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2008 LANL Radionuclide Air Emissions Report

Los Alamos
NATIONAL LABORATORY
EST. 1943

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U.S. Department of Energy Report
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Site Name: Los Alamos National Laboratory
Location: County of Los Alamos, New Mexico

Operations Office Information:

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Compliance Assessment:

2008 Off-Site Effective Dose Equivalent: 0.55 mrem

Executive Summary

This report describes the impacts from emissions of radionuclides at Los Alamos National Laboratory (LANL) for calendar year 2008. This report fulfills the requirements established by the National Emissions Standards for Hazardous Air Pollutants – Emissions of Radionuclides other than Radon from Department of Energy Facilities (Rad-NESHAP). This report is prepared by LANL's Rad-NESHAP compliance team, which is part of the Environmental Protection Division. The information in this report is required under the Clean Air Act and is being reported to the U.S. Environmental Protection Agency (EPA). The highest effective dose equivalent (EDE) to an off-site member of the public was calculated using procedures specified by the EPA and described in this report. LANL's EDE was 0.55 mrem for 2008. The annual limit established by the EPA is 10 mrem per year.

During calendar year 2008, LANL continuously monitored radionuclide emissions at 26 "major" release points, or stacks. The Laboratory estimates emissions from an additional 57 "minor" release points using radionuclide usage source terms in lieu of stack monitoring. Also, LANL uses a network of air samplers around the Laboratory perimeter to monitor ambient airborne levels of radionuclides. To provide data for dispersion modeling and dose assessment, LANL maintains and operates meteorological monitoring systems. From these measurement systems, a comprehensive evaluation is conducted to calculate the EDE for the Laboratory.

The EDE is evaluated as any member of the public at any off-site location where there is a residence, school, business, or office. In 2008, this location was the East Gate area, immediately down wind from the Los Alamos Neutron Science Center (LANSCE) accelerator facility. Significant contributors to the reported off-site dose included emissions of short-lived radioactive gases from LANSCE facility and the potential emissions from non-monitored (minor) emissions sources throughout the Laboratory. Doses reported to the EPA for the past 10 years are shown in Table E1.

Table E1. Ten-Year Summary of Rad-NESHAP Dose Assessment for LANL

Year	EDE (mrem)	Highest EDE Location
1999	0.32	County Landfill Office
2000	0.64	2470 East Road ("East Gate")
2001	1.84	2470 East Road ("East Gate")
2002	1.69	2470 East Road ("East Gate")
2003	0.65	2470 East Road ("East Gate")
2004	1.68	2470 East Road ("East Gate")
2005	6.46	2470 East Road ("East Gate")
2006	0.47	Los Alamos Airport Terminal
2007	0.52	DP Road, Airnet Station 71
2008	0.55	2470 East Road ("East Gate")

2008 Significant Events

Several events that took place in 2008 are worth discussion in this Executive Summary.

RLUOB scale model stack test. In the fall of 2008, the Chemistry and Metallurgy Research – Replacement (CMRR) Facility built a scale model of the planned exhaust stack for the Radiological Laboratory/Utility/Office Building (RLUOB). Tests performed on this scale model were used to measure variation in air velocity, tracer gas concentration, and aerosol concentration in order to verify the location of the stack monitoring system. The scale model was tested at a variety of flow rates, and passed all criteria under American National Standards Institute/Health Physics Society N13.1-1999 for a representative sampling location. Once the actual stack is constructed, verification tests will be performed to ensure that the results from the scale model test can be applied to the actual stack. The final stack design for RLUOB was completed in early 2009 based on these test results.

Preparation for cleanup of Material Disposal Area B. Material Disposal Area B (MDA B) at Technical Area (TA) 21 is a legacy waste disposal site dating back to the mid-1940s. Under a Consent Order with the State of New Mexico, the Laboratory will be cleaning up MDA B in preparation for transferring the land back to the private sector. The Rad-NESHAP team worked with the TA-21 Remediation project to develop a Pre-Construction Application, which was submitted to EPA Region 6 in late 2008 and approved in 2009. Emissions from cleanup activities will be measured using a mix of stack sampling (for fixed installations) and ambient air measurements at receptor locations (for the mobile excavation enclosures). Plans were made for periodic emissions and dose tracking once operations get underway, using rapid turnaround of isotopic analysis of ambient air samples. Much of this latter work was described in the MDA B Emissions Management Plan, finalized in late spring 2009.

Status update presentation to EPA Region 6. In June 2008, the LANL Rad-NESHAP team leader travelled to Dallas to present a status update to EPA Region 6. Several topics were discussed, including plans for the various CMRR facility phases, MDA B, and other ongoing topics. Follow-up to this presentation will take place when Region 6 visits the LANL site in the summer of 2009.

Clarification of source-to-receptor distances. To appropriately model off-site doses, the CAP88-PC program requires the distance and direction from the emissions source to the receptor location. These distances were originally developed using site maps and early-technology geographic information system (GIS) data available at LANL in the 1990s. In 2008, we undertook a systematic review of this information, verifying the source-to-receptor distances and direction using state-of-the-art GIS technology. While many distances were unchanged, some values were adjusted slightly in our database. Both the distances from a source to its individual "critical receptor" as well as to the Laboratory-wide maximally exposed individual location were determined. Information in this report reflects the updated values for these distances. You may note slight changes in some values if emissions reports are compared across various years, but values used in this report represent the official distances of record in use for 2008 and the foreseeable future.

Planning for future operations. There are several upcoming activities at LANL that have been the focus of the Rad-NESHAP team in 2008.

- As discussed above, the cleanup of MDA B will commence in 2009.
- The second CMRR facility continues in its project design phase. Construction activities would commence, at the earliest, in the 2011 timeframe.
- Radioactive waste processing at TA-54 will be ramping up in late summer 2009, with plans for increasing throughput so that operations in a previously non-monitored building will require emissions monitoring. While this is an ongoing activity at LANL and thus is exempt from pre-construction notification, a full description of the processes and monitoring plans will be sent to EPA Region 6 as a courtesy.
- The Economic Stimulus Package approved by the federal government will be implemented at LANL as an accelerated cleanup of TA-21 legacy facilities.
- There are other facilities planned for which stack monitoring issues are a high priority. These include planned upgrades of the TA-55 Plutonium Facility stacks, the transuranic waste processing facility, and others. As plans finalize, updated communications with EPA Region 6 will take place.

2008 LANL Radionuclide Air Emissions Report

Abstract

The emissions of radionuclides from Department of Energy Facilities such as Los Alamos National Laboratory (LANL) are regulated by the Amendments to the Clean Air Act of 1990, National Emissions Standards for Hazardous Air Pollutants (40 CFR 61 Subpart H). These regulations established an annual dose limit of 10 mrem to the maximally exposed member of the public attributable to emissions of radionuclides. This document describes the emissions of radionuclides from LANL and the dose calculations resulting from these emissions for calendar year 2008. This report meets the reporting requirements established in the regulations.

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, engineering, and biology.

The primary facilities involved in the emissions of radioactivity are outlined in this section. The facility locations are designated by technical area (Figure 2) and building. For example, the facility designation TA-3-29 is Building 29 at Technical Area (TA) 3. Potential radionuclide release points are listed in several tables that follow. Some of the sources described below are characterized as non-point (diffuse and fugitive) emissions. Off-site impacts resulting from non-point emissions of radioactive particles and tritium oxide (HTO) are calculated using LANL's air sampling network (Airnet).

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 particulate or vapor activation products (P/VAP).

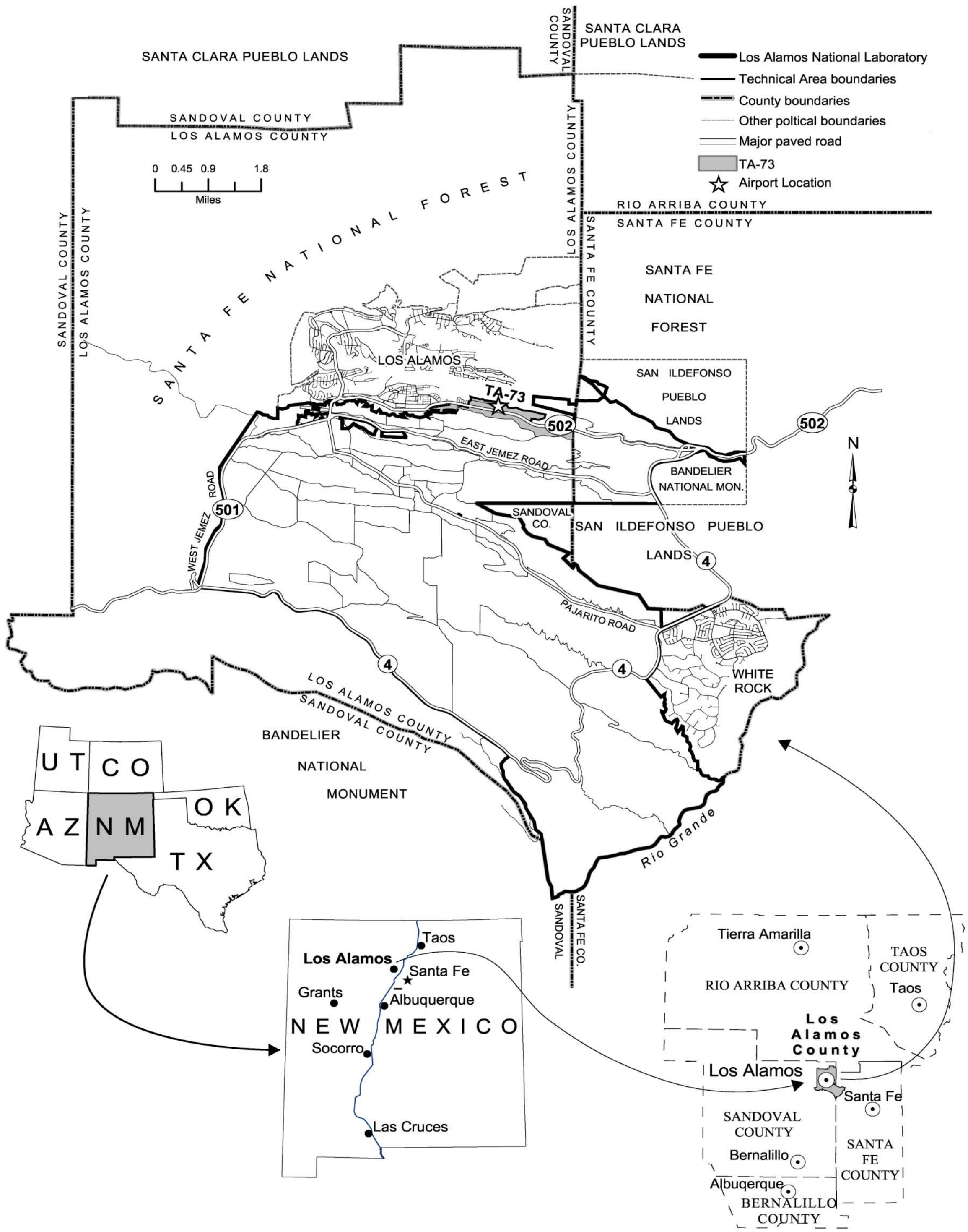

Figure 1. Location of Los Alamos National Laboratory.

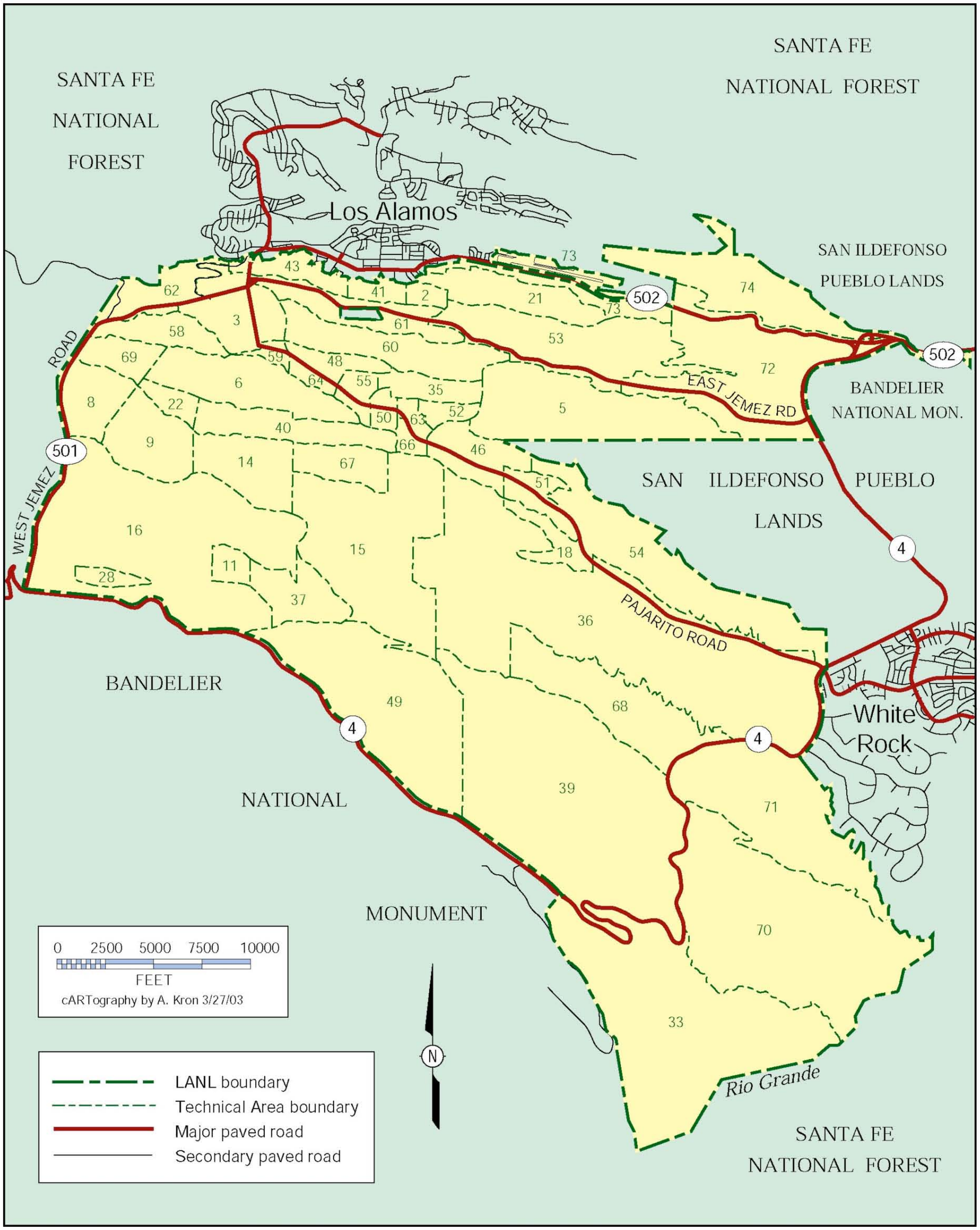

Figure 2. Los Alamos National Laboratory technical areas by number.

The radionuclides emitted from point sources at LANL in calendar year 2008 are listed in the subsequent tables. Tritium is released as either tritiated water vapor (called HTO) or elemental tritium gas (HT). 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, and ^{15}O. Various radionuclides such as ^{197m}Hg, ^{68}Ge, and ^{76}Br make up the majority of the P/VAP emissions.

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

Additional descriptions of LANL technical areas can be found in the Annual Environmental Surveillance Report for LANL.[1] More thorough descriptions of LANL operations can be found in the Annual Site-Wide Environmental Impact Statement Yearbooks, the most recent being published in 2009.[2] A complete list of non-monitored sources and activities is found in the Radioactive Materials Usage Survey, described in the next section.

The primary facilities responsible for radiological airborne emissions are as follows.

TA-3-29: The Chemistry and Metallurgy Research (CMR) facility conducts chemical and metallurgical research. The principal radionuclides used are isotopes of plutonium as well as other actinides. There are a variety of activities involving plutonium and uranium, which support many LANL and other U.S. Department of Energy (DOE) programs.

TA-3-66: This facility is 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 facility is designated as 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 conducting research in materials science.

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

TA-15-312: Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility: This facility conducts high-explosive-driven experiments to investigate weapons functions and behavior during nonnuclear tests using advanced radiography. Starting in 2007, explosive operations at DARHT are conducted in containment vessels. Use of these vessels virtually eliminates air emissions from these operations.

TA-16-205 and -450: Weapons Engineering Tritium Facility (WETF): Building 205 was specifically designed and built to process tritium safely. The operations at WETF are divided into two categories: tritium processing and activities that support tritium processing. Examples of tritium-processing operations include the repackaging of tritium into smaller quantities and the packaging of 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. In 2007, expansion of WETF into building 450 began. During this expansion, emissions from TA-16-205 were ducted into TA-16-450. Therefore, TA-16-205 is discontinued as a monitored point source and TA-16-450 will be the point source for both buildings. The exhaust stack was certified to measure emissions from building 450 whenever that portion of the complex becomes active. The monitoring system located in the duct between building 16-205 and the 16-450 stack remains active to monitor emissions from building 16-205.

TA-21: Many of the facilities at this decommissioned radiochemistry site are undergoing decontamination and demolition. Some of these operations may contribute to diffuse emissions of uranium and plutonium into the air. The tritium operations in TA-21 were relocated in 2006 to other LANL sites, primarily WETF.

TA-41-4: This building was formerly used as a tritium-handling facility. The tritium sources were removed in 2002. Diffuse tritium emissions could result from residual tritium contamination and cleanup operations.

TA-48-1: The principal activities carried out in this facility are radiochemical separations supporting 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 an industrial low-level (radioactive) liquid waste treatment plant.

TA-50-37: Currently there are no operations involving radioactive material in this building; future operations may involve the use of radioactive actinides**.**

TA-50-69: This waste management site consists of a waste characterization, reduction, and repackaging 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. Airborne radioactive emissions result from proton beams and secondary particles passing through and activating air in target cells, beam stop, and surrounding areas, or activating water used in target cooling systems. The majority of the emissions are short-lived activation products such as ^{11}C, ^{13}N, and ^{15}O. Most of the activated air is vented through the main stacks; however, a fraction of the activated air becomes a fugitive emission from the target areas. Two 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. MDA 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.

TA-55: Building 4 of the Plutonium Facility (PF-4) provides a pit manufacturing capability and continues the role providing the capability for research and development applications in chemical and metallurgical processes for recovering, purifying, and converting plutonium and other actinides.[3] A wide range of activities (e.g., the heating, dissolution, forming, and welding of special nuclear materials) is also conducted. Additional activities include investigating the means to safely ship, receive, handle, and store nuclear materials and to manage wastes and residues from TA-55. Limited-scope tritium operations also take place in certain areas of TA-55. Building 2 of TA-55 houses associated support facilities for operations in PF-4, including the radiological sample analysis laboratory. Operations from this laboratory are tracked as part of LANL's non-monitored source program.

Section II. Air Emissions Data

61.94(b)(4) Point Sources

Monitored and unmonitored release points at LANL are listed in Table 1. The point sources are identified using an eight-digit identification number for each exhaust stack (StackID); 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.

In addition to the 26 monitored point sources, 57 unmonitored release points in more than 40 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 (PEDE) 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 *2008 Radioactive Materials Usage Survey for Unmonitored Point Sources*.[4] The purpose of this survey is to collect and analyze radioactive materials usage and process information for the monitored and unmonitored point sources at LANL.

The distance between each of the release points and the nearest receptor is provided in Table 1. 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 most critical receptor location.

In compliance with 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 PEDEs are calculated by modeling these emissions estimates using the U.S. Environmental Protection Agency (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. The Laboratory has established administrative requirements to evaluate all potentially new sources. These requirements are established for the review of new Laboratory activities and projects, ensuring that air quality regulatory requirements will be met before the activity or project begins.[5]

Non-point Sources

There are a variety of non-point sources within the 111 km^2 of land occupied by LANL. Non-point sources can occur as diffuse or large-area sources or as leaks or fugitive emissions from facilities. Examples of non-point sources of airborne radionuclides include surface impoundments, shallow land burial sites, open burn sites, live firing sites, outfalls, container storage areas, unvented buildings, waste treatment areas, solid waste management units, and tanks. Additionally, buildings with only standard heating/ventilating/air conditioning systems and/or without active process ventilation are considered to be non-point sources.

LANL summarizes the potential impacts of non-point sources by analyzing and reporting air concentration measurements of significant radionuclides (other than activation products) collected at ambient air-sampling (Airnet) sites around the Laboratory and at locations of public receptors surrounding the Laboratory. The LANL Airnet system was approved for use in monitoring LANL's non-point radioactive air emission sources in 1996.[6] Based on the original methodology approved by EPA, additional procedures were developed to identify when new Airnet stations were required to assure continued compliance with the National Emissions Standards for Hazardous Air Pollutants – Emissions of Radionuclides other than Radon from Department of Energy Facilities (Rad-NESHAP).[7,8] No new Airnet stations were sited in 2008. The data collected in 2008 from Airnet stations is reported in Section III of this report. No unusual measurements were recorded for the Airnet environmental monitoring system for 2008.

Radionuclide Emissions

Radionuclides released from monitored point sources, along with the annual emissions in curies for each radionuclide, are documented in Table 2. The point sources are identified using an eight-digit identification number for each exhaust stack: the first two digits represent the LANL technical area, the next four digits the building, and the last two digits the stack number. No detectable emissions are denoted as "none." A map showing the general locations of the facilities continuously monitored for radionuclide emissions is shown in Figure 3.

Pollution Controls

The most common type of filtration for emission control purposes at LANL is the HEPA filter, as noted in Table 1. HEPA filters are constructed of submicrometer glass fibers that are pressed and glued into a compact, paper-like, pleated media. The media are 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 99.95% of 0.3-μm particles at rated airflow. Other types of filters used in ventilation systems are Aerosol 95; RIGA-Flow 220, 221, and 222; 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.

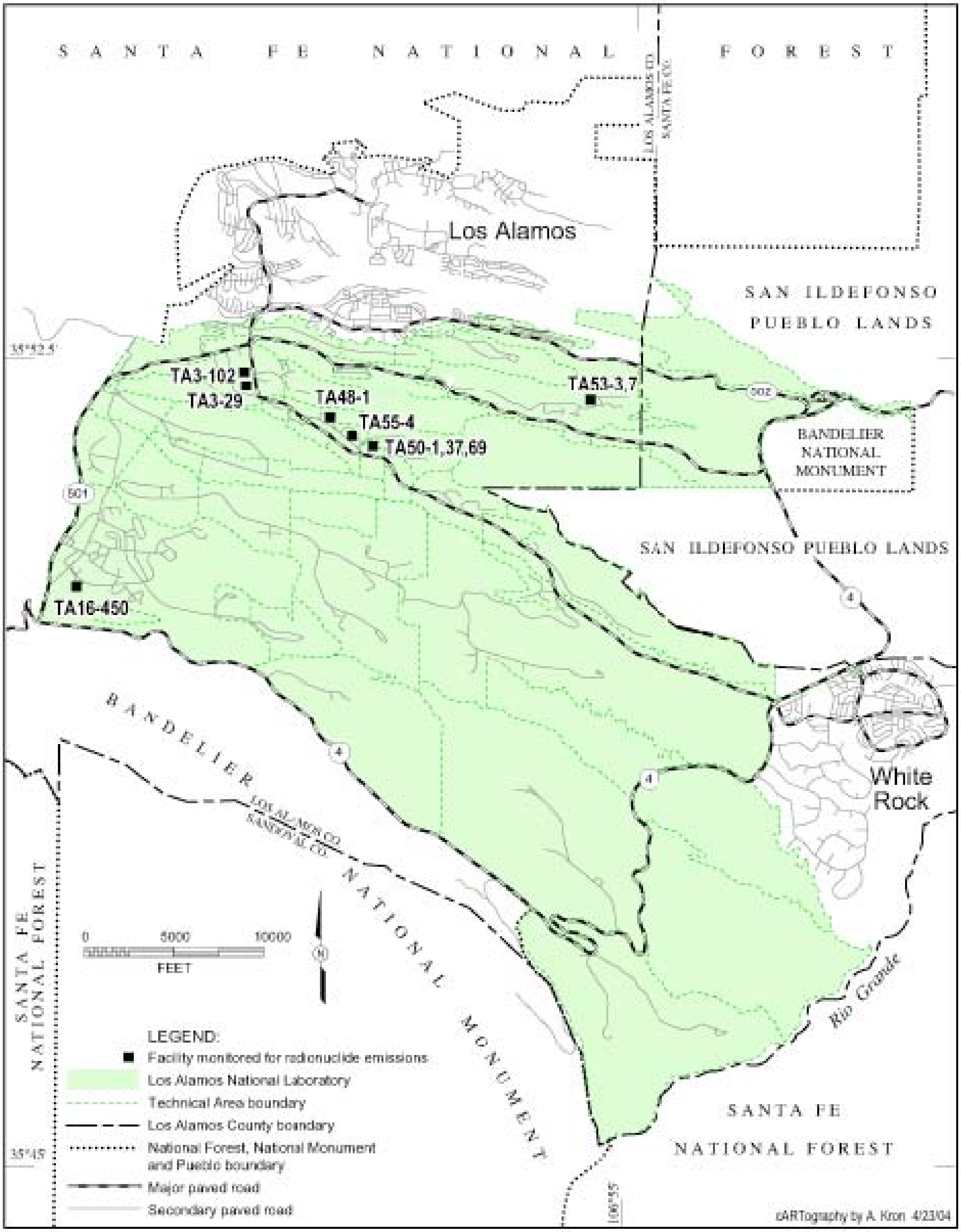

Figure 3. Location of facilities with continuously operated stack-sampling systems for radionuclide emissions.

The above-mentioned filters are only effective for particles. When the contaminant of concern is in the form of a gas or vapors, 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 achieve an efficiency of 98% capture.

Tritium effluent controls are generally composed of a catalytic reactor and a molecular sieve bed. Tritium-contaminated effluent is passed through a catalyst that converts HT into 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.

A delay system is used to reduce some of the short-lived radionuclides generated by activation at LANSCE. Emissions from the highest source of activated gas (the off-gas system for the 1L target cooling loops) are directed into a long transport line to hold up the radionuclide gases before emission. This delay system is used to provide a reduction in radionuclide emissions from the 1L target area.

Compliance with Maintenance and Inspection Requirements under the Revised Rad-NESHAP

The 2003 revisions to Subpart H established several inspection and maintenance requirements for monitored stacks. These requirements are based on American National Standards Institute/Health Physics Society N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities*. Annual visual inspection of particulate monitoring systems is a component of the Laboratory's program to comply with these new requirements. Of the 26 monitored stacks at LANL, we performed stack sampling system inspections on 23 of these stacks in 2008. Two stacks were not inspected because they do not require monitoring under Rad-NESHAP regulations. One additional stack is a tritium-only sampler, and per alternative method approval from EPA Region 6, we use quantitative performance tests in lieu of visual inspections for tritium systems. For tritium samplers, the measured emissions are scaled up as needed based on the results of these performance tests. One stack sampling system was found to have particulate deposition and requires cleaning. This system is scheduled to be cleaned as part of the 2009 inspection cycle.

Five stack sampling systems that were identified for cleaning from the 2007 inspection were cleaned during 2008. In 2008, no radiological material was measured on inspection or cleaning equipment. Therefore, no additions to the source term are required from this pathway for 2008.

Section III. Dose Assessment

61.94(b)(7) Description of Dose Calculations

Effective dose equivalent (EDE or dose) calculations for point sources, unmonitored point sources, and non-point gaseous activation products from LANSCE were performed with the CAP88 code. Starting with the 2006 annual emissions report, LANL uses CAP88-PC version 3 to demonstrate compliance. Verification of the CAP88 code is performed by periodically running the EPA test case.

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 if 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 the HTO is removed from the air, leaving elemental tritium, or HT. The sample, containing the HT, is then passed through a palladium catalyst that converts the HT 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. The bubbler will discriminate HTO vapor from HT gas, allowing separate dose assessment with CAP88-PC version 3.

Tritium emissions from LANSCE do not require monitoring under 40 CFR 61.93(b)(4)(i). The primary source for airborne tritium emissions at LANSCE is activation of water vapor in air and activation and subsequent evaporation of water in the cooling system of beam targets. Because of the low relative contribution of tritium to the off-site dose at LANSCE, formal monitoring for tritium was discontinued after July 2001. However, the tritium emissions for 2008 can be calculated based on the rate of generation measured in 2001. Using these rate-of-generation calculations, the tritium emissions from LANSCE stacks in 2008 were calculated to be about 30 Ci.

Radioactive particulate emissions

Emissions of radioactive particulate matter, generated by operations at facilities such as the CMR facility (TA-3-29) and the Plutonium Facility (TA-55), 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 stack samples for subsequent analysis at an off-site laboratory. These composite samples are analyzed to determine the total activity of materials such as ^{234}U, ^{235}U, ^{238}U, ^{238}Pu, ^{239}Pu, and ^{241}Am. These data are then combined with estimates of sampling losses and stack and sample flows to calculate emissions. Short-lived progeny are assumed to be emitted in secular equilibrium with their long-lived parent nuclides. In most cases, we measure for the presence of ^{90}Sr and assume that an equal amount of the progeny ^{90}Y is emitted as well.

Vapor form emissions

Vapor emissions, generated by LANSCE operations and by hot-cell activities at TA-3-29 and TA-48, are sampled using a charcoal filter or canister. A continuous sample of stack air is pulled through a charcoal filter upon which 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 ^{68}Ge and ^{76}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

EDE to potential receptors was 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 New Mexico State Plane coordinates, are provided in Table 4. The relationship of the highest receptor location to the individual release points are provided in Table 5. Other site-specific parameters and the sources of these data are provided in Table 6.

LANL 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 2008, data from two different towers were used for the air-dispersion modeling; the tower data that are most representative of the release point are applied. Copies of the meteorological data files used for the 2008 dose assessment are provided in Table 7.

The Laboratory 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 from the New Mexico Bureau of Business and Economic Research. 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 2008 are provided in Table 2.

Public Receptors

Compliance with the annual dose standard is determined by calculating the highest EDE to any member of the public at any off-site point where there is a residence, school, business, or office. The Laboratory routinely evaluates public areas to assure that any new residence, school, business, or office is identified for the EDE calculation. As per EPA guidance,[9] personnel that work in leased space within the boundaries of the Laboratory are not considered members of the public for the EDE determination. Personnel of this type are considered to be subcontractors to DOE, similar to security guards and maintenance workers.

Point Source Emissions Modeling

The CAP88 version 3 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. CAP88 includes all radionuclides for which there are dose conversion factors in the EPA's Federal Guidance Reports.[10, 11, 12] In 2008, only three monitored radionuclides were not included in CAP88: ^{10}C, ^{14}O, and ^{16}N. For these, ^{11}C was used as a surrogate, as described in the Laboratory procedure ENV-EAQ-512.[13] CAP88 was used to calculate the ^{11}C dose, which was then adjusted for the number of curies emitted, the gamma energy emitted per decay, and the half life of the radionuclides. The maximum dose from emissions of radionuclides not included in the CAP88 library was 4.0E-05 mrem. This dose contribution is well below the criteria for individual nuclide monitoring, which is 10% of a source's PEDE. This situation was described in a memo to the EPA, ENV-EAQ:09-076.

LANSCE Fugitive Emission Modeling

Some of the GMAP created at the accelerator target cells or at other accelerator beam line locations migrate into room air and into the environment. These fugitive sources are continuously monitored throughout the beam-operating period. In 2008, approximately 72 Ci of ^{11}C and 3 Ci of ^{41}Ar were released from LANSCE as fugitive emissions.[14] These sources were modeled as area sources using CAP88. Fugitive effluents were modeled from two areas at LANSCE, and the additional source information is provided in Table 9.

Environmental Data Used for Non-point Source Emission Estimation

The net annual average ambient concentration of airborne radionuclides measured at 26 air sampling stations (Figure 4) is calculated by subtracting an appropriate background concentration value.[15] The net concentration at each air sampler is converted to the annual 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).[16] Dose assessment results from each air sampler are given in Table 10. The operational performance and analytical completeness of each air sampler is provided in Table 11.

LANSCE Monthly Assessments

The Laboratory evaluates and reports the dose from short-lived radioactive gases released from LANSCE exhaust stack 53000702 on a monthly basis. This is so we can track the emissions and identify any issues that need addressing. The monthly dose values are evaluated with the actual meteorology for the month and these doses are shown in Table 12. For 2008 the Laboratory also evaluated this stack's total gaseous emissions for the year in a single CAP88 run and compared the results to the monthly values summed for the calendar year. The sum of monthly doses resulted in a dose of 0.209 mrem, while the annual total single analysis resulted in a total of 0.187 mrem. All doses were evaluated at the East Gate receptor location. The values show satisfactory agreement. Since the sum of the monthly runs resulted in a slightly higher dose in 2008, this value was conservatively used for reporting purposes.

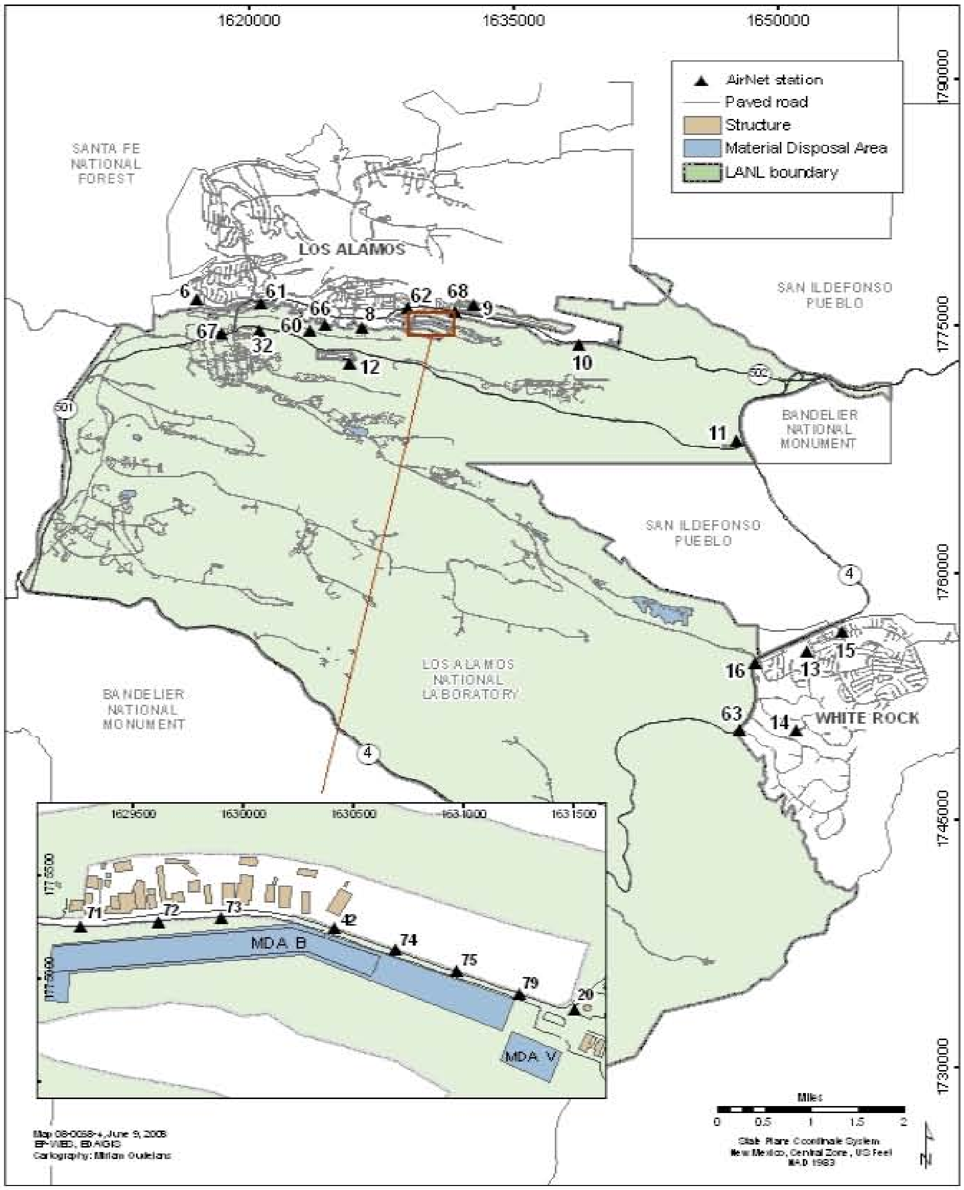

Figure 4. Locations of air sampling stations used for non-point source emissions compliance.

Highest EDE Determination

For most of the recent past, the maximally exposed individual (MEI) location has been at 2470 East Road, usually referred to as "East Gate." The dose was mostly a result of LANSCE emissions. Because the LANSCE emissions after 2005 have been reduced to such low levels, the location of the MEI for this year was not as readily apparent as in the past and required more detailed evaluation, as follows.

We know that the dose from LANSCE emissions is a significant contributor at the East Gate location, but much less so at other possible MEI locations. So we evaluated the LANSCE facility 53000702 annual GMAP emissions contribution from Table 12 (0.187 mrem) and added to it the contribution from the East Gate Airnet station (0.0247 mrem) for a rounded total of 0.212 mrem. We used this value as a point of comparison for examining the dose at other Airnet locations (see Table 10) summed with the dose from the 53000702 annual GMAP emissions contribution at those locations. Two Airnet stations with relatively higher doses located at places of a business or residence closest to LANSCE were further considered. They are Airnet stations 42 and 66 located near a DP Road business and the former Los Alamos Inn on Trinity Drive, respectively. The Airnet doses for each station were 0.0760 mrem and 0.130 mrem, respectively. The doses from the 53000702 annual GMAP emissions contribution at these locations were 0.0156 mrem and 0.00767 mrem, respectively. The sums of the Airnet dose and 53000702 annual GMAP emissions contribution dose at each location were 0.0916 mrem and 0.138 mrem, respectively. The dose of 0.212 mrem at East Gate was higher so it is the MEI location for 2008 operations.

61.92 Compliance Assessment

The highest EDE to any member of the public at any off-site point where there is a residence, school, or business was 0.55 mrem for radionuclides released by LANL in 2008. 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 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 0.229 mrem from unmonitored stacks. Because the emissions estimates do not account for pollution control systems, the actual dose will be significantly less for these unmonitored point sources. Also, this dose includes a minor contribution from radionuclides not included in CAP88. Table 13 of this report provides the compliance assessment summary. The location of the off-site point of highest EDE for 2008 was 2470 East Road, usually referred to as "East Gate."

Section IV. Construction and Modifications

61.94(b)(8) Construction, Modifications, and 61.96 Activity Relocations

A brief description of construction and modifications that were completed and/or reviewed in 2008 but for which the requirement to apply for approval to construct or modify was waived under 61.96 is listed below.

Soil Vapor Extraction Operations

The soil vapor extraction (SVE) pilot study discussed in the 2006 LANL Radionuclide Air Emissions Report was relocated to TA-54, MDA G, from May 29 through October 8, 2008. Due to the presence of tritium in the soil, this was considered a new source of radioactive air emissions. Emissions were conservatively calculated, based on the highest concentration of tritium found in the soil in the area of operation, 100% release of all tritium, and a full year of around-the-clock operation (8760 hours) of the extraction unit. With these parameters, CAP88 calculated a worst case uncontrolled dose of less than 0.001 mrem/year. Actual operation time for the SVE system was 1405 hours. There are no current plans to use SVE at the Laboratory in the coming year, although it remains a viable treatment option and could be used in the future.

Isotope Separation System Removal

In late 2008, the Tritium System Test Assembly (TSTA) at TA-21-155 underwent more cleanup work in preparation for final demolition. Of special interest was the removal of the Isotope Separation System (ISS) tank from the facility process lines. The ISS tank was suspected to be the primary remaining source of radiological contamination and off-gassing of tritium in TSTA. To account for any unexpected emissions during this operation, the Rad-NESHAP team restarted stack emissions monitoring for the duration of the ISS tank removal job. Stack emissions of tritium before and during the job averaged 4600 microcuries per hour. After the removal of the ISS tank, these emissions fell to under 800 microcuries per hour, a reduction of over 80% over previous levels. After establishing the new emissions rate in early 2009, stack monitoring ceased. The complete demolition of TSTA is expected to be completed by the end of fiscal year 2011. Until the building is removed, we will continue to assume continuous off-gassing from this building and track it along with other LANL non-monitored sources.

Section V. Additional Information

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

Unplanned Releases

During 2008, the Laboratory had no instances of increased airborne emissions of radioactive materials that required reporting to the EPA. There were no instances of an unplanned event.

Environmental Monitoring

In addition to the Airnet monitors identified in this report, additional environmental monitoring stations are operated at LANL and include several environmental monitoring stations located near the LANSCE boundary inhabited by the public. Measurement systems at these stations include 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 associated with NESHAP compliance are included in this document, while results for all monitoring data are published in the Annual Environmental Surveillance Report for DOE Order compliance. This can be found on the web at the following URL: http://www.lanl.gov/environment/air/reports.shtml

Other Supplemental Information

The following information is included for completeness, but not directly required under 40 CFR 61 Subpart H regulations.

- 80-km collective effective (population) dose equivalent for 2008 airborne releases: 0.791 person-rem
- Compliance with Subparts Q and T of 40 CFR 61—Radon-222 Emissions
  These regulations apply to ^{222}Rn emissions from DOE storage/disposal facilities that contain by-product material. "By-product 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 by-product material used in experiments in the TA-54 low-level waste facility, MDA G; this practice makes the Laboratory subject to this regulation. Subject facilities cannot exceed an emissions rate of 20 pCi/m^2 s of ^{222}Rn. In 1993 and 1994, LANL conducted a study to characterize emissions from the MDA G disposal site.[17] This study showed an average emission

rate of 0.14 pCi/m^2 s for MDA G. The performance assessment for MDA G has determined that there will not be a significant increase in ^{222}Rn emissions in the future.[18]

- 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 is in compliance with these requirements.

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

StackID	Location	Control Description	Number of Effluent Controls	Control Efficiency	Monitored	Nearest Receptor (m)	Receptor Direction
03001600	TA-03-16	None	0	0%		968	N
03002913	TA-03-29-1	unknown	0	0%		859	NNE
03002914	TA-03-29-2	HEPA	2	99.95% each	X	733	NE
03002915	TA-03-29-2	HEPA	2	99.95% each	X	734	NE
03002919	TA-03-29-3	Aerosol 95	1	80%	X	838	NNE
03002920	TA-03-29-3	Aerosol 95	1	80%	X	837	NNE
03002923	TA-03-29-4	FARR 30/30	1	20%	X	618	NNW
03002924	TA-03-29-4	FARR 30/30	1	20%	X	618	NNW
03002928	TA-03-29-5	HEPA	2	99.95% each	X	938	NE
03002929	TA-03-29-5	HEPA	2	99.95% each	X	939	NE
03002932	TA-03-29-7	HEPA	2	99.95% each	X	858	NNE
03002933	TA-03-29-7	HEPA	2	99.95% each	X	857	NNE
03002937	TA-03-29-V	HEPA	2	99.95% each	X	872	NE
03002944	TA-03-29-9	RIGA-Flow	1	80%	X	939	NNE
03002945	TA-03-29-9	RIGA-Flow	1	80%	X	941	NNE
03002946	TA-03-29-9	RIGA-Flow	1	80%	X	940	NNE
03003299	TA-03-32	unknown	0	0%		641	NNE
03003400	TA-03-34	none	0	0%		668	NNE
03003501	TA-03-35	HEPA	1	99.95%		683	NNE
03006601	TA-03-66	none	0	0%		695	N
03006602	TA-03-66	none	0	0%		709	N
03006603	TA-03-66	none	0	0%		708	N
03006604	TA-03-66	none	0	0%		708	N
03006605	TA-03-66	none	0	0%		714	N
03006606	TA-03-66	none	0	0%		670	N
03006626	TA-03-66	HEPA	1	99.95%		618	N
03006654	TA-03-66	HEPA	1	99.95%		665	N
03006699	TA-03-66	none	0	0%		669	N
03010222	TA-03-102	HEPA	1	99.95%	X	792	N
03010225	TA-03-102	HEPA	1	99.95%		772	N

Table 1 (Continued)

StackID	Location	Control Description	Number of Effluent	Control Efficiency	Monitored	Nearest Receptor (m)	Receptor Direction
03169800	TA-03-1698	none	0	0%		717	NNE
09002103	TA-09-21	none	0	0%		3044	NE
15053401	TA-15-534	HEPA	1	99.95%		3282	NNE
16020299	TA-16-202	unknown	0	0%		1185	S
16045005	TA-16-450	none	0	0%	X	772	S
21000507	TA-21-5	HEPA	2	99.95% each		611	N
21015001	TA-21-150	HEPA	1	99.95%		595	N
21015505	TA-21-155	CR/MS	1	>99%		680	NNW
21020901	TA-21-209	CR/MS	1	>99%		712	NNW
21025704	TA-21-257	none	0	0%		601	N
35000200	TA-35-2	none	0	0%		1294	NNW
35021305	TA-35-213	none	0	0%		1010	N
36000104	TA-36-1	unknown	0	0%		5379	SE
41000104	TA-41-1	HEPA	2	99.95% each		28	N
41000417	TA-41-4	none	0	0%		60	N
43000100	TA-43-1	none	0	0%		122	NNE
46002499	TA-46-24	none	0	0%		2887	N
46003100	TA-46-31	none	0	0%		2792	N
46004106	TA-46-41	none	0	0%		2890	N
46015405	TA-46-154	none	0	0%		2769	N
46015899	TA-46-158	none	0	0%		3053	N
46020099	TA-46-200	none	0	0%		2743	N
48000107	TA-48-1	HEPA/Charcoal	2	99.95% each	X	754	NNE
48000111	TA-48-1	none	0	0%		874	NNE
48000115	TA-48-1	none	0	0%		764	NNE
48000135	TA-48-1	none	0	0%		797	NNE
48000145	TA-48-1	none	0	0%		893	NNE
48000154	TA-48-1	HEPA	2	99.95% each	X	756	NNE
48000160	TA-48-1	HEPA	1	99.95%	X	769	NNE

Table 1 (Continued)

StackID	Location	Control Description	Number of Effluent	Control Efficiency	Monitored	Nearest Receptor (m)	Receptor Direction
48000166	TA-48-1	HEPA	2	99.95% each		867	NNE
48000167	TA-48-1	HEPA	2	99.95% each		897	NNE
48000168	TA-48-1	none	0	0%		874	NNE
48004500	TA-48-45	none	0	0%		742	N
50000102	TA-50-1	HEPA	1	99.95% each	X	1185	N
50000299	TA-50-2	none	0	0%		1215	N
50003701	TA-50-37	HEPA	2	99.95% each	X	1171	N
50006901	TA-50-69	HEPA	1	99.95%		1199	N
50006902	TA-50-69	HEPA	1	99.95%		1188	N
50006903	TA-50-69	HEPA	2	99.95% each	X	1187	N
53000116	TA-53-1	unknown	0	0%		1443	ENE
53000303	TA-53-3	HEPA	1	99.95%	X	806	NNE
53000702	TA-53-7	HEPA	1	99.95%	X	957	NNE
53000799	TA-53-7	none	0	0%		926	NNE
53001899	TA-53-18	none	0	0%		1019	NNE
53098401	TA-53-984	none	0	0%		1232	NE
53109099	TA-53-1090	none	0	0%		1009	NNE
54028101	TA-54-281	HEPA	1	99.95%		1922	ESE
54100199	TA-54-1001	none	0	0%		4999	ESE
54100999	TA-54-1009	none	0	0%		4781	ESE
55000201	TA-55-2	none	0	0%		1111	NNE
55000415	TA-55-4	HEPA	4	99.95% each	X	1018	NNE
55000416	TA-55-4	HEPA	4	99.95% each	X	1091	NNE
59000100	TA-59-1	none	0	0%		1104	N

Table 2. 40-61.94(b)(7) User Supplied Data—Radionuclide Emissions

StackID	Nuclide	Emissions (Ci)
03002914	Am-241	3.81E-09
03002914	Pu-238	3.55E-08
03002914	Pu-239	1.93E-08
03002914	Th-232	8.31E-09
03002915	Am-241	5.11E-09
03002915	Th-228	2.16E-08
03002915	Th-230	3.11E-08
03002919	Am-241	4.14E-07
03002919	Pu-238	3.53E-07
03002919	Pu-239	2.57E-06
03002919	Th-232	1.51E-08
03002920	Am-241	6.06E-08
03002920	Pu-238	2.97E-08
03002920	Pu-239	3.62E-07
03002923	Pu-238	4.47E-09
03002923	Th-228	2.32E-08
03002923	Th-232	1.21E-08
03002923	U-234	5.51E-07
03002923	U-238	4.08E-08
03002923	Pa-234m (p)	4.08E-08
03002923	Th-234 (p)	4.08E-08
03002924	Am-241	2.71E-08
03002924	Pu-238	3.82E-07
03002924	Pu-239	9.32E-08
03002924	Th-228	2.56E-07
03002924	Th-232	9.24E-09
03002924	U-234	5.56E-06
03002924	U-238	3.49E-08
03002924	Pa-234m (p)	3.49E-08
03002924	Th-234 (p)	3.49E-08
03002928	Am-241	3.38E-08
03002928	Pu-238	6.14E-07
03002928	Pu-239	1.70E-07
03002928	Th-232	1.07E-08
03002929	U-238	3.82E-08
03002929	Pa-234m (p)	3.82E-08
03002929	Th-234 (p)	3.82E-08
03002932	Am-241	4.22E-09
03002932	Th-232	1.24E-08
03002933	Th-228	3.17E-08
03002937	None	0.00E+00
03002944	Th-228	2.63E-08
03002944	Th-232	2.06E-08
03002945	Th-232	2.30E-08
03002946	None	0.00E+00
03010222	Th-232	2.28E-10
03010222	U-234	2.94E-09
16045005	H-3(Gas)	2.10E+02
16045005	H-3(HTO)	2.26E+02
48000107	Br-77	1.51E-05
48000107	Ge-68	7.08E-03
48000107	Ga-68 (p)	7.08E-03
48000107	Se-75	1.23E-05
48000154	Pu-239	9.63E-10
48000160	As-73	1.95E-06
48000160	Br-77	5.04E-06
48000160	Ge-68	4.79E-05
48000160	Ga-68 (p)	4.79E-05
48000160	Se-75	2.89E-06
50000102	Am-241	8.39E-09
50000102	Pu-239	2.00E-08
50000102	Th-232	1.92E-08
50003701	Th-232	1.05E-09
50006903	Pu-238	9.34E-11
50006903	Pu-239	6.70E-11
50006903	Th-232	2.52E-10
50006903	U-235	3.03E-10
53000303	Ar-41	2.98E+00
53000303	Be-7	7.70E-05
53000303	Br-82	1.19E-04
53000303	C-11	7.14E+01
53000303	H-3(HTO)	2.55E+01
53000303	Na-24	1.75E-05
53000702	Ar-41	1.19E+01
53000702	As-73	2.47E-05
53000702	Be-7	8.14E-07
53000702	Br-76	1.06E-03
53000702	Br-77	2.94E-04
53000702	Br-82	2.50E-03
53000702	C-10	9.41E-01
53000702	C-11	4.49E+02
53000702	Co-58	8.45E-08
53000702	H-3(HTO)	4.80E+00
53000702	Hg-197m	1.03E-03
53000702	Hg-197 (p)	1.03E-03
53000702	N-13	4.72E+01
53000702	N-16	8.15E-02
53000702	Na-24	1.29E-04
53000702	O-14	3.52E+00
53000702	O-15	2.29E+02

StackID	Nuclide	Emissions (Ci)
53000702	Os-191	1.19E-05
53000702	Se-75	3.71E-06
55000415	Pu-239	9.53E-10
55000415	Th-232	5.79E-09
55000415	U-238	6.42E-09
55000415	Pa-234m	6.42E-09
	(p)	
55000415	Th-234 (p)	6.42E-09
55000416	H-3(Gas)	5.34E+00
55000416	H-3(HTO)	4.07E+00
55000416	Th-232	8.49E-09
55000416	U-235	6.57E-09

Table 2 Notes:

Stacks at the Chemistry & Metallurgy Research (CMR) facility identified as 03002915 through 03002933 are recorded in the RADAIR database as N3002915 through N3002933, to indicate measurements made with the New sampling systems, effective 2001.

Starting in 2006, particulate emissions from TA-55 stacks 55000415 and 55000416 are measured from new sample systems, which consist of four independent sample systems on each stack. The four samplers are identified as 5500415A, -B, -C, and -D; and 5500416A, -B, -C, and -D. Stack emissions data reported in this table represent average emission values measured from these four samplers. In the RADAIR database, these average emissions are given the stack ID 5500415X and 5500416X, with the "X" indicating the calculated average value from the four samples. The emissions of tritium (H-3, both HT and HTO forms) from the ES-16 stack use a different sample system, and references remain unchanged in the database.

Radionuclides with the designator "(p)" are short-lived progeny in secular equilibrium with their parent radionuclide; e.g., Ga-68 (progeny) is in equilibrium with Ge-68 (parent).

The term "None" in the Nuclide column indicates no detectable emissions from this source for this calendar year.

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

StackID	Height (m)	Diameter (m)	Exit Velocity (m/s)	Nearest Meteorological Tower
03002914	15.9	1.07	7.73	TA-6
03002915	15.9	1.05	24.00	TA-6
03002919	15.9	1.07	19.61	TA-6
03002920	15.9	1.07	23.88	TA-6
03002923	15.9	1.07	22.93	TA-6
03002924	15.9	1.06	17.28	TA-6
03002928	15.9	1.05	22.12	TA-6
03002929	15.9	1.07	17.51	TA-6
03002932	15.9	1.07	11.21	TA-6
03002933	15.9	1.06	26.51	TA-6
03002937	16.8	0.20	14.70	TA-6
03002944	16.5	1.52	8.14	TA-6
03002945	16.5	1.52	7.53	TA-6
03002946	16.5	1.88	7.07	TA-6
03010222	13.4	0.91	0.44	TA-6
16045005	18.3	1.18	15.73	TA-6
48000107	13.4	0.30	21.32	TA-6
48000154	13.1	0.91	5.08	TA-6
48000160	12.4	0.38	7.38	TA-6
50000102	15.5	1.82	11.96	TA-6
50003701	12.4	0.91	6.09	TA-6
50006903	10.5	0.31	6.76	TA-6
53000303	33.5	0.91	11.47	TA-53
53000702	13.1	0.91	7.91	TA-53
55000415	9.5	0.93	7.79	TA-6
55000416	9.5	0.94	10.83	TA-6

Table 4. 61.94(b)(7) User-Supplied Data—Monitored Stack Parameters— NM State Plane Coordinates (NAD '83)

StackID	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
16045005	1,609,426	1,760,910
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	1,769,111
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. 40-61.94(b)(7) User-Supplied Data—Highest Off-Site Dose Location for Monitored Release Points

StackID	Associated Meteorological Tower	Distance to LANL Highest Dose Location (m)	Direction to LANL Highest Dose Location
03002914	TA-06	6,002	E
03002915	TA-06	6,003	E
03002919	TA-06	5,990	E
03002920	TA-06	5,998	E
03002923	TA-06	6,151	E
03002924	TA-06	6,153	E
03002928	TA-06	6,137	E
03002929	TA-06	6,139	E
03002932	TA-06	5,987	E
03002933	TA-06	5,986	E
03002937	TA-06	6,075	E
03002944	TA-06	6,077	E
03002945	TA-06	6,080	E
03002946	TA-06	6,078	E
03010222	TA-06	6,270	E
16045005	TA-06	9,821	ENE
48000107	TA-06	4,758	ENE
48000154	TA-06	4,715	ENE
48000160	TA-06	4,755	ENE
50000102	TA-06	4,152	ENE
50003701	TA-06	4,263	ENE
50006903	TA-06	4,319	ENE
53000303	TA-53	806	NNE
53000702	TA-53	957	NNE
55000415	TA-06	4,456	ENE
55000416	TA-06	4,530	ENE

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

Description	Value	Units	CAP88 Variable Name
Annual rainfall rate	45.3	cm/y	RR
Lid height	1600	m	LIPO
Annual ambient temperature	9	deg C	TA
Absolute humidity	5.5	g/m^3	
E-vertical temperature gradient	0.02	K/m	TG
F-vertical temperature gradient	0.035	K/m	TG
G-vertical temperature gradient	0.035	K/m	TG
Food supply fraction - local vegetables	1	F1V	
Food supply fraction - vegetable regional	0	F2V	
Food supply fraction - meat local	1	F1B	
Food supply fraction - meat regional	0	F2B	
Food supply fraction - meat imported	0	F3B	
Food supply fraction - milk local	1	F1M	
Food supply fraction - milk regional	0	F2M	
Food supply fraction - milk imported	0	F3M	
Ground surface roughness factor	0.5	GSCFAC	
Food supply fraction - vegetable imported	0	F3V	

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

```
CAP88 Input Data for 2008 TA-6 Meteorological Tower
(95.0% Data Completeness)
    N A 0.001100.000210.000030.000000.000000.00000
  NNE A 0.001500.000420.000000.000000.000000.00000
   NE A 0.002520.000840.000030.000000.000000.00000
  ENE A 0.004780.001340.000000.000000.000000.00000
    E A 0.004930.002130.000000.000000.000000.00000
  ESE A 0.003780.002020.000030.000000.000000.00000
   SE A 0.003360.001840.000000.000000.000000.00000
  SSE A 0.003120.002050.000000.000000.000000.00000
    S A 0.001860.001470.000000.000000.000000.00000
  SSW A 0.001050.000660.000000.000000.000000.00000
   SW A 0.000680.000340.000000.000000.000000.00000
  WSW A 0.000450.000160.000000.000000.000000.00000
    W A 0.000210.000370.000000.000000.000000.00000
  WNW A 0.000340.000180.000050.000000.000000.00000
   NW A 0.000420.000100.000030.000000.000000.00000
  NNW A 0.000580.000290.000000.000000.000000.00000
    N B 0.000420.000340.000000.000000.000000.00000
  NNE B 0.000470.000470.000000.000000.000000.00000
   NE B 0.000580.000940.000000.000000.000000.00000
  ENE B 0.001420.001710.000030.000000.000000.00000
    E B 0.001390.002700.000000.000000.000000.00000
  ESE B 0.001230.002410.000050.000000.000000.00000
   SE B 0.000890.002890.000000.000000.000000.00000
  SSE B 0.000810.002760.000000.000000.000000.00000
    S B 0.000310.001550.000030.000000.000000.00000
  SSW B 0.000260.000710.000050.000000.000000.00000
   SW B 0.000160.000260.000050.000000.000000.00000
  WSW B 0.000130.000370.000050.000000.000000.00000
    W B 0.000030.000260.000080.000000.000000.00000
  WNW B 0.000100.000130.000050.000000.000000.00000
   NW B 0.000050.000180.000030.000000.000000.00000
  NNW B 0.000100.000180.000030.000000.000000.00000
    N C 0.000160.000420.000080.000000.000000.00000
  NNE C 0.000660.001230.000160.000000.000000.00000
   NE C 0.000730.003120.000050.000000.000000.00000
  ENE C 0.001570.003880.000050.000000.000000.00000
    E C 0.002180.004590.000000.000000.000000.00000
  ESE C 0.001420.005430.000080.000000.000000.00000
   SE C 0.001500.006480.000100.000000.000000.00000
  SSE C 0.001180.009030.000920.000000.000000.00000
    S C 0.000790.005980.001340.000030.000000.00000
  SSW C 0.000630.002200.001100.000000.000000.00000
   SW C 0.000340.000870.000390.000000.000000.00000
  WSW C 0.000160.000790.000240.000030.000000.00000
    W C 0.000130.000420.000310.000000.000000.00000
  WNW C 0.000210.000470.000240.000050.000000.00000
   NW C 0.000130.000550.000600.000050.000000.00000
  NNW C 0.000130.000260.000130.000000.000000.00000
    N D 0.004330.007580.004230.001360.000160.00000
  NNE D 0.004620.009450.007400.002940.000160.00000
   NE D 0.003180.009050.003830.000470.000030.00000
  ENE D 0.003750.007270.001290.000050.000000.00000
```

Table 7 (Continued)

E	D	0.005590.008160.000600.000000.000000.00000
ESE	D	0.004090.007320.000890.000030.000000.00000
SE	D	0.003150.009420.003440.000160.000000.00000
SSE	D	0.003780.017430.015770.002310.000030.00000
S	D	0.004300.022700.030970.008030.000290.00003
SSW	D	0.004440.018560.026510.010130.001420.00005
SW	D	0.003440.010080.016480.012130.002940.00016
WSW	D	0.003830.008240.012470.014750.004300.00100
W	D	0.003730.007010.013120.017430.005910.00097
WNW	D	0.002680.005960.011630.011780.005330.00150
NW	D	0.003230.007660.010160.008980.002550.00034
NNW	D	0.003940.007030.004020.001360.000050.00000
N	E	0.002130.004800.003040.000000.000000.00000
NNE	E	0.001650.003780.001360.000000.000000.00000
NE	E	0.001100.001970.000450.000000.000000.00000
ENE	E	0.000890.000730.000080.000000.000000.00000
E	E	0.001020.000420.000050.000000.000000.00000
ESE	E	0.000550.000790.000100.000000.000000.00000
SE	E	0.000870.001570.000130.000000.000000.00000
SSE	E	0.001680.002680.000390.000000.000000.00000
S	E	0.001680.008580.002780.000000.000000.00000
SSW	E	0.002260.013940.003070.000000.000000.00000
SW	E	0.002390.011630.008480.000000.000000.00000
WSW	E	0.002700.005430.004750.000000.000000.00000
W	E	0.001710.003460.002410.000000.000000.00000
WNW	E	0.002280.004590.005250.000000.000000.00000
NW	E	0.002100.006690.005700.000000.000000.00000
NNW	E	0.002550.005750.001470.000000.000000.00000
N	F	0.005930.006960.000660.000000.000000.00000
NNE	F	0.003670.001810.000080.000000.000000.00000
NE	F	0.002200.000630.000000.000000.000000.00000
ENE	F	0.001100.000130.000000.000000.000000.00000
E	F	0.001000.000130.000000.000000.000000.00000
ESE	F	0.001130.000130.000000.000000.000000.00000
SE	F	0.001000.000210.000000.000000.000000.00000
SSE	F	0.000730.000160.000000.000000.000000.00000
S	F	0.001840.000730.000030.000000.000000.00000
SSW	F	0.003020.002600.000030.000000.000000.00000
SW	F	0.004670.013100.001310.000000.000000.00000
WSW	F	0.006960.026510.006880.000000.000000.00000
W	F	0.006430.024120.003620.000000.000000.00000
WNW	F	0.006250.019820.003310.000000.000000.00000
NW	F	0.007030.024750.001780.000000.000000.00000
NNW	F	0.007190.013520.000500.000000.000000.00000

Table 7 (continued)

```
CAP88 Input Data for 2008 TA-53 Meteorological Tower
(99.0% Data Completeness)
```

```
  N A 0.001170.000260.000000.000000.000000.00000
NNE A 0.001740.000740.000000.000000.000000.00000
 NE A 0.003330.001310.000000.000000.000000.00000
ENE A 0.003730.002480.000000.000000.000000.00000
  E A 0.002990.002820.000000.000000.000000.00000
ESE A 0.002850.002420.000000.000000.000000.00000
 SE A 0.002650.002250.000000.000000.000000.00000
SSE A 0.002330.001680.000000.000000.000000.00000
  S A 0.001170.001590.000000.000000.000000.00000
SSW A 0.000800.000630.000000.000000.000000.00000
 SW A 0.000370.000510.000000.000000.000000.00000
WSW A 0.000370.000260.000000.000000.000000.00000
  W A 0.000400.000200.000000.000000.000000.00000
WNW A 0.000260.000170.000000.000000.000000.00000
 NW A 0.000370.000170.000000.000030.000000.00000
NNW A 0.000570.000230.000060.000000.000000.00000
  N B 0.000400.000140.000000.000000.000000.00000
NNE B 0.000370.000480.000060.000000.000000.00000
 NE B 0.001000.001540.000000.000000.000000.00000
ENE B 0.001170.002450.000000.000000.000000.00000
  E B 0.000970.002680.000030.000000.000000.00000
ESE B 0.000850.001680.000000.000000.000000.00000
 SE B 0.000740.001650.000000.000000.000000.00000
SSE B 0.000740.002160.000030.000000.000000.00000
  S B 0.000230.001540.000000.000000.000000.00000
SSW B 0.000090.000710.000000.000000.000000.00000
 SW B 0.000000.000510.000030.000000.000000.00000
WSW B 0.000000.000310.000030.000000.000000.00000
  W B 0.000090.000230.000060.000000.000000.00000
WNW B 0.000000.000370.000090.000000.000000.00000
 NW B 0.000110.000140.000090.000000.000000.00000
NNW B 0.000200.000140.000030.000000.000000.00000
  N C 0.000280.000370.000280.000000.000000.00000
NNE C 0.000970.001910.000370.000000.000000.00000
 NE C 0.001340.003700.000480.000000.000000.00000
ENE C 0.001820.006380.000170.000000.000000.00000
  E C 0.001540.006690.000060.000000.000000.00000
ESE C 0.000850.004010.000110.000000.000000.00000
 SE C 0.000800.003960.000090.000000.000000.00000
SSE C 0.001050.005550.000400.000000.000000.00000
  S C 0.000740.004780.000600.000000.000000.00000
SSW C 0.000170.003070.000480.000000.000000.00000
 SW C 0.000140.001170.000230.000000.000000.00000
WSW C 0.000140.000710.000430.000000.000000.00000
  W C 0.000110.000600.000850.000000.000000.00000
WNW C 0.000090.000630.000480.000000.000000.00000
 NW C 0.000110.000370.000110.000030.000000.00000
NNW C 0.000200.000370.000170.000030.000000.00000
  N D 0.005010.008340.009680.004410.000260.00006
NNE D 0.005830.012010.008770.003020.000370.00000
 NE D 0.005750.009340.005320.000630.000000.00000
ENE D 0.004380.010840.002730.000260.000000.00000
```

Table 7 (Continued)

```
 E D 0.003870.009560.001740.000000.000000.00000
ESE D 0.003130.006660.001200.000000.000000.00000
 SE D 0.002360.005640.001850.000230.000000.00000
SSE D 0.002760.011930.009450.004070.000370.00009
  S D 0.003670.016140.031140.016280.000460.00031
SSW D 0.002590.014260.037260.028460.004130.00068
 SW D 0.002190.009110.019840.016420.004010.00051
WSW D 0.001650.005490.014230.015280.005040.00094
  W D 0.001510.005490.014910.012070.002330.00000
WNW D 0.002190.003900.009450.007260.001940.00037
 NW D 0.002330.003420.005920.007290.002620.00065
NNW D 0.004410.005150.005860.002500.000510.00006
  N E 0.003900.009020.003070.000000.000000.00000
NNE E 0.002620.007310.002990.000000.000000.00000
 NE E 0.001710.003930.001000.000000.000000.00000
ENE E 0.001110.001510.000340.000000.000000.00000
  E E 0.000830.001250.000200.000000.000000.00000
ESE E 0.001050.001110.000090.000000.000000.00000
 SE E 0.000880.001050.000260.000000.000000.00000
SSE E 0.000830.002330.000630.000000.000000.00000
  S E 0.000800.005460.005950.000000.000000.00000
SSW E 0.000970.009020.028400.000000.000000.00000
 SW E 0.000910.015650.017700.000000.000000.00000
WSW E 0.001000.007000.012890.000000.000000.00000
  W E 0.001250.006690.008620.000000.000000.00000
WNW E 0.001540.005380.004440.000000.000000.00000
 NW E 0.001990.003220.001420.000000.000000.00000
NNW E 0.003470.006350.003590.000000.000000.00000
  N F 0.006630.003050.000060.000000.000000.00000
NNE F 0.006200.002220.000060.000000.000000.00000
 NE F 0.006030.001940.000000.000000.000000.00000
ENE F 0.004980.001140.000030.000000.000000.00000
  E F 0.003790.000710.000000.000000.000000.00000
ESE F 0.003760.000880.000000.000000.000000.00000
 SE F 0.003700.001280.000030.000000.000000.00000
SSE F 0.003590.002450.000030.000000.000000.00000
  S F 0.004810.005040.000110.000000.000000.00000
SSW F 0.005640.009850.002500.000000.000000.00000
 SW F 0.005290.007030.000400.000000.000000.00000
WSW F 0.003900.009310.003640.000000.000000.00000
  W F 0.003330.009510.004130.000000.000000.00000
WNW F 0.005150.005320.000460.000000.000000.00000
 NW F 0.005460.002790.000460.000000.000000.00000
NNW F 0.005780.003330.000400.000000.000000.00000
```

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

Estimated 2002 Population within 80 km of Los Alamos National Laboratory, 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	17	56	27	53	82	94	139	0	0	0	0	16	97	1003	1483
NNW	7	17	48	230	169	89	257	278	21	0	0	0	8	22	276	492
NW	9	17	21	57	320	384	208	678	415	393	54	0	2	26	53	1076
WNW	0	0	10	15	68	210	819	1047	1866	2613	723	0	0	33	38	3195
W	0	0	0	0	0	0	96	163	0	0	0	0	9	80	356	175
WSW	0	0	0	0	0	0	0	0	0	0	0	2	9	45	493	2909
SW	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	2932
SSW	0	0	0	0	0	0	0	0	0	0	0	35	4	1048	1564	72580
S	0	0	0	0	0	0	0	0	0	0	0	19	7	20	177	3953
SSE	0	0	0	0	0	0	0	0	0	336	220	313	56	349	6351	3057
SE	0	0	0	0	0	0	0	0	0	1546	3305	563	1	1160	81840	9164
ESE	0	0	0	0	0	0	0	0	0	0	0	11	13	788	9029	3085
E	0	0	0	0	0	0	0	0	0	0	2	1	1928	4593	447	490
ENE	0	0	0	0	0	0	0	0	0	0	0	0	2309	5111	3953	3153
NE	7	10	2	0	0	0	0	0	0	0	0	0	1298	15818	2690	6744
NNE	7	17	53	8	38	32	25	24	0	0	0	0	15	2514	413	1047

Table 9. 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^3)	Distance to LANL Maximum Dose Location (m)	Direction to LANL Maximum Dose Location
TA-53 Switchyard	^{41}Ar	7.50E-01	484	774	NNE
	^{11}C	1.81E+01	484	774	NNE
TA-53-1L Service Area	^{41}Ar	2.24E+00	1.0	943	NNE
	^{11}C	5.38E+01	1.0	943	NNE

Table 10. Environmental Data—Compliance Stations

2008 Effective Dose Equivalent (net in mrem) measured at air sampling locations around LANL.

Site Number and Name		^{3}H	^{241}Am	^{238}Pu	^{239}Pu	^{234}U	^{235}U	^{238}U	Rounded Total (mrem)
06	48th Street	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08	McDonalds	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02
09	Los Alamos Airport Terminal	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.02
10/90*	Eastgate	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
11	Well PM-1 (East. Jemez)	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
12	Royal Crest Trailer Court	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
13	Rocket Park	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.02
14	Pajarito Acres	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02
15	White Rock Fire Station	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
16	White Rock Nazarene Ch.	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.04
20	TA-21 Area B	0.00	0.01	0.00	0.03	0.03	0.00	0.02	0.09
32	County Landfill	0.00	0.00	0.00	0.01	0.04	0.00	0.03	0.08
42	A15 - West End	0.02	0.01	0.00	0.02	0.02	0.00	0.02	0.08
60	LA Canyon	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.02
61	LA Hospital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
62	Crossroads Bible Church	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
63	Monte Rey South	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
66	Los Alamos Inn - South	0.00	0.00	0.00	0.11	0.01	0.00	0.01	0.13
67	TA-3 Research Park	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02
68	Los Alamos Airport Road	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.02
71	DP - Fire Station	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.05
72	DP – Ace	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.03
73	DP - Monitor	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.05
74	A15 - West Center	0.00	0.00	0.00	0.02	0.02	0.00	0.01	0.07
75	A15 – East Center	0.01	0.00	0.00	0.03	0.02	0.00	0.01	0.07
79	A15 – East End	0.00	0.00	0.00	0.13	0.02	0.00	0.02	0.18

*Eastgate has two Airnet stations at this location—#10 is the primary station, while #90 is the quality assurance/backup station. We report the more conservative (highest) of the dose values from the two stations.

Table 11. Environmental Data—Compliance Stations

2008 Analytical Completeness and Air Sampler Operation Summary

Site Number and Name		Percent Analytical Completeness							
		^{3}H	^{241}Am	^{238}Pu	^{239}Pu	^{234}U	^{235}U	^{238}U	Percent run time
06	48th Street	100	100	100	100	100	100	100	99.6
08	McDonalds	100	100	100	100	100	100	100	99.6
09	Los Alamos Airport Terminal	100	100	100	100	100	100	100	99.6
10	Eastgate	100	100	100	100	100	100	100	99.5
11	Well PM-1 (East. Jemez)	100	100	100	100	100	100	100	99.3
12	Royal Crest Trailer Court	100	100	100	100	100	100	100	99.2
13	Rocket Park	100	100	100	100	100	100	100	99.3
14	Pajarito Acres	100	100	100	100	100	100	100	98.4
15	White Rock Fire Station	100	100	100	100	100	100	100	99.3
16	White Rock Nazarene Ch.	100	100	100	100	100	100	100	99.3
20	TA-21 Area B	100	100	100	100	100	100	100	96.6
32	County Landfill	100	100	100	100	100	100	100	99.3
42	A15 - West End	98.0	100	100	100	100	100	100	100
60	LA Canyon	100	100	100	100	100	100	100	99.0
61	LA Hospital	100	100	100	100	100	100	100	99.3
62	Crossroads Bible Church	100	100	100	100	100	100	100	99.6
63	Monte Rey South	100	100	100	100	100	100	100	99.3
66	Los Alamos Inn - South	100	100	100	100	100	100	100	99.0
67	TA-3 Research Park	96.2	100	100	100	100	100	100	99.2
68	Los Alamos Airport Road	100	100	100	100	100	100	100	98.9
71	DP - Fire Station	99.6	100	100	100	100	100	100	100
72	DP - Ace	99.6	100	100	100	100	100	100	100
73	DP - Monitor	99.1	100	100	100	100	100	100	100
74	A15 - West Center	97.5	100	100	100	100	100	100	100
75	A15 - East Center	99.5	100	100	100	100	100	100	100
79	A15 - East End	99.5	100	100	100	100	100	100	100

Table 12. LANSCE Monthly Assessments, Comparison, and Facility Summary

Description	StackID	Dose at East Gate Receptor
LANSCE stack January GMAP	53000702	none
LANSCE stack February GMAP	53000702	none
LANSCE stack March GMAP	53000702	none
LANSCE stack April GMAP	53000702	none
LANSCE stack May GMAP	53000702	7.04E-04
LANSCE stack June GMAP	53000702	1.53E-02
LANSCE stack July GMAP	53000702	7.24E-03
LANSCE stack August GMAP	53000702	2.65E-02
LANSCE stack September GMAP	53000702	3.73E-02
LANSCE stack October GMAP	53000702	2.87E-02
LANSCE stack November GMAP	53000702	3.50E-02
LANSCE stack December GMAP	53000702	5.82E-02
Sum of monthly GMAP runs for this stack	53000702	2.09E-01
GMAP single annual analysis for this stack	53000702	1.87E-01

To be conservative, the **maximum value** of the two above methods will be used for all further reporting of GMAP emissions from the main LANSCE stack 53000702.

SUMMARY OF LANSCE FACILITY DOSE		
LANSCE stack GMAP (see above)	53000702	2.09E-01
LANSCE stack PVAP	53000702	3.27E-03
LANSCE Non-CAP88 Radionuclides	53000702	4.01E-05
LANSCE stack GMAP	53000303	1.17E-02
LANSCE stack PVAP	53000303	7.33E-03
LANSCE Non-CAP88 Radionuclides	53000303	none
LANSCE Fugitive Emissions – Switchyard	530003SY	1.63E-02
LANSCE Fugitive Emissions – 1L Service Area	5300071L	3.36E-02
	LANSCE facility summary:	2.81E-01

GMAP = Gaseous Mixed Activation products; short-lived radioactive gases (e.g., C-11, O-15, Ar-41).

PVAP = Particulate & Vapor Activation Products (e.g., Na-24, Br-76).

Note: all CAP88 assessments above are annual assessments, with the exception of the monthly GMAP analyses for stack 53000702, as described above.

Table 13. 40-61.92 Highest Effective Dose Equivalent Summary

Description	StackID	Dose for Release Site Receptor	Dose at East Gate Receptor
CMR Stack	03002914	6.33E-06	5.50E-07
CMR Stack	03002915	2.11E-06	2.40E-07
CMR Stack	03002919	2.71E-04	2.77E-05
CMR Stack	03002920	3.35E-05	3.52E-06
CMR Stack	03002923	5.76E-06	5.61E-07
CMR Stack	03002924	9.95E-05	9.11E-06
CMR Stack	03002928	4.77E-05	6.37E-06
CMR Stack	03002929	1.43E-07	1.81E-08
CMR Stack	03002932	8.93E-07	8.75E-08
CMR Stack	03002933	1.79E-06	1.95E-07
CMR Stack	03002937	none	none
CMR Stack	03002944	2.51E-06	2.73E-07
CMR Stack	03002945	9.33E-07	1.01E-07
CMR Stack	03002946	none	none
Shops Addition Stack	03010222	2.74E-08	1.88E-09
WETF Stack - new	16045005	7.50E-02	9.19E-03
Radiochemistry Stack	48000107	1.59E-02	1.91E-03
Radiochemistry Stack/non-CAP88 radionuclides	48000107	none	none

Table 13 (Continued)

Description	StackID	Dose for Release Site Receptor	Dose at East Gate Receptor
Radiochemistry Stack	48000154	0.00E+00	0.00E+00
Radiochemistry Stack	48000160	1.19E-04	1.33E-05
Waste Management Stack	50000102	1.96E-06	5.64E-07
Waste Management Stack	50003701	3.62E-08	9.44E-09
Waste Management Stack	50006903	0.00E+00	0.00E+00
LANSCE-Stack-Annual - Gas	53000303	1.17E-02	1.17E-02
LANSCE-Stack-Annual – Particulate/Vapor	53000303	7.33E-03	7.33E-03
LANSCE Fugitive Emissions-Switch Yard	530000SY	1.63E-02	1.63E-02
LANSCE-Stack-Monthly – Gas	53000702	2.09E-01	2.09E-01**
LANSCE-Stack-Annual – Particulate/Vapor	53000702	3.27E-03	3.27E-03
LANSCE-Stack/non CAP88 radionuclides	53000702	4.01E-05	4.01E-05
LANSCE Fugitive Emissions-1L Service Area	5300071L	3.36E-02	3.36E-02
Plutonium Facility Stack	55000415	3.17E-07	5.61E-08
Plutonium Facility Stack	55000416	2.83E-03	6.05E-04
Unmonitored Stacks-gross	99000000	2.29E-01	2.29E-01
Air Sampler Net Dose @ this location	99000010	N/A	2.47E-02
	Total maximally exposed individual dose (mrem)		**5.47E-01**
	Rounded total for reporting purposes (mrem)		**0.55**

** As described in Table 12, the reporting value for GMAP emissions from 53000702 is the maximum value of either the annual GMAP dose assessment or the sum of monthly GMAP dose assessments. In 2008, the sum of the monthly GMAP assessments is used.

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 U.S.C. 1001.

Signature: ___*(Signature on File)*________________________________ Date: ________________

Donald L. Winchell, Jr., Owner
Manager
Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy

Signature: ____*(Signature on File)*_______________________________ Date: ________________

J. Chris Cantwell, Operator
Associate Director
Environment, Safety, Health and Quality Division
Los Alamos National Security, LLC
Los Alamos National Laboratory

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