report
2001 LANL Radionuclide Air Emissions

Site Name: Los Alamos National Laboratory
Location: County of Los Alamos, New Mexico

Operations Office Information:

Office: Office of Los Alamos Site Operations

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

Contact: Joseph C. Vozella **Phone:** (505) 665-6351

Site Information:

Operator: University of California

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

Contact: Jean M. Dewart **Phone:** (505) 665-8855

Compliance Assessment:

2001 **EDE:** 1.84 mrem

Preface

Amendments to the Clean Air Act, which added radionuclides to the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), went into effect in 1990. 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 30. This report includes results of monitoring at LANL and the dose calculations for the calendar year (CY) 2001.

Executive Summary

Presented is the Laboratory-wide certified report regarding radioactive effluents released into the air by LANL in 2001. 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 Meteorology and Air Quality Group (MAQ) 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 CY 2001, was 1.84 mrem. This location was a business office located at 2470 East Gate Drive, on the northeastern boundary of LANL. The majority of this dose is due to air-borne 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 seven years are shown in the following table. The U.S. EPA annual dose limit is 10 mrem.

Seven 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
2001	1.84	2470 East Gate Dr

In 2001, LANSCE operated in the same configuration as 2000; with continuous beam operation to the "1L Target" and the Lujan Neutron Scattering Center. However, changes in the operation of the target cooling water system resulted in more off-gassing of short-lived radionuclides (primarily oxygen-15) from the water system into the stack air-stream. As a result, total emissions from the exhaust stack for Building #7 at LANSCE increased in 2001 (Figure i). The facility operated with the "beam on" from May to December of 2001. In previous years, emissions from LANSCE have contributed to over 90% of the total off-site dose. In 2001, the contribution was about 81% of the total value. Future emissions from LANSCE are expected to remain near the CY 2001 level.

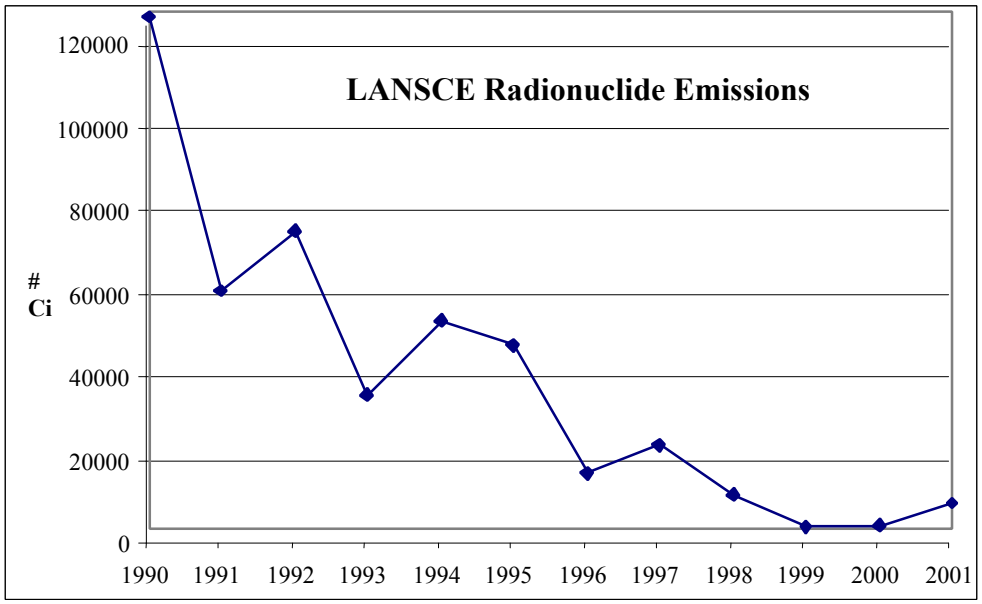

Figure i. Approximate LANSCE radionuclide emissions for the past eleven years.

2001 Events

The Audits and Assessments group at LANL conducted two internal audits of specific elements of the Rad-NESHAPs project. One audit reviewed activities involving sample collection for the Lab's monitored stacks. As a result of the audit there were several administrative and procedural improvements made. The other audit reviewed the dose assessments performed for Rad-NESHAPs. The audit revealed that the monthly dose calculations for the LANSCE facility had fallen behind schedule and subsequent peer review of the dose assessments were not being conducted in a timely manner. We have taken steps to address this issue. Another audit finding was that computer software used in conjunction with calculating doses had not been properly classified and documented. We have since prepared a report that documents the critical software used in conjunction with the Rad-NESHAPs dose assessment.[1]

In January, an unplanned release of tritium occurred at the Weapons Engineering Tritium Facility (WETF). The release occurred on January 31 between 9 and 10 am. Facility alarm systems detected the release, and it was isolated so that it could be vented out the main effluent stack at WETF. For further discussion and analysis of the release, please see Section V of the report.

In April, George Brozowski, a representative from EPA Region 6 visited LANL. Ongoing work was discussed as well as future work with 'Title V' and the proposed amendment to 40CFR61 subpart H. The new amendment could change the methods used for sample extraction for monitored stacks.

From September to November personnel with the LANL Environmental Restoration (ER) project removed contaminated sediment from the south fork of Acid Canyon is Los Alamos. This part of the canyon had received untreated and treated liquid radioactive waste during the early days of Laboratory operations. Air samples collected during the removal operations indicated that some of the contaminated sediment became airborne during the cleanup. Further discussion and analysis of this project is given in Section IV of the report.

In October of 2001 the Quality Assurance Project Plan for the Rad-NESHAPs was reissued. The Concerned Citizens for Nuclear Safety provided additional input to the QA plan. The QA plan serves as a tool to describe all the tasks required and performed for Rad-NESHAPs compliance.

[1] "RRES-MAQ Software Development – CAP88 Tools," Prepared by K.W. Jacobson, April 25, 2002.

Late in the year a new database was implemented to augment the Rad-NESHAP's Usage Survey. The Usage Survey serves an important role in documenting the potential emissions from facilities handling radioactive materials at the Lab. The database allows for rapid and accurate evaluation of potential EDE from these facilities.

Also late in the year, a revision to the methods used to calculate airborne levels of tritium was implemented. Investigations into the collection efficiency of the sample media revealed that the sample matrix was having an effect on the amount of tritium extracted from the sample. A correction factor to account for this matrix effect was subsequently applied to all of the tritium in air concentrations measured by the air samplers that are used for Rad-NESHAPs compliance.

During the year a new methodology for calculating the dose from the airborne emission of tritium was developed and presented by our colleagues at the Lawrence Livermore National Laboratory (LLNL).[2] This new method, called the NEWTRIT model, evaluates the dose arising from three forms of tritium in the environment, as well as the conversion of the gas form into the water form. A further discussion of the methodology is given in Section III of the report. In late 2001, we developed an approach to use this model for LANL-specific climate conditions. Pending EPA approval of the LLNL model, LANL plans to request EPA Region VI approval to use the model in future dose assessments. Some additional discussion is given in Section III of this report.

This report contains two major divisions. The first division is primarily text that describes the "Rad-NESHAP" program and compliance activities at LANL and is organized into five sections. The second division consists mainly of data tables required for reporting purposes; in this section, Table 14 provides doses calculated at various public locations around LANL, and Table 15 summarizes the different LANL contributions to the total highest dose for CY 2001.

[2] "A New Tritium Model for CAP88-PC." S-R. Perterson, G. Duckworth. Health Physics 80(6) June 2001.

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, nonproliferation, 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 support 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 are 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) 2001 are listed in the 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, ^{11}C, ^{13}N, ^{16}N, ^{14}O, and ^{15}O. Various radionuclides such as ^{193}Hg, ^{197}Hg, ^{68}Ge, and ^{68}Ga 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,

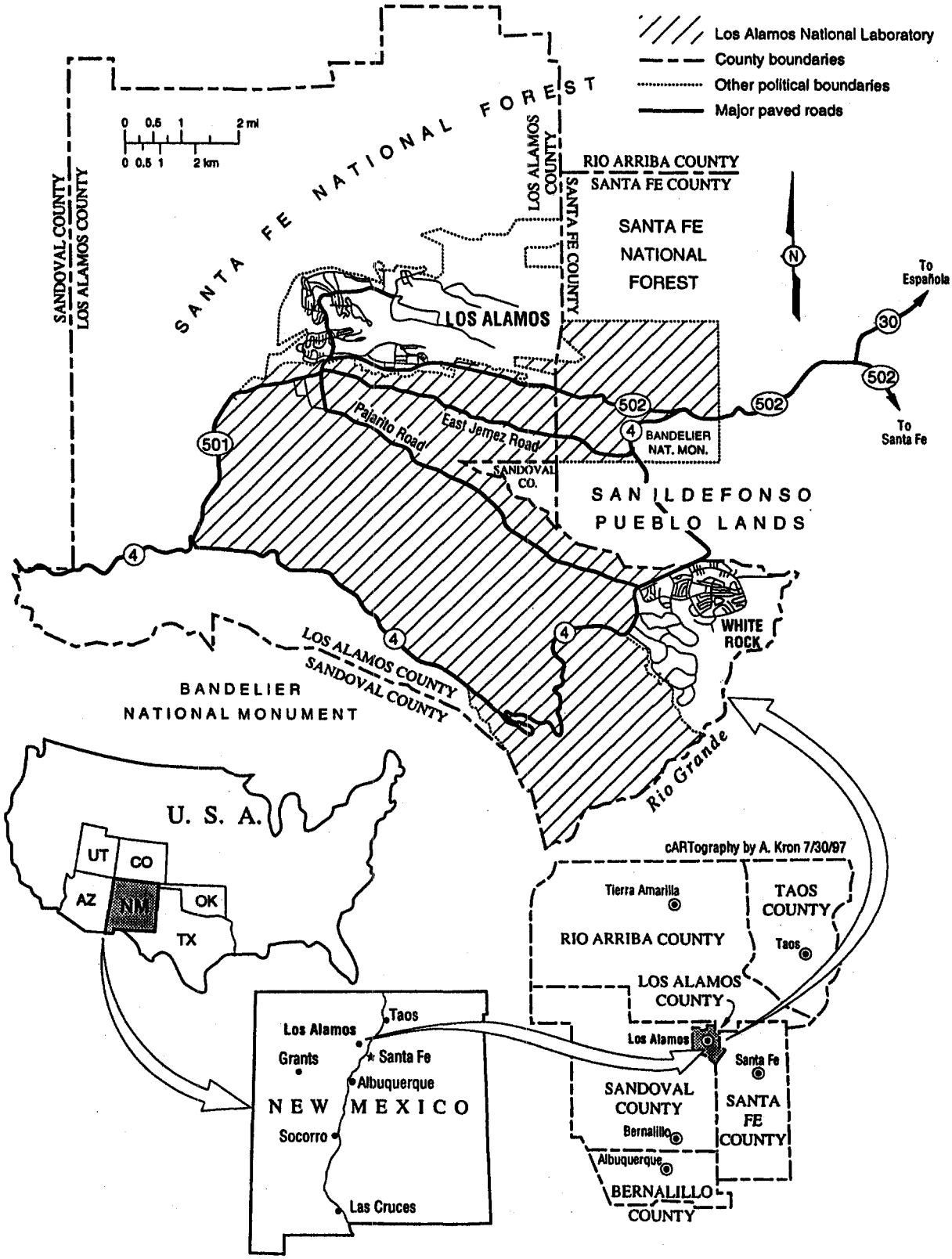

Figure 1. Location of Los Alamos National Laboratory.

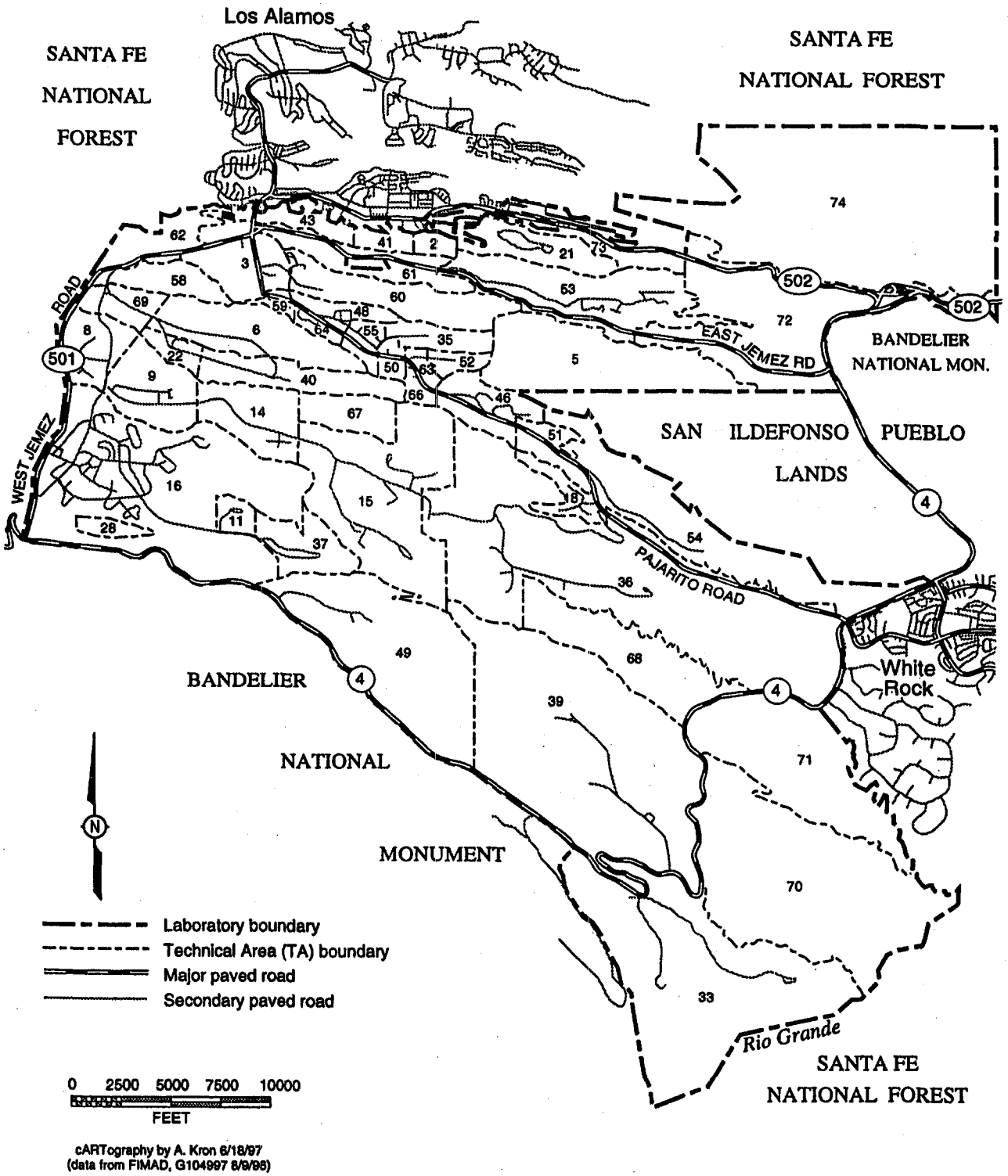

Figure 2. Los Alamos National Laboratory technical areas by number.

the most recent being published in 2002.[1]

TA-3-29: This facility is known as the Chemistry and Metallurgy Research (CMR) building. Programs conducting chemical and metallurgical research are located in this facility. Principal radionuclides are isotopes of plutonium as well as other actinides. There are a variety of activities involving plutonium and uranium that support many LANL and other DOE programs conducted primarily at other facilities.

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

TA-3-66: This building and three other main buildings are used for a variety of nuclear materials work, primarily for dealing with metallic and ceramic items, including depleted uranium.

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

TA-3-1698: This relatively new two-story building is designated the Materials Science Laboratory. The building was designed to accommodate a wide variety of chemicals used in small amounts that are typical of many university and industrial labs that conduct research in materials science.

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

TA-15-312-DARHT: This new facility is used for conducting high explosive driven experiments to investigate weapons functions and behavior during nonnuclear tests using advanced radiography.

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 packaging 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), the preparation of targets containing tritium for laser-fusion research, and the handling of tritium for defense programs. Tritium recovery operations 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 may result 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 H^- 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 2001. Medium (100 microamp) intensity beam operations to the Proton Storage Ring (PSR) and the Manuel Lujan Neutron Scattering Center were conducted from May to December of 2001. Low-intensity beam (up to 10 microamps) operations to the PSR, the Weapons Neutron Research facility and the Proton Radiography facility were conducted throughout the same period.

Airborne radioactive emissions result from the proton beams and secondary particles passing through and activating air in the target cells, beam stop, and surrounding areas. The majority of the emissions are short-lived activation products such as C-11, N-13, and O-15. 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 2001, 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 2001.

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 the means to safely ship, receive, handle, and store nuclear materials, as well as manage the wastes and residues produced by TA-55 operations.

Section II. Air Emissions Data

61.94(b)(4) Point Sources

Monitored and unmonitored 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 the building, 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 stage and 2.5×10^{-7} for two stages in series, in which penetration equals the 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 farm producing milk 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 in 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 to 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, depending on the magnitude of potential emissions. Results of the 2001 Usage Survey can be found in the report *2001 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 the annual average ambient concentrations of important airborne 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 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 2001.

Radionuclide Emissions

Radionuclides released from monitored point sources, along with the annual release rate for each radionuclide, are documented in Table 9. 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. No detectable emissions are denoted as ND. A map showing the general locations of the facilities continuously monitored for radionuclide emissions is shown in Figure 3.

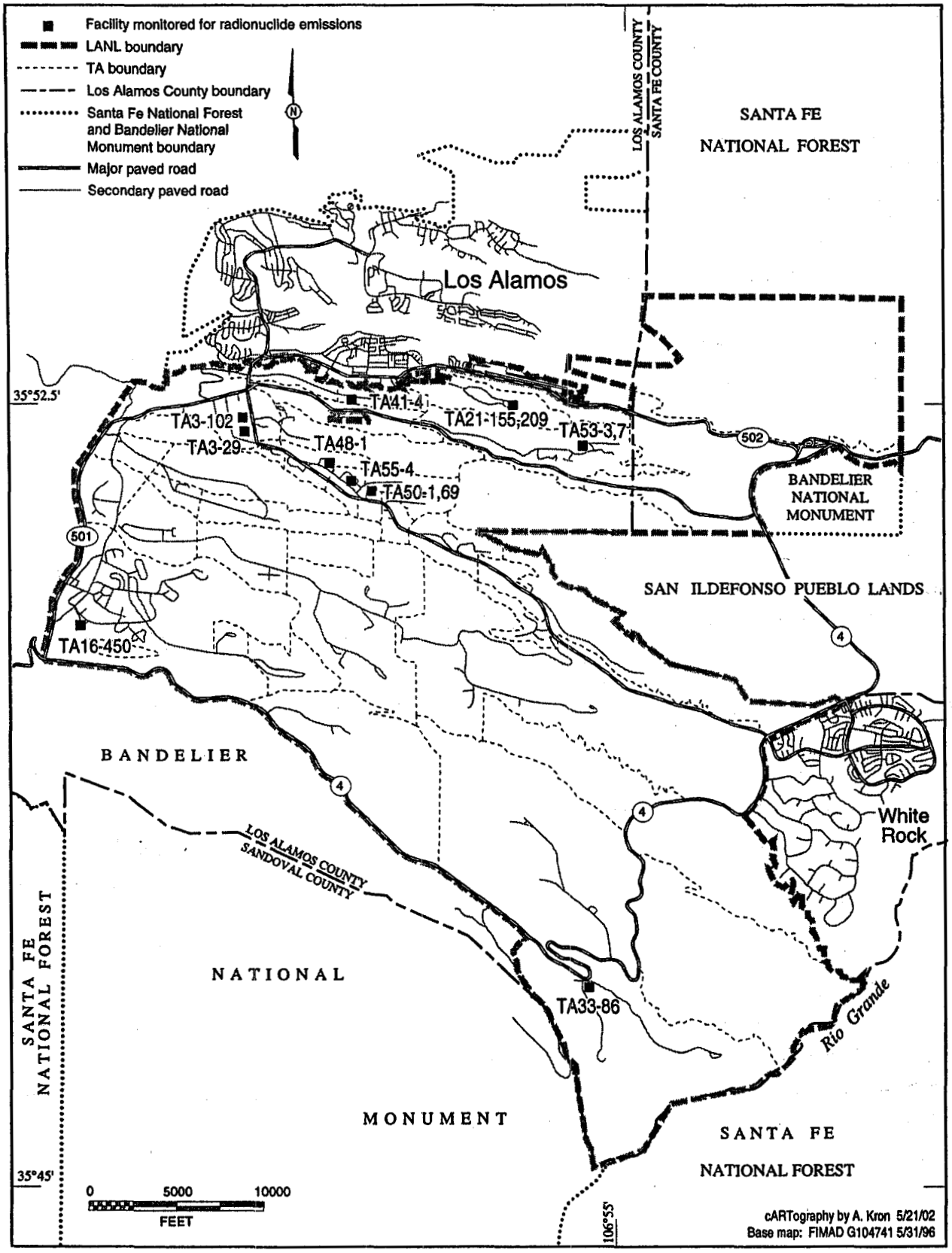

Figure 3. Locations of facilities with continuously operated stack-sampling systems for radionuclide emissions.

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 μm 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 particles. When the contaminant of concern is in the form of a gas, activated charcoal beds can be used. Charcoal beds collect the gas contaminant through an adsorption process in which the gas comes in contact with the charcoal and adheres to the surface of the charcoal. 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.

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 is 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 pulled 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. Due to the minor contribution of HTO to the LANSCE facility emissions, HTO sampling was discontinued after July 2001. Emissions of HTO presented in this report reflect the measured emissions, scaled up to represent annual emissions.

Radioactive particle emissions

Emissions of radioactive particulate matter, generated by operations at facilities such as the Chemistry and Metallurgy Research Building and the Plutonium Facility, are sampled using a glass-fiber filter. A continuous sample of stack air is pulled 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 composites 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 ^{238}U, and its short-lived progeny (^{234}Th and ^{234m}Pa) are assumed to be in equilibrium with ^{238}U.

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. Examples of radionuclides of this type include ^{193}Hg, ^{197}Hg, ^{68}Ge, ^{68}Ga, and ^{82}Br.

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 pulled 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 ^{11}C, ^{13}N, and ^{15}O.

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 stacks. 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 Meteorology and Air Quality Group (MAQ) operates an on-site network of meteorological monitoring towers. Data gathered by the towers are summarized and formatted for input to the CAP88 program. For 2001, 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 2001 dose assessment are provided in Table 7.

The Meteorology and 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 2001 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 2001 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 2001

compliance assessment, LANL-wide doses were evaluated at the nearest off-site point for each monitored emissions stack, as well as a number of additional key locations.

Starting in CY 2001, the Lab began leasing some office buildings and property to parties not directly employed by LANL. One such example is the ICON facility located at TA-46. Another case is the establishment of office and workspace for U.S. Forest Service Personnel to be housed on-site during periods of increased danger from wildfires. In neither case are these personnel determined to be public receptors. Personnel of this type are considered as subcontractors to DOE, similar to security guards and maintenance workers. These workers must carry a LANL identification badge and pass through a gate controlled for access to LANL/DOE employees and contractors only. This determination in concurrent with EPA guidance on leased DOE facilities.[8]

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.[9] For these radionuclides such as ^{193}Hg, ^{197}Hg, ^{68}Ge, ^{68}Ga, ^{10}C and ^{14}O, etc., LANL uses the CAP88 code to calculate airborne concentrations. We then apply exposure-to-dose conversion factors from EPA approved sources, such as dose conversation factors from U.S. DOE reports [10,11] or EPA's Federal Guidance Reports.[12,13] At the LANL-wide maximum dose location for 2001, 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 the U.S. EPA of the various steps and methods used to calculate the doses from such radionuclides.[14]

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 2001, approximately 150 Ci of ^{11}C and 7 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 2001 were evaluated for their potential to create ^{41}Ar gas. In 2001, approximately 0.3 Ci of ^{41}Ar was generated, and the dose was evaluated with CAP88. Additional source information is provided in Table 10.

Environmental Data

The net annual average ambient concentration of airborne radionuclides measured at 18 air sampling stations (Figure 4) is calculated by subtracting an appropriate background concentration value. The net concentration at each air sampler is converted to the 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).15 Dose assessment results from each air sampler are given in Table 11. The operational performance and analytical completeness of each air sampler is provided in Table 12.

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 13. 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 1.53 and 1.41 mrem, respectively. The values would not be expected to match, but do show satisfactory agreement between each other.

CAP88-NEWTRIT

To better evaluate doses from tritium emissions, scientists at the Lawrence Livermore National Laboratory (LLNL) and Chalk River Laboratories of Atomic Energy of Canada Limited have developed a new model for calculating tritium doses, called NEWTRIT. Developers at LLNL added the NEWTRIT model to CAP88 and have submitted this revised modeling procedure to EPA for approval. We received the CAP88-NEWTRIT model and evaluated it for use at LANL.

Tritium emissions can exist in two major chemical forms, tritium gas (HT) and tritiated water vapor (HTO). The dose received by exposure to HTO is much greater than the dose from HT. The current version of the CAP88 model only evaluates the HTO form. The NEWTRIT model calculates the dose from both forms and takes into account the contributions to dose arising from the conversion of HT to HTO in the environment. The NEWTRIT model also accounts for the human dose caused by another form of tritium that forms in the environment—organically bound tritium (OBT). The NEWTRIT model uses HT, HTO, and OBT dose coefficients that were derived and published by the International Commission on Radiological Protection.

Presented here is our summary of the CAP88 dose program incorporating the NEWTRIT model. We evaluated tritium emissions from the WETF facility for CY 2001, which totaled 7730 Ci of tritium in the form of HT, and 197 Ci of tritium in the form of HTO. The result was a HT dose of 0.028 mrem and a HTO dose of 0.011 mrem for a sum of 0.039 mrem (including the contribution from the OBT form as determined by NEWTRIT). This sum is nearly 90% different than the value calculated using the traditional method for this report (and given in Table 15 as 0.389 mrem). For future reports to EPA, we hope to apply the CAP88-NEWTRIT model at LANL, pending EPA approval of the methodology.

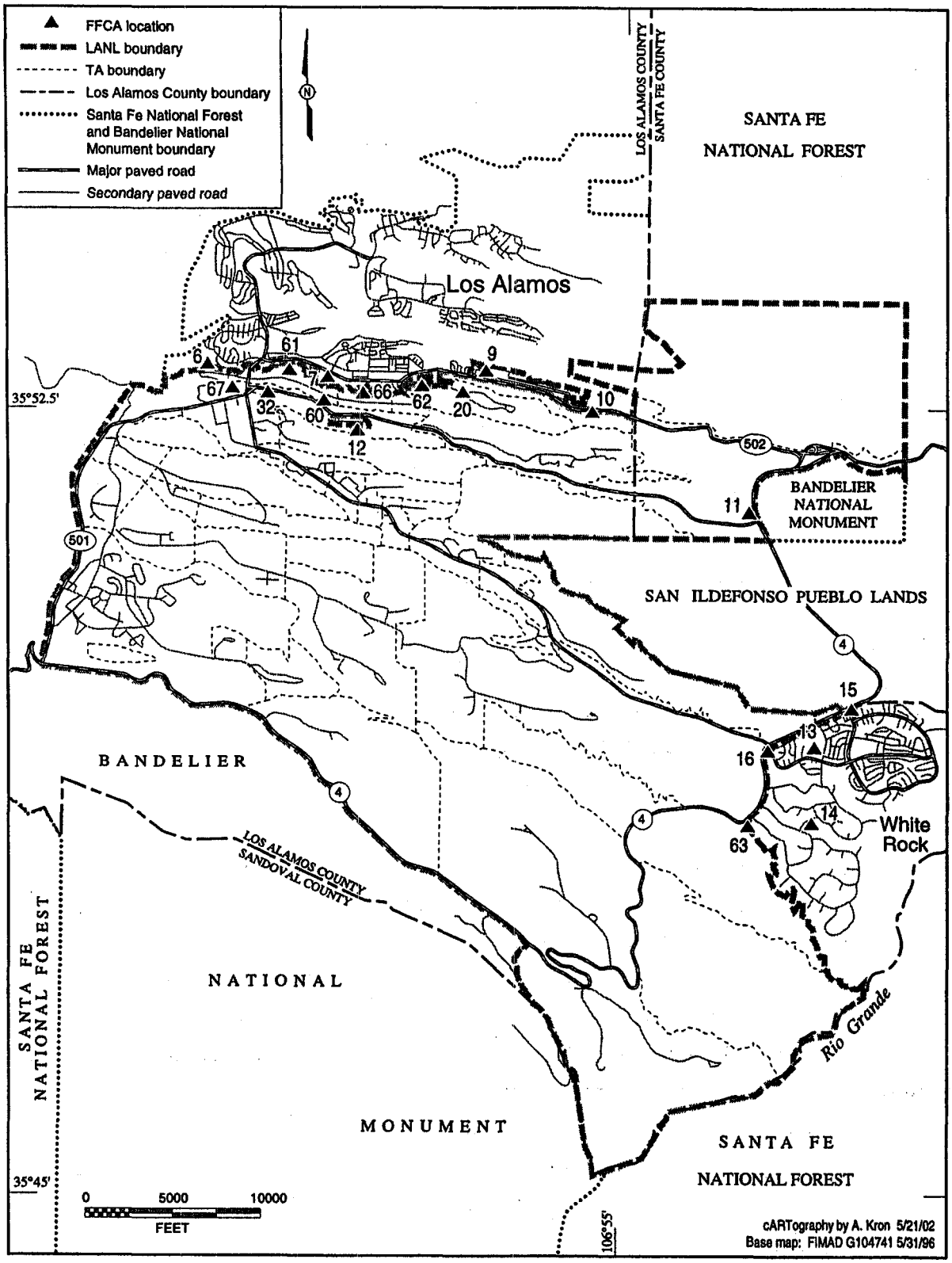

Figure 4. Locations of Air Sampling Stations Used for Non-point Source Compliance.

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 has averaged about 5 mrem. For 1999, the highest off-site EDE from the LANSCE facility was about 0.01 mrem. The highest offsite EDE location for LANSCE effluents is a business office in the East Gate area (2470 East Gate Drive). Because the contribution from LANSCE for 1999 was greatly reduced, the location of the highest off-site dose was not as readily established as 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 Citizen's 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 and 2001 dose assessments. Table 14 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 14. The highest off-site dose location was determined to be the East Gate area because of increased emissions from LANSCE in 2001 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 1.84 mrem for radionuclides released by LANL in 2001. 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 0.23 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 15 provides the compliance assessment summary. The location of the off-site point of highest EDE for 2001 was a business office at 2470 East Gate Drive; this location is the same as the location of the previous year’s assessment.

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 2001, but for which the requirement to apply for approval to construct or modify was waived under 61.96, is normally provided here. The Meteorology and Air Quality Group for LANL/DOE maintains the documents developed to support the waiver. We are providing additional information on other Rad-NESHAP activities noteworthy for 2001.

New Stacks at TA-48 Building #1

Two new exhaust stacks, 48000166 and 48000167, to be used for radionuclide air emissions were constructed at TA-48-1. Radionuclide air emissions were released from the new stacks for the first time in calendar year 2001. The activities that generate the emissions include ongoing sample analyses for research and activities that are ongoing at TA-48-1 previously exhausted from a different stack and relocated to the new stacks. No new activities were performed and exhausted to the new stacks.

The process that was exhausted to 48000166 and that took place in 2001 involved 72 g of depleted uranium metal and 410 g uranium oxide (50% of which is depleted uranium). The metal and oxide were mixed with glass surrogate and chemically extracted with carbonate solution in a hood exhausted by 48000166. The slurry was filtered. The solution was then precipitated with hydroxide and the solids recovered by centrifugation. Emissions for the activities exhausted to this stack were estimated using 40 CFR 61, Appendix D, release factors. Based on the CAP88 modeling results, the potential effective dose equivalent (PEDE) from this process at the nearest receptor was 1.09E-05 mrem/yr. This PEDE, which was well below the monitoring threshold of 0.1 mrem/yr specified in the Rad-NESHAP, also represents the total PEDE from the point source at the nearest receptor because there were no other activities or operations vented to this stack. Therefore, the stack did not require emissions monitoring. This process is one that is ongoing at TA-48-1 (previously exhausted from a different stack).

Activities that were exhausted to 48000167 and that took place in 2001 involved ongoing sample analyses for research and experiments that are ongoing at TA-48-1 and previously exhausted from a different stack. The experiments involved depleted uranium, ^{236}U, ^{233}U, ^{237}Np, ^{239}Pu, ^{242}Pu, and ^{55}Fe. The experiments are designed to study solubility, solution-complexation, interaction with microbes, sorption, toxicity, and hydrothermal synthesis. In addition to these experiments that have been historically performed at TA-48-1, ongoing sample analyses for research was moved into the building. The sample analysis involved 20 mg of ^{239}Pu prepared for assay by UV-Vis-NIR spectrophotometery. Emissions from the experiments and sample analysis exhausted to 48000167 were estimated using 40 CFR 61, Appendix D, release factors. Based on the CAP88 modeling results, the PEDE from this stack at the nearest receptor was 1.03E-02 mrem/yr. This PEDE, which was below the monitoring threshold of 0.1 mrem/yr, also represents the total PEDE from the point source at the nearest receptor because there were no other activities or operations vented to this stack. Therefore, the stack did not require emissions monitoring.

New Activities at TA-46, Building #200

TA-46-200 housed activities that generated radionuclide emissions for the first time in calendar year 2001. The activities currently housed in TA-46-200 include existing research and development activities previously performed at TA-46-31. The research and development activity involved sample preparation and annealing studies performed on metal samples (depleted uranium, 0.1 g/sample) in a sealed vacuum chamber. To determine the applicability of the Rad-NESHAP monitoring requirements, dose assessments were calculated using CAP88. The Meteorology and Air Quality Group estimated radioactive air emissions from the activities in Room 119 (60 samples in a CY in vacuum chamber) as well as the activities in room 110 (6 samples in a CY washed in acid). Emission estimates were completed using the Enhanced Rule (from the Federal Facilities Compliance Agreement) and 40 CFR 61, Appendix D, release factor for solids. Based on the modeling results, the PEDE from this operation (both rooms) at the nearest receptor is 3.93E-09 mrem/yr. This PEDE, which is well below the monitoring threshold of 0.1 mrem/yr, also represents the total PEDE from the point source at the nearest receptor because there are no other activities or operations vented to this stack (46020099). Therefore, the stack did not require emissions monitoring.

By definition of modification, the relocations of existing activities at LANL do not require pre-construction approval from EPA. Therefore, these relocations do not require reporting as constructions or modifications for which the requirement for approval was waived under Section 61.96. However, the relocations are presented as the construction of new release points and the first-time use of radionuclides in an existing building.

Acid Canyon Remediation Project

From September to November, personnel with the LANL Environmental Restoration (ER) project removed contaminated sediments from the south fork of Acid Canyon. Acid Canyon is a steep narrow canyon located between two mesas within the town of Los Alamos (see Figure 5). This south fork of the canyon had received untreated and treated liquid radioactive waste during the early days of Laboratory operations. The ER project was in charge of remediating the south fork of the canyon by removing sediments contaminated with various transuranic radionuclides, mostly plutonium-239, -240. About 490 cubic yards of sediment was removed during the cleanup. Based on samples collected during operations, the estimated total activity removed was about 0.45 Ci of transuranic radionuclides.[16] Air samples collected during the removal operations indicated that some of the contaminated sediment became airborne during the cleanup.

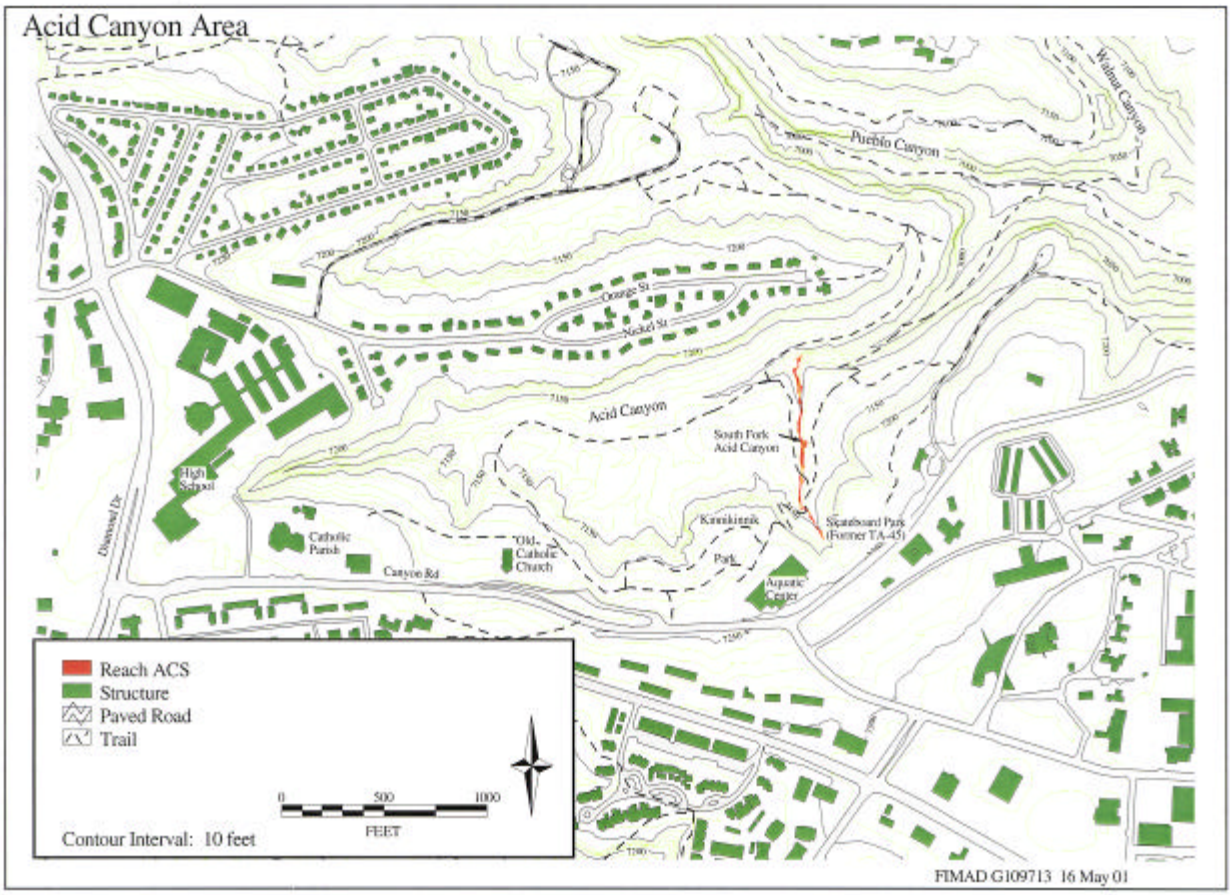

Figure 5. South Fork of Acid Canyon and Vicinity.

This type of activity is subject to the Rad-NESHAP regulations, and we have evaluated the air sampling results accordingly. The air sampling conducted at the work site is not representative for a nearby residence. However, using these results along with standard dispersion calculations, we estimated the potential dose to a nearby public residence. We estimate the total dose a nearby residence could have received to be 0.04 mrem, with an uncertainty factor of 2. We believe our estimate is conservative because it does not take into account additional air dispersion caused by the complexity of the site.[17]

The Meteorology and Air Quality group formally reviewed the Acid Canyon Remediation to determine the potential impacts against the Rad-NESHAP standard. If we determine that a diffuse emission could result in a dose for a 'NESHAP' receptor that exceeds 0.1 mrem/yr, we have committed ourselves to continuous air sampling of the activity and EPA approval of the air-sampling site and methods. In this case, both preliminary and final estimates were less than 0.1 mrem/yr, and the MAQ group did not perform continuous air sampling.

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 2001, the Laboratory had no instances of increased airborne emissions of radioactive materials that required reporting to the Environmental Protection Agency. There was one instance of an unplanned event. An unplanned release of tritium occurred at the Weapons Engineering Tritium Facility on January 31, between 9 and 10 am. Facility alarm systems detected the release, and it was isolated so that it could be vented out the main effluent stack at WETF (Figure 6). The Meteorology and Air Quality (MAQ) group arranged for the immediate analysis of the tritium released from the stack. The analysis showed that about 7,560 Ci of tritium in the gas form or HT was released along with about 5.2 Ci of tritium in the water-vapor form, or HTO.

Figure 6. TA-16 Weapons Engineering Tritium Facility.

We also calculated airborne transport and diffusion using computer-aided analysis. We used the CALMET program along with on-site meteorological monitoring data concurrent to the time of release. The surface level wind field calculated by CALMET is shown in Figure 7. We used the CALPUFF dispersion program to determine the downwind air concentrations. The highest concentration was shown to occur in a forested area about 160 m to the NW of the release point. If we assume an individual performing light work at the time of the release occupied the

area of highest concentration, their resulting dose could have been 3 mrem. The dose to a member of the public occupying a nearby roadway during the release would not have exceeded 1 mrem.

The total tritium emissions from WETF for CY 2001 are provided in Table 9 of this report (which includes the tritium release discussed here). The Rad-NESHAP dose assessment for the WETF facility is provided in Table 15 of this report. The Rad-NESHAP dose assessment procedure follows the method as described in Subpart H, §61.93, of 40 CFR 61.

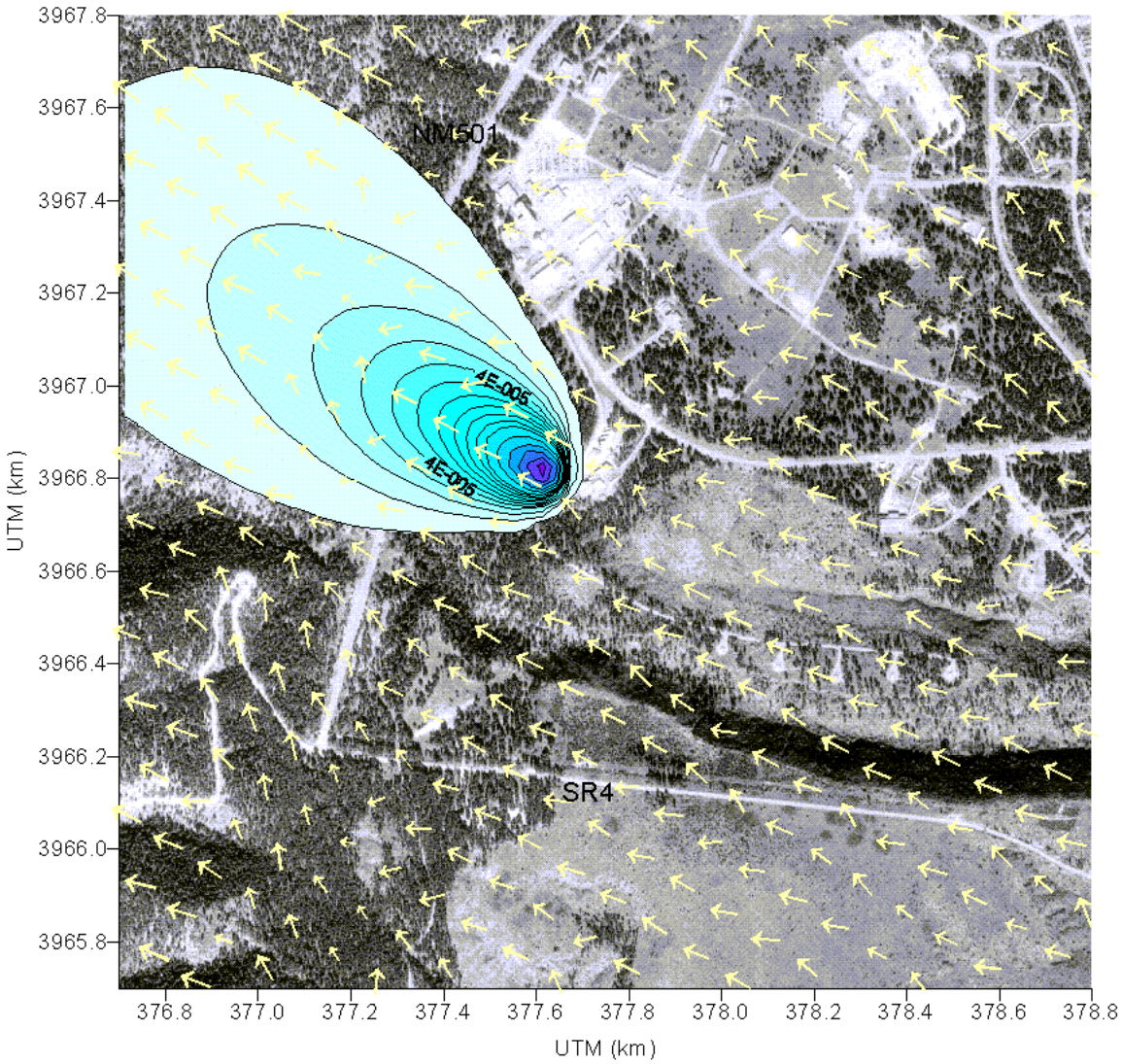

Figure 7. Aerial photo of TA-16 and vicinity with tritium plume (in Ci/m^3) from January 31, 2001, release, with surface wind vectors (range 0.3 to 1.3 m/s) also shown.

Environmental Monitoring

The Meteorology and 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

- Eighty-km collective effective (population) dose equivalent for 2001 airborne releases: 1.6 person-rem.
- Compliance with Subparts Q and T of 40 CFR 61—Radon-222 Emissions.
  These regulations apply to Rn-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 an emissions rate of 20 pCi/m^2 s of Rn-222. In 1993 and 1994, LANL conducted a study to characterize emissions from the Area G disposal site.[18] This study showed an average emission rate of 0.14 pCi/m^2 s for Area G. The performance assessment for Area G has determined that there will not be a significant increase in ^{222}Rn emissions in the future.[19]
- Potential to exceed 0.1 mrem from LANL sources of ^{222}Rn or ^{220}Rn 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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8. Frank Marcinowski, Acting Director, Radiation Protection Division, "Criteria to Determine Whether a Leased Facility at Department of Energy (DOE) is Subject to Subpart H," Office of Radiation and Indoor Air, U.S. Environmental Protection Agency (March 26, 2001).

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14. Keith W. Jacobson, "Non CAP88 Radionuclides Detected in 2001 LANL Air Effluents," letter to Mr. George Brozowski, Radiation Program Manager, Multimedia Planning and Permitting Division U.S Environmental Protection Agency, Region VI (June 3, 2002).

15. 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, Subpart H (1989).

16. Keith Tucker, Washington International Group, personal communication, October 2001.

17. Mike McNaughton, "Estimates of The Doses from Fugitive Dust during Acid Canyon Sediment Removal Activities in 2001," Los Alamos National Laboratory memorandum RRES-MAQ:02-200, (June 3, 2002).

18. Bart Eklund, "Measurements of Emission Fluxes from Technical Area 54, Areas G and L," Radian Corporation report, Austin, Texas (1995).

19. Los Alamos National Laboratory, "Performance Assessment and Composite Analysis for Los Alamos National Laboratory Materials Disposal Area G," Los Alamos National Laboratory report LA-UR9785 (1997).

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

ESIDNUM	Location	Control Description	Number of Effluent Controls	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%	☐
03004025	TA-03-40	HEPA	1	99.95%	☐
03006601	TA-03-66	none	0	0%	☐

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
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%	☐
03006606	TA-03-66	none	0	0%	☐
03006626	TA-03-66	HEPA	1	99.95%	☐
03006699	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%	☐
03169800	TA-03-1698	none	0	0%	☐
09002103	TA-09-21	none	0	0%	☐
16020504	TA-16-205	CR/MS	1	>99%	☑
16020599	TA-16-205	none	0	0%	☐
18016801	TA-18-168	none	0	0%	☐
21000507	TA-21-5	HEPA	2	99.95% each	☐
21015001	TA-21-150	HEPA	1	99.95%	☐
21015505	TA-21-155	CR/MS	1	>99%	☑
21020901	TA-21-209	CR/MS	1	>99%	☑
21020999	TA-21-209	none	0	0%	☐
21021399	TA-21-213	none	0	0%	☐
21025704	TA-21-257	none	0	0%	☐
33008606	TA-33-86	none	0	0%	☑
35000200	TA-35-2	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%	☐

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
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%	☐
46020099	TA-46-200	none	0	0%	☐
48000107	TA-48-1	HEPA/Charcoal Bed	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%	☑
48000166	TA-48-1	HEPA	2	99.95% each	☐
48000167	TA-48-1	HEPA	2	99.95% each	☐
48004500	TA-48-45	none	0	0%	☐
50000102	TA-50-1	HEPA	1	99.95% each	☑
50000299	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	☑
53000303	TA-53-3	HEPA	1	99.95%	☑
53000702	TA-53-7	HEPA	1	99.95%	☑

ESIDNUM	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored
53000799	TA-53-7	none	0	0%	☐
53036599	TA-53-365	none	0	0%	☐
53109010	TA-53-1090	none	0	0%	☐
54003399	TA-54-33	HEPA	1	99.95%	☐
54003699	TA-54-36	HEPA	1	99.95%	☐
54028101	TA-54-281	HEPA	1	99.95%	☐
54100199	TA-54-1001	none	0	0%	☐
54100999	TA-54-1009	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%	☐

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	746	N
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

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	6.28	TA-6
03002915	15.9	1.05	27.15	TA-6
03002919	15.9	1.07	27.89	TA-6
03002920	15.9	1.07	7.18	TA-6
03002923	15.9	1.07	24.22	TA-6
03002924	15.9	1.06	15.37	TA-6
03002928	15.9	1.05	21.05	TA-6
03002929	15.9	1.07	25.86	TA-6
03002932	15.9	1.07	19.69	TA-6
03002933	15.9	1.06	20.68	TA-6
03002937	16.8	0.20	14.28	TA-6
03002944	16.5	1.52	11.16	TA-6
03002945	16.5	1.52	7.78	TA-6
03002946	16.5	1.88	6.69	TA-6
03010222	13.4	0.91	1.32	TA-6
16020504	18.3	0.46	21.18	TA-6
21015505	29.9	0.79	8.72	TA-53
21020901	22.9	1.22	11.38	TA-53
33008606	23.4	0.61	8.72	TA-49
41000417	30.8	1.52	2.57	TA-6
48000107	13.4	0.30	20.10	TA-6
48000154	13.1	0.91	5.73	TA-6
48000160	12.4	0.38	8.78	TA-6
50000102	15.5	1.82	12.50	TA-6
50003701	12.4	0.91	6.59	TA-6
50006903	10.5	0.31	5.83	TA-6
53000303	33.5	0.90	11.72	TA-53
53000702	13.1	0.91	9.28	TA-53
55000415	9.5	0.93	7.18	TA-6
55000416	9.5	0.94	12.19	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 Off-site Dose Location for Monitored Release Points

ESHIDNUM	Associated Meteorological Tower	Distance to LANL Highest Dose Location (m)	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-49	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 2001 TA-6 Meteorological Tower
(99.7% Data Completeness)

```
 1  1  0.000940.000430.000000.000000.000000.00000
 1  2  0.001720.000570.000030.000000.000000.00000
 1  3  0.003380.001370.000000.000000.000000.00000
 1  4  0.005870.002720.000000.000000.000000.00000
 1  5  0.008100.003580.000000.000000.000000.00000
 1  6  0.007070.004670.000000.000000.000000.00000
 1  7  0.005100.005530.000000.000000.000000.00000
 1  8  0.004410.004780.000000.000000.000000.00000
 1  9  0.002630.003320.000030.000000.000000.00000
 1 10  0.001290.001200.000000.000000.000000.00000
 1 11  0.001060.000570.000000.000000.000000.00000
 1 12  0.000660.000520.000000.000000.000000.00000
 1 13  0.000230.000430.000090.000000.000000.00000
 1 14  0.000630.000630.000060.000000.000000.00000
 1 15  0.000770.000570.000090.000000.000000.00000
 1 16  0.000720.000570.000110.000000.000000.00000
 2  1  0.000200.000290.000060.000000.000000.00000
 2  2  0.000520.000890.000060.000000.000000.00000
 2  3  0.000830.001350.000000.000000.000000.00000
 2  4  0.002030.002460.000000.000000.000000.00000
 2  5  0.002460.003640.000030.000000.000000.00000
 2  6  0.001350.004580.000000.000000.000000.00000
 2  7  0.001570.005300.000000.000000.000000.00000
 2  8  0.001320.007160.000170.000030.000000.00000
 2  9  0.000630.004410.000200.000000.000000.00000
 2 10  0.000400.001920.000260.000000.000000.00000
 2 11  0.000230.000860.000170.000000.000000.00000
 2 12  0.000200.000400.000110.000000.000000.00000
 2 13  0.000110.000400.000170.000000.000000.00000
 2 14  0.000060.000400.000110.000000.000000.00000
 2 15  0.000110.000720.000260.000030.000000.00000
 2 16  0.000260.000460.000340.000000.000000.00000
 3  1  0.000660.000830.000260.000030.000000.00000
 3  2  0.001170.002200.000400.000000.000000.00000
 3  3  0.001370.004980.000860.000030.000000.00000
 3  4  0.002520.005870.000370.000000.000000.00000
 3  5  0.002550.006040.000230.000000.000000.00000
 3  6  0.001770.006330.000140.000000.000000.00000
 3  7  0.001660.007700.000600.000030.000000.00000
 3  8  0.001660.015400.003920.000060.000000.00000
 3  9  0.001630.016400.011140.000140.000000.00000
 3 10  0.000740.009130.007470.000630.000000.00000
 3 11  0.000690.003010.003980.000290.000000.00000
 3 12  0.000140.001950.002380.000200.000000.00000
 3 13  0.000110.001320.001460.000060.000000.00000
 3 14  0.000200.001660.001550.000110.000000.00000
 3 15  0.000230.002060.003750.000110.000000.00000
 3 16  0.000260.001490.001370.000060.000000.00000
```

4	1	0.006530.007470.001950.000060.000000.00000
4	2	0.006240.011710.003290.000460.000000.00000
4	3	0.005120.007270.001890.000260.000000.00000
4	4	0.005210.004720.000570.000030.000000.00000
4	5	0.005670.003210.000110.000000.000000.00000
4	6	0.004840.002980.000110.000000.000000.00000
4	7	0.003320.003460.000340.000030.000000.00000
4	8	0.004980.005780.002090.000060.000000.00000
4	9	0.007590.021610.011620.000430.000000.00000
4	10	0.006580.033320.014400.003090.000060.00000
4	11	0.006270.024960.017210.002660.000060.00000
4	12	0.005070.012370.010510.003490.000290.00000
4	13	0.003290.009850.015060.008130.001460.00023
4	14	0.003840.009820.013680.007870.003030.00106
4	15	0.005010.013860.014200.002780.000490.00000
4	16	0.005950.008960.002780.000230.000030.00000
5	1	0.004490.006670.000230.000000.000000.00000
5	2	0.003150.004070.000090.000000.000000.00000
5	3	0.002090.000770.000000.000000.000000.00000
5	4	0.001550.000310.000000.000000.000000.00000
5	5	0.001090.000140.000000.000000.000000.00000
5	6	0.001490.000230.000000.000000.000000.00000
5	7	0.001430.000430.000000.000000.000000.00000
5	8	0.001550.000430.000000.000000.000000.00000
5	9	0.003120.002520.000000.000000.000000.00000
5	10	0.004810.007390.000110.000000.000000.00000
5	11	0.004180.015290.000290.000000.000000.00000
5	12	0.003640.017780.000600.000000.000000.00000
5	13	0.002810.007930.001290.000000.000000.00000
5	14	0.002610.008270.002550.000000.000000.00000
5	15	0.003810.022330.000770.000000.000000.00000
5	16	0.004350.011220.000090.000000.000000.00000
6	1	0.007010.002030.000000.000000.000000.00000
6	2	0.003750.000600.000000.000000.000000.00000
6	3	0.002000.000060.000000.000000.000000.00000
6	4	0.001370.000060.000000.000000.000000.00000
6	5	0.000830.000000.000000.000000.000000.00000
6	6	0.001170.000030.000000.000000.000000.00000
6	7	0.000740.000000.000000.000000.000000.00000
6	8	0.001000.000030.000000.000000.000000.00000
6	9	0.001920.000260.000000.000000.000000.00000
6	10	0.003440.000720.000000.000000.000000.00000
6	11	0.006930.004040.000000.000000.000000.00000
6	12	0.008330.013770.000000.000000.000000.00000
6	13	0.008240.026140.000290.000000.000000.00000
6	14	0.006840.023070.000660.000000.000000.00000
6	15	0.007870.012340.000000.000000.000000.00000
6	16	0.007530.004720.000000.000000.000000.00000

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

CAP88 Input Data For 2000 TA-53 Meteorological Tower
(99.4% Data Completeness)

```
 1  1  0.001580.000490.000060.000000.000000.00000
 1  2  0.002470.000570.000000.000000.000000.00000
 1  3  0.004910.002270.000000.000000.000000.00000
 1  4  0.007900.004510.000000.000000.000000.00000
 1  5  0.007810.006750.000000.000000.000000.00000
 1  6  0.005890.005170.000030.000000.000000.00000
 1  7  0.004220.003450.000000.000000.000000.00000
 1  8  0.003130.003530.000000.000000.000000.00000
 1  9  0.001980.001980.000000.000000.000000.00000
 1 10  0.001260.001290.000000.000000.000000.00000
 1 11  0.000890.000750.000000.000000.000000.00000
 1 12  0.000490.000660.000000.000000.000000.00000
 1 13  0.000400.000660.000000.000000.000000.00000
 1 14  0.000490.000660.000060.000000.000000.00000
 1 15  0.000630.000370.000030.000000.000000.00000
 1 16  0.000570.000430.000030.000000.000000.00000
 2  1  0.000260.000400.000030.000000.000000.00000
 2  2  0.000490.000460.000000.000000.000000.00000
 2  3  0.001060.001670.000000.000000.000000.00000
 2  4  0.001550.004110.000000.000000.000000.00000
 2  5  0.001580.004480.000030.000000.000000.00000
 2  6  0.001010.003500.000000.000000.000000.00000
 2  7  0.000690.003130.000000.000000.000000.00000
 2  8  0.000550.002790.000030.000000.000000.00000
 2  9  0.000550.002240.000000.000000.000000.00000
 2 10  0.000290.001010.000090.000000.000000.00000
 2 11  0.000200.000660.000030.000000.000000.00000
 2 12  0.000030.000600.000060.000000.000000.00000
 2 13  0.000110.000320.000140.000000.000000.00000
 2 14  0.000110.000920.000170.000000.000000.00000
 2 15  0.000110.000340.000140.000000.000000.00000
 2 16  0.000060.000230.000060.000000.000000.00000
 3  1  0.000400.000860.000400.000000.000000.00000
 3  2  0.000780.001410.000260.000000.000000.00000
 3  3  0.001410.004020.000340.000000.000000.00000
 3  4  0.001780.006860.000230.000000.000000.00000
 3  5  0.001460.007150.000290.000000.000000.00000
 3  6  0.001120.004250.000140.000000.000000.00000
 3  7  0.000800.005050.000110.000000.000000.00000
 3  8  0.000860.006430.000370.000000.000000.00000
 3  9  0.000570.007670.002150.000000.000000.00000
 3 10  0.000260.003850.001460.000030.000000.00000
 3 11  0.000110.001900.001150.000000.000000.00000
 3 12  0.000200.001290.001690.000110.000000.00000
 3 13  0.000140.002470.003040.000090.000000.00000
 3 14  0.000140.001750.002440.000060.000000.00000
 3 15  0.000110.001230.001150.000090.000000.00000
 3 16  0.000230.000890.000260.000000.000000.00000
```

4	1	0.00658	0.00962	0.00752	0.00123	0.00000	0.00000
4	2	0.00758	0.01286	0.00859	0.00204	0.00026	0.00003
4	3	0.00678	0.01149	0.00500	0.00072	0.00020	0.00000
4	4	0.00494	0.00698	0.00135	0.00014	0.00000	0.00000
4	5	0.00350	0.00528	0.00066	0.00000	0.00000	0.00000
4	6	0.00290	0.00293	0.00055	0.00000	0.00000	0.00000
4	7	0.00233	0.00413	0.00155	0.00026	0.00000	0.00000
4	8	0.00287	0.00979	0.00833	0.00247	0.00046	0.00006
4	9	0.00379	0.01717	0.03093	0.00836	0.00043	0.00000
4	10	0.00299	0.01947	0.04009	0.01332	0.00135	0.00000
4	11	0.00287	0.01933	0.02527	0.00749	0.00069	0.00003
4	12	0.00207	0.00853	0.01341	0.00637	0.00101	0.00000
4	13	0.00218	0.00927	0.01335	0.00459	0.00080	0.00000
4	14	0.00284	0.00778	0.01126	0.00302	0.00040	0.00003
4	15	0.00393	0.00434	0.00620	0.00253	0.00043	0.00009
4	16	0.00546	0.00569	0.00457	0.00155	0.00032	0.00006
5	1	0.00770	0.00844	0.00146	0.00000	0.00000	0.00000
5	2	0.00583	0.00859	0.00198	0.00000	0.00000	0.00000
5	3	0.00356	0.00503	0.00095	0.00000	0.00000	0.00000
5	4	0.00241	0.00224	0.00009	0.00000	0.00000	0.00000
5	5	0.00207	0.00126	0.00000	0.00000	0.00000	0.00000
5	6	0.00181	0.00095	0.00006	0.00000	0.00000	0.00000
5	7	0.00123	0.00155	0.00014	0.00000	0.00000	0.00000
5	8	0.00152	0.00201	0.00046	0.00000	0.00000	0.00000
5	9	0.00164	0.00580	0.00261	0.00000	0.00000	0.00000
5	10	0.00187	0.01829	0.01746	0.00000	0.00000	0.00000
5	11	0.00316	0.02653	0.01022	0.00000	0.00000	0.00000
5	12	0.00247	0.01927	0.01108	0.00000	0.00000	0.00000
5	13	0.00258	0.01611	0.00701	0.00000	0.00000	0.00000
5	14	0.00287	0.01103	0.00299	0.00000	0.00000	0.00000
5	15	0.00431	0.00643	0.00227	0.00000	0.00000	0.00000
5	16	0.00520	0.00729	0.00230	0.00000	0.00000	0.00000
6	1	0.00477	0.00129	0.00000	0.00000	0.00000	0.00000
6	2	0.00580	0.00172	0.00000	0.00000	0.00000	0.00000
6	3	0.00569	0.00129	0.00000	0.00000	0.00000	0.00000
6	4	0.00428	0.00040	0.00000	0.00000	0.00000	0.00000
6	5	0.00330	0.00017	0.00000	0.00000	0.00000	0.00000
6	6	0.00302	0.00020	0.00000	0.00000	0.00000	0.00000
6	7	0.00345	0.00075	0.00000	0.00000	0.00000	0.00000
6	8	0.00416	0.00121	0.00000	0.00000	0.00000	0.00000
6	9	0.00442	0.00235	0.00000	0.00000	0.00000	0.00000
6	10	0.00411	0.00471	0.00009	0.00000	0.00000	0.00000
6	11	0.00333	0.00218	0.00003	0.00000	0.00000	0.00000
6	12	0.00244	0.00353	0.00017	0.00000	0.00000	0.00000
6	13	0.00264	0.00365	0.00009	0.00000	0.00000	0.00000
6	14	0.00299	0.00347	0.00009	0.00000	0.00000	0.00000
6	15	0.00362	0.00129	0.00006	0.00000	0.00000	0.00000
6	16	0.00442	0.00109	0.00003	0.00000	0.00000	0.00000

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

CAP88 Input Data For 2001 TA-49 Meteorological Tower
(99.6% Data Completeness)

```
 1  1  0.000570.000110.000000.000000.000000.00000
 1  2  0.001060.000290.000000.000000.000000.00000
 1  3  0.001290.000750.000000.000000.000000.00000
 1  4  0.002260.001290.000000.000000.000000.00000
 1  5  0.003070.002550.000030.000000.000000.00000
 1  6  0.002810.003240.000000.000000.000000.00000
 1  7  0.002380.002260.000000.000000.000000.00000
 1  8  0.001630.002010.000030.000000.000000.00000
 1  9  0.001150.001350.000000.000000.000000.00000
 1 10  0.000890.000570.000000.000000.000000.00000
 1 11  0.000340.000490.000030.000000.000000.00000
 1 12  0.000200.000520.000030.000000.000000.00000
 1 13  0.000170.000320.000000.000000.000000.00000
 1 14  0.000200.000230.000000.000000.000000.00000
 1 15  0.000370.000200.000000.000000.000000.00000
 1 16  0.000170.000170.000030.000000.000000.00000
 2  1  0.000200.000060.000000.000000.000000.00000
 2  2  0.000260.000340.000030.000000.000000.00000
 2  3  0.000400.000770.000000.000000.000000.00000
 2  4  0.000400.000950.000000.000000.000000.00000
 2  5  0.000860.002320.000000.000000.000000.00000
 2  6  0.000430.002260.000000.000000.000000.00000
 2  7  0.000320.002410.000000.000000.000000.00000
 2  8  0.000400.002090.000030.000000.000000.00000
 2  9  0.000370.002410.000000.000000.000000.00000
 2 10  0.000320.000600.000030.000000.000000.00000
 2 11  0.000200.000430.000000.000000.000000.00000
 2 12  0.000140.000290.000090.000000.000000.00000
 2 13  0.000030.000340.000060.000000.000000.00000
 2 14  0.000030.000320.000090.000000.000000.00000
 2 15  0.000060.000200.000060.000000.000000.00000
 2 16  0.000110.000140.000090.000000.000000.00000
 3  1  0.000260.000490.000090.000030.000000.00000
 3  2  0.000490.000690.000110.000000.000000.00000
 3  3  0.000490.001380.000090.000000.000000.00000
 3  4  0.000690.002950.000090.000000.000000.00000
 3  5  0.001320.005300.000110.000000.000000.00000
 3  6  0.000570.004190.000090.000000.000000.00000
 3  7  0.000630.004700.000170.000000.000000.00000
 3  8  0.000490.005820.000400.000000.000000.00000
 3  9  0.000690.007080.001060.000000.000000.00000
 3 10  0.000290.002520.000600.000000.000000.00000
 3 11  0.000170.000950.000260.000060.000000.00000
 3 12  0.000200.000750.000570.000000.000000.00000
 3 13  0.000230.001000.001720.000060.000000.00000
 3 14  0.000090.001200.001550.000110.000000.00000
 3 15  0.000110.000540.000720.000000.000000.00000
 3 16  0.000170.000540.000260.000000.000000.00000
```

4	1	0.00404	0.00935	0.00350	0.00052	0.00000	0.00000
4	2	0.00513	0.01072	0.00453	0.00152	0.00000	0.00000
4	3	0.00333	0.01175	0.00720	0.00143	0.00023	0.00003
4	4	0.00335	0.01066	0.00350	0.00017	0.00000	0.00000
4	5	0.00355	0.00771	0.00092	0.00020	0.00000	0.00000
4	6	0.00244	0.00447	0.00123	0.00011	0.00003	0.00000
4	7	0.00212	0.00525	0.00218	0.00043	0.00009	0.00000
4	8	0.00215	0.00897	0.01109	0.00284	0.00060	0.00003
4	9	0.00249	0.02531	0.04756	0.02242	0.00077	0.00011
4	10	0.00333	0.02184	0.02835	0.01150	0.00204	0.00020
4	11	0.00255	0.01253	0.01582	0.00728	0.00103	0.00032
4	12	0.00258	0.00946	0.01181	0.00697	0.00097	0.00003
4	13	0.00267	0.00783	0.01359	0.00717	0.00149	0.00009
4	14	0.00178	0.00771	0.01531	0.00522	0.00100	0.00009
4	15	0.00264	0.00631	0.01066	0.00522	0.00046	0.00011
4	16	0.00278	0.00912	0.00636	0.00298	0.00006	0.00000
5	1	0.00272	0.01362	0.00794	0.00000	0.00000	0.00000
5	2	0.00284	0.00613	0.00238	0.00000	0.00000	0.00000
5	3	0.00209	0.00258	0.00095	0.00000	0.00000	0.00000
5	4	0.00166	0.00132	0.00003	0.00000	0.00000	0.00000
5	5	0.00097	0.00075	0.00003	0.00000	0.00000	0.00000
5	6	0.00095	0.00054	0.00003	0.00000	0.00000	0.00000
5	7	0.00077	0.00040	0.00020	0.00000	0.00000	0.00000
5	8	0.00126	0.00112	0.00069	0.00000	0.00000	0.00000
5	9	0.00178	0.00734	0.00355	0.00000	0.00000	0.00000
5	10	0.00218	0.01694	0.00424	0.00000	0.00000	0.00000
5	11	0.00215	0.01901	0.00771	0.00000	0.00000	0.00000
5	12	0.00224	0.01161	0.00579	0.00000	0.00000	0.00000
5	13	0.00189	0.00840	0.00335	0.00000	0.00000	0.00000
5	14	0.00140	0.01198	0.00937	0.00000	0.00000	0.00000
5	15	0.00264	0.01026	0.00456	0.00000	0.00000	0.00000
5	16	0.00281	0.00711	0.00568	0.00000	0.00000	0.00000
6	1	0.00602	0.01112	0.00123	0.00000	0.00000	0.00000
6	2	0.00556	0.00224	0.00003	0.00000	0.00000	0.00000
6	3	0.00252	0.00029	0.00000	0.00000	0.00000	0.00000
6	4	0.00158	0.00003	0.00000	0.00000	0.00000	0.00000
6	5	0.00095	0.00003	0.00000	0.00000	0.00000	0.00000
6	6	0.00120	0.00006	0.00000	0.00000	0.00000	0.00000
6	7	0.00109	0.00037	0.00000	0.00000	0.00000	0.00000
6	8	0.00109	0.00032	0.00003	0.00000	0.00000	0.00000
6	9	0.00126	0.00135	0.00003	0.00000	0.00000	0.00000
6	10	0.00292	0.00333	0.00032	0.00000	0.00000	0.00000
6	11	0.00355	0.00837	0.00069	0.00000	0.00000	0.00000
6	12	0.00298	0.01972	0.00344	0.00000	0.00000	0.00000
6	13	0.00338	0.02485	0.00742	0.00000	0.00000	0.00000
6	14	0.00307	0.01270	0.00419	0.00000	0.00000	0.00000
6	15	0.00450	0.01058	0.00312	0.00000	0.00000	0.00000
6	16	0.00530	0.02311	0.01170	0.00000	0.00000	0.00000

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

Estimated 2001 Population within 80 km of Los Alamos National Laboratory

	Distance from TA-53-LANSCE (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	9	18	58	28	55	85	98	145	0	0	0	0	16	97	1003	1483
NNW	7	18	50	240	176	93	268	290	22	0	0	0	8	22	276	492
NW	6	12	22	59	333	400	217	706	432	409	56	0	2	26	53	1076
WNW	0	8	10	16	71	219	853	1091	1944	2722	753	0	0	32	37	3092
W	0	0	4	9	14	19	150	170	17	0	0	0	9	77	345	169
WSW	0	0	0	0	0	0	0	0	0	0	0	2	9	44	477	2815
SW	0	0	0	0	0	0	0	0	0	0	1	12	12	0	0	2815
SSW	0	0	0	0	0	0	0	0	0	0	10	35	4	1014	1514	70245
S	0	0	0	0	0	0	0	0	0	0	0	26	7	20	177	3878
SSE	0	0	0	0	0	0	0	0	0	357	229	326	55	341	6204	2986
SE	0	0	0	0	0	0	0	0	0	1615	3443	586	1	1133	79947	8952
ESE	0	0	0	0	0	0	0	0	0	0	0	11	13	770	8820	3085
E	0	0	0	0	0	0	0	0	0	0	2	1	1883	4487	437	490
ENE	1	0	0	0	0	0	0	0	0	0	0	0	2256	4993	3862	3153
NE	6	10	2	0	0	0	0	0	0	0	0	0	1298	15818	2690	6640
NNE	8	18	55	8	40	33	26	25	0	0	0	0	15	2514	413	1047

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

ESID Number	Nuclide	Emissions (Ci)
03002914	Pu-238	1.95E-09
03002914	Th-232	2.41E-09
03002915	Th-232	6.71E-09
03002919	Am-241	9.09E-08
03002919	Pu-238	1.26E-07
03002919	Pu-239	2.99E-07
03002920	Am-241	7.61E-09
03002920	Pu-238	1.30E-08
03002920	Pu-239	4.09E-08
03002923	Am-241	1.63E-08
03002923	Pu-238	1.76E-08
03002923	Pu-239	1.69E-09
03002923	U-234	4.33E-06
03002923	U-235	1.42E-07
03002923	Th-231	1.40E-07
03002923	U-238	2.26E-07
03002923	Th-234	2.30E-07
03002923	Pa-234m	2.30E-07
03002924	Am-241	1.15E-08
03002924	Pu-238	9.87E-08
03002924	Pu-239	4.67E-09
03002924	Th-228	1.00E-07
03002924	U-234	2.35E-06
03002928	Am-241	1.34E-07
03002928	Pu-238	7.92E-06
03002928	Pu-239	6.39E-07
03002929	Pu-238	1.86E-08
03002929	Pu-239	5.37E-09
03002932	Pu-238	8.78E-09
03002933	Pu-238	3.92E-09
03002937	Th-232	2.32E-10
03002944	ND	None
03002945	Pu-239	5.41E-09
03002945	Th-230	2.74E-08
03002946	U-234	2.59E-08

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

ESIDNUM	Nuclide	Emissions (Ci)
03010222	U-234	2.10E-08
03010222	U-235	9.91E-10
03010222	Th-231	9.90E-10
03010222	U-238	4.48E-10
03010222	Th-234	4.50E-10
03010222	Pa-234m	4.50E-10
16020504	H-3(Gas)	7.73E+03
16020504	H-3(HTO)	1.97E+02
21015505	H-3(Gas)	7.09E+00
21015505	H-3(HTO)	5.84E+01
21020901	H-3(Gas)	3.12E+01
21020901	H-3(HTO)	3.88E+02
33008606	H-3(Gas)	2.33E+01
33008606	H-3(HTO)	4.38E+02
41000417	H-3(Gas)	4.25E+02
41000417	H-3(HTO)	1.10E+02
48000107	As-73	4.15E-05
48000107	As-74	1.07E-05
48000107	Ga-68	1.10E-03
48000107	Ge-68	1.14E-03
48000154	ND	None
48000160	Ga-68	1.80E-05
48000160	Ge-68	1.77E-05
50000102	Pu-238	3.80E-08
50000102	Pu-239	4.53E-09
50003701	ND	None
50006903	Am-241	5.80E-11
50006903	Pu-238	3.59E-11
50006903	Pu-239	2.72E-10
53000303	H-3(HTO)	6.74E-01
53000303	C-11	1.97E+00
53000702	H-3(HTO)	5.72E+00

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

ESIDNUM	Nuclide	Emissions (Ci)
53000702	Ar-41	1.59E+01
53000702	As-73	7.65E-04
53000702	Br-76	1.37E-03
53000702	Br-82	3.39E-03
53000702	C-10	2.55E+00
53000702	C-11	3.36E+03
53000702	Hg-193	6.92E-01
53000702	Hg-195m	2.41E-02
53000702	Hg-197	3.65E-01
53000702	Hg-203	8.58E-03
53000702	N-13	1.33E+02
53000702	N-16	2.80E-02
53000702	O-14	3.36E+01
53000702	O-15	2.39E+03
55000415	Am-241	6.15E-09
55000415	Pu-239	1.38E-08
55000415	Th-228	3.08E-08
55000415	Th-230	3.29E-08
55000415	Th-232	3.03E-08
55000415	U-234	3.18E-08
55000415	U-238	5.31E-08
55000415	Th-234	5.30E-08
55000415	Pa-234m	5.30E-08
55000416	H-3(Gas)	2.52E+00
55000416	H-3(HTO)	7.36E-01
55000416	Pu-238	1.00E-08
55000416	Pu-239	1.87E-08
55000416	Th-228	2.89E-08
55000416	Th-232	2.80E-08
55000416	U-234	2.10E-08
55000416	U-238	6.45E-08
55000416	Th-234	6.50E-08
55000416	Pa-234m	6.50E-08

Table 10. 40-61.94(b)(7) User-supplied Data— Modeling Parameters for LANL Non Point 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	^{41}Ar	0.3	484	774	NNE
	^{11}C	7.1	484	774	NNE
TA-53-1L Service Area	^{41}Ar	5.9	1.0	943	NNE
	^{11}C	142.4	1.0	943	NNE
TA-18	^{41}Ar	0.3	31,400	3,894	NNE

Table 11. Environmental Data—FFCA Stations

2001 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	0.007	0.010	-0.001	0.002	0.002	0.002	0.002	0.02
08 McDonalds	0.000	0.092	0.000	0.005	0.007	0.002	0.010	0.12
09 Los Alamos Airport	0.003	0.039	0.000	0.006	0.005	0.002	0.014	0.07
10 East Gate	0.004	0.036	0.000	-0.001	0.005	0.003	0.011	0.06
11 Well PM-1 (E. Jemez Road)	0.003	0.017	-0.002	0.002	0.000	0.003	0.005	0.03
12 Royal Crest Trailer Court	0.008	0.021	0.000	0.001	0.008	0.001	0.013	0.05
13 Rocket Park	0.000	0.032	0.001	0.006	0.004	0.002	0.008	0.05
14 Pajarito Acres	-0.001	0.019	0.002	-0.001	0.003	0.002	0.011	0.04
15 White Rock Fire Station	-0.002	0.019	0.001	0.000	0.010	0.003	0.017	0.05
16 White Rock Nazarene Church	0.002	0.045	0.000	-0.002	0.002	0.002	0.006	0.05
20 TA-21 Area B	0.001	0.053	0.001	0.000	0.007	0.002	0.020	0.08
32 County Landfill	0.000	0.021	0.000	0.012	0.061	0.005	0.063	0.16
60 LA Canyon	0.005	0.048	0.000	0.002	0.008	0.001	0.010	0.08
61 LA Hospital	-0.003	0.017	0.001	0.004	0.009	0.002	0.008	0.04
62 Crossroads Bible Church	-0.001	0.023	0.000	0.004	0.006	0.002	0.018	0.05
63 Monte Rey South	0.001	0.018	0.001	-0.001	0.004	0.003	0.013	0.04
66 Los Alamos Inn—South	0.002	0.056	0.002	0.099	0.008	0.002	0.012	0.18
67 TA-3 Research Park	-0.002	0.013	0.000	0.004	0.020	0.002	0.022	0.06

Table 12. Air Sampler Operation and Analytical Completeness Summary

Air Sampler Site #	Site Name	Percent Run Time	Analysis	Percent Analytical Completeness
06	48th Street	100.0		
			Am-241	100.0
			H-3	96.2
			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
10	Eastgate	99.6		
			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 12. Air Sampler Operation and Analytical Completeness Summary (continued)

Air Sampler Site #	Site Name	Percent Run Time	Analysis	Percent Analytical Completeness
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
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	98.0		
			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 12. Air Sampler Operation and Analytical Completeness Summary (continued)

Air Sampler Site #	Site Name	Percent Run Time	Analysis	Percent Analytical Completeness
16	White Rock Nazarene Church	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
20	TA-21 Area B	99.0		
			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
32	County Landfill	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	99.8		
			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

Table 12. Air Sampler Operation and Analytical Completeness Summary (continued)

Air Sampler Site #	Site Name	Percent Run Time	Analysis	Percent Analytical Completeness
62	Crossroads Bible Church	99.4		
			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
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	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
67	TA-3 Research 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 13. LANSCE Monthly Assessments and Summary

description	ESIDNUM	Dose at East Gate Receptor
LANSCE-stack-January	53000303	na
LANSCE-stack-February	53000303	na
LANSCE-stack-March	53000303	na
LANSCE-stack-April	53000303	na
LANSCE stack-May	53000303	1.61E-05
LANSCE stack-June	53000303	4.17E-05
LANSCE stack-July	53000303	6.02E-05
LANSCE stack-August	53000303	3.40E-05
LANSCE stack-September	53000303	3.68E-05
LANSCE-stack-October	53000303	2.68E-05
LANSCE-stack-November	53000303	7.60E-05
LANSCE-stack-December	53000303	4.26E-05
LANSCE-stack-PVAP*	53000303	3.26E-05
LANSCE-Non-CAP88 Radionuclides*	53000303	na
LANSCE-stack-January	53000702	na
LANSCE-stack-February	53000702	na
LANSCE-stack-March	53000702	na
LANSCE-stack-April	53000702	na
LANSCE stack-May	53000702	2.76E-03
LANSCE stack-June	53000702	8.28E-02
LANSCE stack-July	53000702	1.39E-01
LANSCE stack-August	53000702	4.68E-02
LANSCE stack-September	53000702	1.06E-01
LANSCE-stack-October	53000702	2.26E-01
LANSCE-stack-November	53000702	4.92E-01
LANSCE-stack-December	53000702	3.10E-01
LANSCE-stack-PVAP*	53000702	7.35E-04
LANSCE-Non-CAP88 Radionuclides*	53000702	1.04E-02
LANSCE-Fugitive Emissions - Switchyard*	530003sy	4.95E-03
LANSCE-Fugitive Emissions - 1L Area*	5300071L	6.73E-02
LANSCE Summary		**1.49E+00**

*Annual Value

Table 14. 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		1.20E-01
2	Residence Near Urban Park	1,618,400	1,780,000	Urban Park†	05		1.26E-01
3	Residence on Fairway Drive	1,618,602	1,776,052	48th Street	06		9.16E-02
4	Los Alamos Shell / Trinity Drive	1,624,450	1,775,300	Los Alamos Inn-S	66		2.70E-01
5	Los Alamos McDonald's	1,626,450	1,775,350	LA McDonald's	08		2.28E-01
6	Los Alamos Airport	1,632,902	1,776,247	Los Alamos Airport	09		2.13E-01
7	Tsankawi Visitor Center	1,648,105	1,758,380	Well PM-1	11		1.48E-01
8	Royal Crest Trailer Court - West	1,624,256	1,773,065	Royal Crest Tlr. Crt.	12		1.56E-01
9	Royal Crest Trailer Court - East	1,625,778	1,772,955	Royal Crest Trl. Crt.	12		1.61E-01
10	Residence near WR Rocket Park	1,651,950	1,755,300	Rocket Park	13		9.88E-02
11	Residence in Pajarito Acres	1,650,770	1,750,520	Pajarito Acres	14		8.60E-02
12	White Rock Fire Station	1,653,580	1,756,630	WR Fire Station	15		9.88E-02
13	White Rock Nazarene Church	1,648,778	1,754,676	WR Nazarene Ch.	16		1.06E-01
14	Bandelier Fire Lookout	1,635,700	1,739,005	Bandelier†	17		8.99E-02
15	Residence on Nambe Loop	1,621,568	1,776,046	TA-21 Area B	20		1.99E-01
16	Ponderosa Campground	1,608,575	1,758,460	TA-49†	26		4.44E-01
17	County Landfill Office	1,620,569	1,774,763	County Landfill	32		2.49E-01
18	Los Alamos Ice Rink	1,617,852	1,775,692	LA Canyon	60		1.53E-01
19	Los Alamos Hospital	1,620,200	1,776,300	LA Hospital	61		1.22E-01
20	Crossroads Bible Church	1,629,200	1,776,000	Cross. Bible Church	62		1.48E-01
21	Residence on Monte Rey South	1,647,976	1,750,376	Monte Rey South	63		8.98E-02
22	Los Alamos Inn	1,624,450	1,775,300	Los Alamos Inn-S	66		2.78E-01
23	Research Park	1,618,300	1,774,600	TA-3 Research Park	67		1.39E-01
24	2470 East Gate (NNE sector)	1,638,825	1,774,097	East Gate	10		1.72E+00
25	Residence at East Gate (N sector)	1,638,616	1,774,231	East Gate	10		1.14E+00
26	Business at East Gate (NE sector)	1,640,230	1,774,090	East Gate	10		1.14E+00

*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 15. 61.92 Highest Effective Dose Equivalent Summary

ESIDNUM	Description	Dose for Release Site Receptor	Dose at East Gate Receptor
03002914	CMR Stack	1.15E-06	8.55E-08
03002915	CMR Stack	1.06E-06	1.11E-07
03002919	CMR Stack	8.05E-05	8.62E-06
03002920	CMR Stack	1.44E-05	1.27E-06
03002923	CMR Stack	2.62E-04	2.89E-05
03002924	CMR Stack	1.91E-04	1.92E-05
03002928	CMR Stack	1.14E-03	1.35E-04
03002929	CMR Stack	2.83E-06	3.49E-07
03002932	CMR Stack	1.36E-06	1.41E-07
03002933	CMR Stack	5.97E-07	6.18E-08
03002937	CMR Stack	5.96E-08	4.80E-09
03002944	CMR Stack	0.00E+00	0.00E+00
03002945	CMR Stack	4.40E-06	4.69E-07
03002946	CMR Stack	1.70E-06	1.83E-07
03010222	Shops Addition Stack	2.38E-06	1.66E-07
16020504	WETF Stack	3.89E-01	4.13E-02
18000001	TA-18 Diffuse	1.64E-05	1.64E-05
21015505	TSTA Stack	2.27E-03	1.43E-03
21020901	TSFF Stack	1.60E-02	1.05E-02
33008606	HP-Site Stack	1.09E-02	1.29E-03
41000417	W-Site Stack	2.42E-02	4.51E-03
48000107	Radiochemistry Stack/non-CAP88 radionuclides	6.01E-03	5.51E-04
48000154	Radiochemistry Stack	0.00E+00	0.00E+00
48000160	Radiochemistry Stack/non CAP88 radionuclides	1.00E-04	8.50E-06
50000102	Waste Management Stack	3.80E-06	1.01E-06
50003701	Waste Management Stack	0.00E+00	0.00E+00
50006903	Waste Management Stack	5.46E-08	1.25E-08
53000303	LANSCE-Stack-Annual	3.67E-04	3.67E-04
53000303	LANSCE-Stack/non CAP88 radionuclides	0.00E+00	0.00E+00
53000000	LANSCE Fugitive Emissions	7.23E-02	7.23E-02
53000702	LANSCE-Stack-Annual	1.41E+00	1.41E+00
53000702	LANSCE-Stack/non CAP88 radionuclides	1.04E-02	1.04E-02
55000415	Plutonium Facility Stack	2.71E-05	3.95E-06
55000416	Plutonium Facility Stack	2.57E-04	5.02E-05
99000000	Unmonited Stacks-gross	2.30E-01	2.30E-01
99000010	Air-Sampler Net Dose	5.70E-02	5.70E-02
	total	**2.23E+00**	**1.84E+00**

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: _____ Date: 6/24/02

for Dennis Martinez, Owner
Acting Director
Office of Los Alamos Site Operations
U.S. Department of Energy

Signature: _____ Date: 21 June '02

Beverly Ramsey, Operator
Director, Risk Reduction and Environmental Stewardship Division
Los Alamos National Laboratory

2000 LANL Radionuclide Emissions Report Errata as noted by K.W. Jacobson

Figure 3 on Page 12 showed additional locations of air sampling stations versus those only used for non-point compliance, Figure 4 of this report shows the correct stations.