LA-UR-11-10754
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Title: Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for TA-54 Dome 375 Waste Processing Activities

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Intended for: Environmental Regulatory Notification
US EPA
Air quality
Reading Room
Clean Air Act / Radionuclide NESHAP

From: David Janecky
To: George Rael, LASO
Date: June 8, 2010

Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for TA-54 Dome 375 Waste Processing Activities

Dear Mr. Real:

Please find attached to this memo an Application Pre-Construction Approval under 40 CFR 61 Subparts A and H for TA-54 Dome 375 Waste Processing Activities. This application is required to be submitted to the Environmental Protection Agency Region 6 to meet criteria in the Radionuclide NESHAP, that portion of the Clean Air Act which regulates airborne emissions of radionuclides from DOE facilities.

The subject of this application is the new point source of radionuclide air emissions at Technical Area 54, Dome 375. This dome will house waste processing activities, including the sorting, segregating, size-reduction, and repackaging of various waste forms at TA-54 in preparation for the closure of Materials Disposal Area G in the coming years.

Equipment is being moved into Dome 375 in support of these activities later this year, and operations are expected to start in early 2012. Region 6 of the EPA must approve this new source prior to construction; since this dome is an existing structure, LANL has defined the start of construction as foundation work within Dome 375 to allow installation of the waste processing containment zone inside the dome. This is scheduled to begin in mid-August of this year. Given the required 60-day evaluation time at Region 6, this application should be forwarded at your earliest convenience to George Brozowski. Mr Brozowski is the Regional Health Physicist of Region 6, and primary regulator for the Laboratory's Radionuclide NESHAP program under 40 CFR 61 Subpart H.

The waste processing activities will be conducted in a negative pressure, HEPA filtered containment structure. During the 12-month period of highest radioactive material throughput, the *potential* emissions from the operations, without taking credit for HEPA filtration, would result in 7.9 millirem per year. After HEPA filtration is accounted for, anticipated emissions from this operation are expected to result in less than 0.4 millirem per year to the facility's maximally exposed individual.

This level of potential emission requires continuous monitoring of emissions using sampling systems that meet ANSI/HPS N13.1-1999 requirements. Tests to validate the planned system design under that ANSI standard will take place in July 2011, and the system will fully documented in accordance with requirements in 40 CFR 61 Subpart H and the Laboratory's Radionuclide NESHAP program. In addition to emissions monitoring at the source, the Radionuclide NESHAP team also integrates data from an extensive network of ambient air monitoring stations exists around Area G and at public receptor locations in the White Rock and Los Alamos town sites.

If you have any questions or comments, please contact David Fuehne of my staff. David can be reached by email at davef@lanl.gov or (505) 665-3850.

Sincerely,

David Janecky
Deputy Group Leader, ENV-ES

Attachment:
LA-UR-11-XXXXX, Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for TA-54 Dome 375 Waste Processing Activities

Cy:

Isaac Richardson, DIR, A100	Denny Hjeresen, ENV-DO, K404
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Chris Cantwell, ADESH&Q, K491	Patricia Gallagher, ENV-ES, J978
IRM-RMSSO, A150	Charlie Lenoie, PMFS-DO, J976
ESH&Q File, K491	Kathryn Roberts, ET-ER, M992
Steve Fong, LASO, A316	Robert Lechel, ENV-ES, J593
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Steve Clemmons, WDP-DO, J910	David Fuehne, ENV-ES, J978
Cliff Kirkland EWMO-DO, J910	Harold Martinez, ENV-ES, J978
ENV-ES Memo File	Rebecca Clark, ENV-ES, J978

ENV-ES Rad-NESHAP Records, 2011 Section 1.6, EPA Correspondence

Application for Pre-Construction Approval
under 40 CFR 61 Subparts A and H
for TA-54 Dome 375 Waste Processing Activities

Los Alamos National Laboratory
Radionuclide NESHAP Compliance Program

1. Name & Address

Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Technical Area (TA) 3, Building 1410
West Jemez Road
Los Alamos, NM 87545

2. Location of Source

Los Alamos National Laboratory (LANL)
Technical Area 54
Materials Disposal Area G, Dome 375
Los Alamos, NM 87545

3. Technical Information

a. Nature of the project

Technical Area 54 (TA-54), Materials Disposal Area G ("Area G") is the site at LANL designated for subsurface disposition and retrievable storage of low-level radioactive waste and certain other waste types. The site consists of active and inactive subsurface units that include pits, shafts, and trenches with depths ranging from 10 to 65 feet below the original ground surface. Minimal waste disposition is still ongoing at Area G. Other waste processing activities currently underway are dedicated to the characterization, removal, sorting, segregating, size-reduction, and repackaging of waste. In preparation for site closure of Area G (currently planned for 2015), these waste processing operations have been expanded.

In 2010, two processing lines were started up at TA-54, in Building 412 and Dome 231. These two buildings had already housed radiological waste processing operations, so additional pre-construction applications were not needed. When operations at these two sources increased to the level for which continuous exhaust air emissions monitoring was required, appropriate notifications of new source startup were made to Region 6 of the Environmental Protection Agency. For Dome 375, only waste drum storage is currently ongoing; no active radiological operations currently take place in this structure. Bringing operations into this structure and the installation of waste processing lines constitutes need for this pre-construction application.

The start of building preparation and installation of process line equipment is scheduled to take place in mid-August 2011. That is the date that ENV-ES has determined to be the "start of construction" for this emissions source. Actual waste processing operations in Dome 375 will not begin until early in calendar year 2012. Normal notification of planned startup and actual startup will take place as required in 40 CFR 61.09.

Initial waste forms tasked for processing in Dome 375 include Fiberglass-Reinforced Plywood (FRP) boxes, and later, corrugated metal pipes (CMP). Due to the initial waste form to be processed, the operation in Dome 375 is referred to as the "Box Line." Additional waste forms may be processed over the lifetime of operations in Dome 375. This facility and all operations at TA-54 Area G are anticipated to end in calendar year 2015, under current schedules and funding plans.

b. Description of proposed facility

Dome 375 is a 300 ft x 100 ft (30,000 ft^2) structure located within Area G at TA-54, running generally east-to-west. The dome is an aluminum A-frame truss design that is anchored to a concrete ring wall. Dome 375 uses modular construction, with a membrane or fabric covering, and is equipped with several personnel doors and 2 large roll-up doors. Ramped entries provide forklift and other vehicle access into and out of the dome.

The dome currently sits on top of an asphalt slab, designated "Pad 11." Pad 11 is approximately 4 inches thick, 478 ft long by 137 ft wide, and slightly sloped to the southeast. Storage of waste drums currently takes place on Pad 11 in and around Dome 375, as well as at other designated locations around Area G. In addition to Dome 375, Pad 11 also houses a real-time radiography instrument used to characterize waste drums using x-ray examinations.

A Perma-Con[1] modular containment structure will be installed into Dome 375 for the processing of waste containers. The waste process area is currently designed to be 7200 square feet; design changes may adjust that number as plans are finalized. The Perma-Con is designed to be a negative-pressure, HEPA-filtered environment sized to handle large-scale waste items and appropriate handling equipment, both direct hands-on equipment and remote-operated equipment.

Current designs call for the Perma-Con to have a general process area as well as a buffer area for entry & exit and a control room area to coordinate operations. There will be access from the main Dome 375 area into the Perma-Con through personnel doors and larger waste access doors.

Attachment A contains site maps, showing the locations of LANL in general and TA-54 and Dome 375 in particular.

[1] Perma-Con is a trademark of Radiation Protection Services, Groton, CT. In this document, the term Perma-Con or permacon is used to represent the specific product as well as the general type of modular structure used for radiation protection confinement operations. The actual structure will be either a hard Perma-Con type structure or a containment tent that provides similar functionality.

c. Size of operation/facility

TA-54 sits on Mesita del Buey in Los Alamos County, a mesa top situated between Canada del Buey to the north and Pajarito Canyon to the south. Area G is located within TA-54, and covers 63 acres. The current mission of TA-54 is to process radioactive waste for off-site disposal and closure of the Area G site. This work includes waste characterization, size reduction, repackaging, and shipping.

Attachment B contains the proposed layout for Dome 375 and the Perma-Con structure inside the dome.

All radiological operations with potential for airborne emissions will be conducted inside a Perma-Con unit or similar negative-pressure containment with HEPA-filtered exhaust. Emissions sources at TA-54 are tracked in the LANL Radioactive Materials Usage Survey (RMUS) conducted by ENV-ES, and/or are monitored for radionuclide air emissions per the Radionuclide NESHAP Quality Assurance Compliance Plan[2].

d. Methods of operation

[Note: acronyms and other references are explained in Attachment C.]

Transport of Waste from Domes to Box Line Processing Location

Waste to be processed in box line operations are packaged in FRP boxes, plywood crates over-packed in metal containers, or waste directly loaded into metal containers. Boxes are currently stored in the following locations: Dome 153, Dome 230, outside Dome 153 (south side), outside Dome 283 (south side), outside Dome 375 (west side), and northwest side of Pad 10. Smaller boxes (e.g. 4ft x 4 ft x 7ft and smaller) will be transported to the box line operations with the use of a forklift. Larger boxes will be retrieved by forklift and placed on a DOT trailer and transported to the box line operation location, where a forklift will again be utilized to off load the box. The box will be placed on a caster/roller system and transported into the Perma-Con enclosure or similar structure.

Waste to be Processed

Dome 375 box line operations waste stream has been identified. This waste stream primarily consists of larger boxes that will be processed in a larger Perma-Con type structure. These boxes contain primarily large volume waste such as empty pencil tanks, gloveboxes, ancillary equipment in gloveboxes (e.g. mills, lathes, furnaces, weigh scales, etc.), glovebox transfer tunnels. These gloveboxes were taken off line during the 1978-1980 D&D effort at TA-21. Gloveboxes were decontaminated with a paint stripper and then sealed with multiple layers of latext paint. Windows and gloveports were sealed with a caulking material. Materials used for decontamination of these boxes (e.g. rags)

[2] ENV-ES-RN, Quality Assurance Project Plan for the Radionuclide NESHAP Compliance Team. Document and associated procedures describe LANL's approach for compliance with 40 CFR 61 Subpart H.

were left in the gloveboxes. The processing methodology will be the same for all waste forms, starting with lower-activity containers and moving towards higher activity containers later in the schedule. Criticality safety issues are being addressed by LANL's criticality safety organization.

Other waste forms to be processed at Dome 375 include corrugated metal pipes (CMPs). These CMPs are filled with cemented transuranic (TRU) waste generated from radioactive liquid waste (RLW) treatment operations at TA-21. This RLW was solidified in a pug mill using Portland cement and then pumped into 20-foot-long CMPs. This waste was typically generated between 1968 and 1978. The CMPs have general dimensions of 34 inches outside diameter, 30 inches inner diameter, and are 20 feet long. Both ends of the CMP are sealed with 12-inch concrete plugs. The CMP will be cut into sections to fit into SWBs or other certified waste containers, and packaged for characterization and shipment to WIPP.

Box Line Operations Descriptions

Unsheathing

Once the box is in the containment structure, a pilot hole will be drilled in the FRP box. This pilot hole will be used for radiological and chemical sampling of the waste. Another hole will be drilled to install localized ventilation on the FRP box. FRP material will be cut using "sawzalls" (reciprocating saw-type tools) on corners and circular saws on straight areas. There is a potential to cut through nails. This operations will be performed under a spark and flame permit (e.g. welding blankets and welding shields). The crate material will be cut into approximately 3 ft pieces and radiological surveys will be performed to separate waste into low-level waste (LLW) or transuranic (TRU) waste. Low-level waste will be packaged into appropriate LLW containers (e.g. B-25s, laundry boxes, transportainers, drums). Crate material that is of radiological quantities to be potentially classified as TRU will be packaged with the remaining waste stream in standard waste boxes (SWBs) or other approved containers (e.g., drums).

Waste Material Repackaging

Waste material will be removed from the FRP box as soon as the waste material is accessible during the unsheathing process. Prohibited items will be separated similar to drum remediation activities. Prohibited items include aerosol cans and liquids; such items will be removed. Small volumes of liquids will be vacuumed and absorbed. Waste will be transferred into standard waste boxes or other approved containers for final packaging as LLW or TRU waste. No decontamination will occur on loose debris due to the nature of the waste. Size reduction of waste material will occur as needed in order for large debris items to fit into the waste containers. Size reduction will be performed with the use of wheel pipe cutters, band saws, etc. Cuts will be performed to the extent possible in radiological containment such as glovebags or bagout bags.

For larger waste items such as gloveboxes, processing activities in the Dome 375 Perma-Con will consist of decontaminating the items to the extent possible and performing radiological surveys to determine if the box is to be categorized as LLW or TRU waste. Once categorized, waste will be size reduced as needed with the use of band saws or similar tools. Remote capability is being examined to size-reduce gloveboxes for higher-activity containers. The size-reduced waste material will be packaged in the Dome 375 Perma-Con. LLW and TRU waste will be packaged in appropriate waste boxes and prepared for characterization and disposition.

Note: Current control procedures restrict comingling waste from multiple TRU waste “parent” drums into single daughter containers.

Packaged waste Disposition

Packaged LLW and TRU waste will be managed and stored at TA-54 Area G under current practices and requirements. Waste categorized as LLW will be either disposed in LLW pits at TA-54 Area G or transported to an approved off-site LLW disposal site such as the Nevada Test Site. Waste categorized as TRU and packaged in SWB will be stored in domes until ready to enter characterization/certification processes at LANL to certify the SWB to be shipped to the Waste Isolation Pilot Plant (WIPP).

e. Emissions controls equipment

The air ventilation system for the Perma-Con structure within Dome 375 will have at least one stage of HEPA filters on the exhaust air stream. Ventilation systems and HEPA filters are being repurposed from the MDA-B remediation site as that project winds down. At least some ventilation fans will be operated constantly to maintain constant negative pressure in the Perma-Con.

There will not be HEPA filtration on the Perma-Con ventilation inlets. Dome 375 is not equipped with active ventilation systems; the dome has ventilation grille openings but these are not equipped with HEPA filters.

The exhaust stream will be directed into a monitored horizontal exhaust stack as indicated in Attachment B.

Regardless of the final specific design or vendor for the process containment area, the same general principles will apply: all operations with significant emissions potential will be performed in a containment structure; negative pressure will be maintained on this structure, there will be HEPA filtered exhaust, and radiological air emissions will be monitored under 40 CFR Subpart H requirements.

f. Emissions monitoring equipment

Installed monitoring equipment will be certified to meet design and sampling location criteria in ANSI/HPS N13.1-1999. Samples will be extracted using a shrouded probe as described in the ANSI standard.

The sample location is certified under ANSI/HPS N13.1-1999 through the allowances for scale model stack testing & certification described in the standard. The operating stack on Dome 231 will be used as a test model; this stack will be a two-thirds scale stack relative to the planned stack at TA-54 Dome 375. Initial certifications of Building 412 and Dome 231 were based on the test model in the RP-2 wind tunnel, as described in a November 2009 memo[3] to EPA Region 6. The full suite of testing under ANSI/HPS N13.1-1999 will be conducted in July 2011 at the Dome 231 stack; these results will be used to certify the design for the larger-scale operations at Dome 375 per ANSI standard guidance. This guidance appears in Attachment E.

4. Emissions Calculations and Off-Site Dose Summary

a. Uncontrolled emission estimates and monitoring requirements

Calculations to determine the potential uncontrolled emissions from the Dome 375 Perma-Con are based on the anticipated radiological throughput of the process line. Project personnel estimate that the highest throughput of radioactive material over any 12-month period over the course of the project is approximately 8,616 curies of plutonium-equivalent material. Attachment 5 shows the year-by-year breakdown of throughput, but the following calculations all assume the maximum 8616 plutonium-equivalent curies per year. [Plutonium “equivalency” is a DOE method for normalizing the relative risks of multiple radionuclides; please see Attachment D for more information.]

This annual throughput is used for analysis of emissions requirements; a release fraction of 0.001 is used, per EPA guidance for particulate-based radionuclides using 40 CFR 61, Appendix D methodology. For determining potential emissions, the product of these two terms (8.6 curies) is assumed to be emitted from the stack. Off-site dose impacts are calculated using CAP88-PC Version 3, the latest EPA-approved analysis code. CAP88 was used to generate a “millirem per curie” factor for a unit release (1.0 Ci) of Pu-239; this allows scaling of emissions and simple analysis of a variety of emissions scenarios. Table 1 contains the analysis and results of emissions and dose calculations. Input parameters for CAP88 and other calculation descriptions are contained in Attachment D.

3 LANL Memo ENV-ES:09-228, “TA-54 Waste Debris Lines Status Update and Request for Approval for Emissions Sampler Certification Methods.” David Fuehne to George Brozowski, November 9, 2009.

Table 1.
Annual Radioactive Materials Usage And Dose Summary
Uncontrolled Emissions

Radionuclide	Annual Usage (Ci/year)	Release Fraction	Emissions Source Term (Ci/year)*	Dose Factor (mrem/Ci)	Off-Site PEDE (mrem/year)
^{239}Pu or equivalent	8,616	0.001	8.6	92.1	792

The resulting off-site dose of 792 mrem/yr is over the Subpart H threshold for continuous monitoring (0.1 mrem/year). Therefore, continuous monitoring of airborne radionuclide emissions is required for this worst-case year. Due to the variable nature of the project, LANL will continuously monitor the airborne emissions for the life of the project at TA-54 Dome 375.

The stack effluent will be sampled for radioactive constituents according to American National Standards Institute 13.1, 1999. All radionuclides that will contribute greater than 10% of the PEDE will be measured in accordance with §61.93(b)(4)(i). The standard suite of radionuclides evaluated at LANL will be used for Dome 375 processes; this includes isotopic measurements of plutonium, uranium, thorium, and americium, in addition to gamma spectroscopy and counting of gross alpha/beta emitting radionuclides. This addresses monitoring concerns for most operations at LANL, including waste handling activities. Per Rad-NESHAP team policy, the source will undergo biennial (every other year) evaluation of monitoring requirements to verify the need to measure emissions of specific radionuclides.

b. Controlled emissions estimates

Section (a) above and Table 1 is the analysis of *potential* emissions, without taking credit for HEPA filters or other emissions controls. Incorporating these parameters, the *controlled* emissions from Dome 375 are calculated in accordance with 40 CFR 61, Subpart H and Appendix D. This calculation is reflected in Table 2.

Table 2.
Annual Radioactive Materials Usage And Dose Summary
Controlled Emissions

Radionuclide	Annual Usage (Ci/year)	Release Fraction	Emissions Source Term (Ci/year)*	HEPA Controls Factor	Dose Factor (mrem/Ci)	Off-Site EDE (mrem/year)
^{239}Pu or equivalent	8,616	0.001	8.6	0.01	92.1	7.9

Note that in Table 2, the controls factor for HEPA filtration is that value provided in Appendix D of 40 CFR 61. This assumes a 99% removal of particulates by a HEPA filter (or 1% transmittal through the filter) for a control factor of 0.01. In reality, HEPA filters at LANL are in-place performance tested and required to meet a removal efficiency of 99.95% for 0.3-micron particles. The corresponding control factor for such a filter is

0.0005, much better than the value in Table 2. The subsequent "anticipated" off-site dose from the operations at Dome 375 will be less than 0.4 mrem/year.

5. Calculation Assumptions

a. Operations with potential emissions

Operations in the "box line" process line area of Dome 375 are all considered to have potential emissions. Certain types of activities at other areas of TA-54 are not considered potential sources of emissions; these include waste drum storage and small-scale headspace gas sampling. All radiological operations at TA-54 are evaluated for Rad-NESHAP compliance concerns.

b. Source term estimates

The source term was estimated using the maximum annual throughput for the time period, based on any consecutive 12-month period. Project personnel provided the most aggressive waste processing schedule, broken down by quarters (three-month intervals). This list was used to generate the table provided in Attachment D.

c. Dose assessment estimates

Procedure ENV-ES-501 and -511 were used to run CAP88. Input parameters selected were the most conservative values – e.g., those which result in the highest calculated off-site dose values. Input criteria for CAP88 are listed in Attachment D.

Dose assessment procedures are available on the ENV-ES internal web site, at the following URL.

http://int.lanl.gov/environment/air/qa.shtml?1

General QA documents are also available on that site, using different tabs on that site.

6. Follow-up questions or comments

If more information is needed or if there are questions or comments, please notify the LANL Radionuclide NESHAP compliance program.

Team Leader David Fuehne
505-665-3850
davef@lanl.gov

ATTACHMENT A
Site Maps

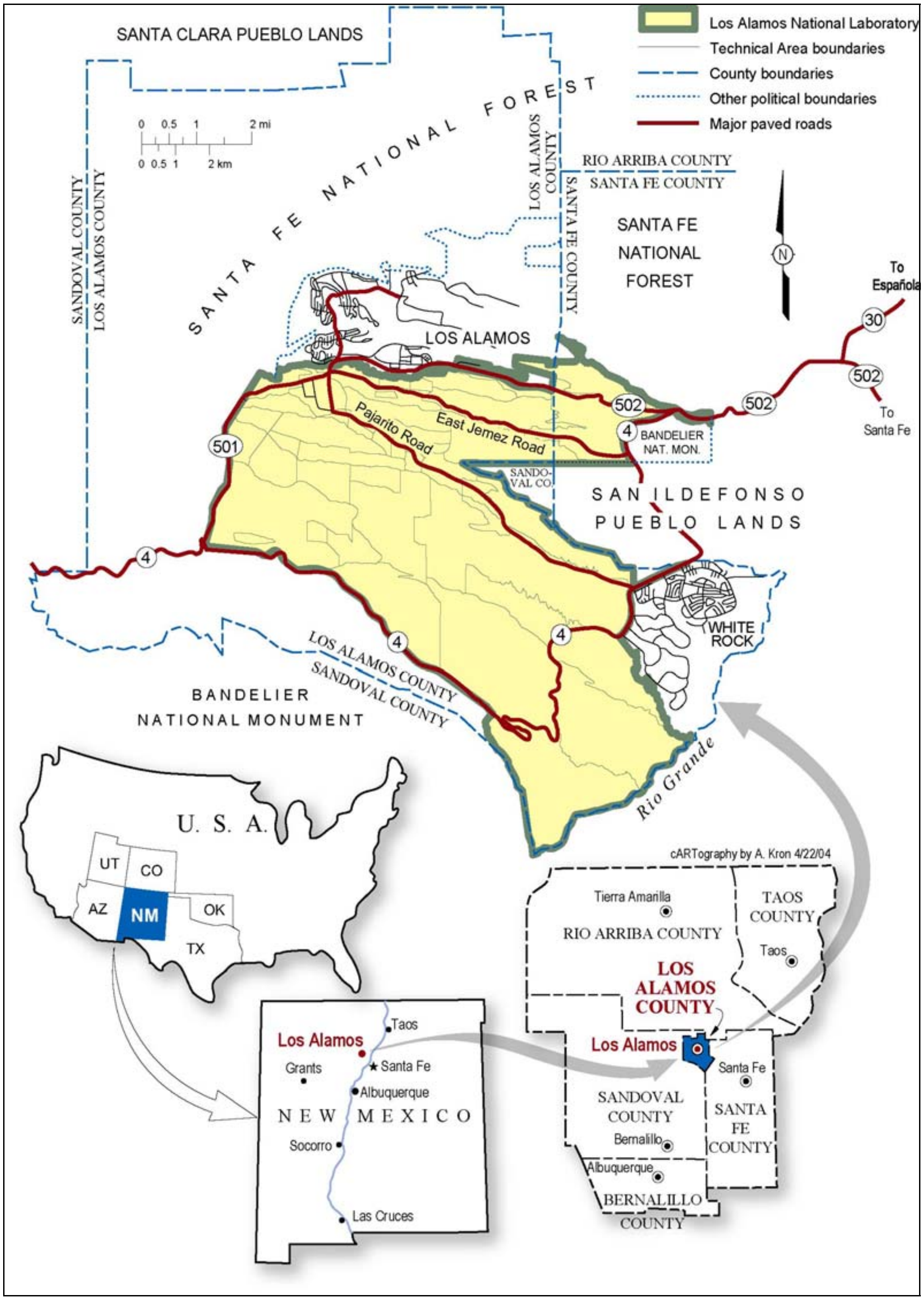

Figure 1.
Map of Los Alamos National Laboratory (LANL) on a national, state, regional, and county scale.

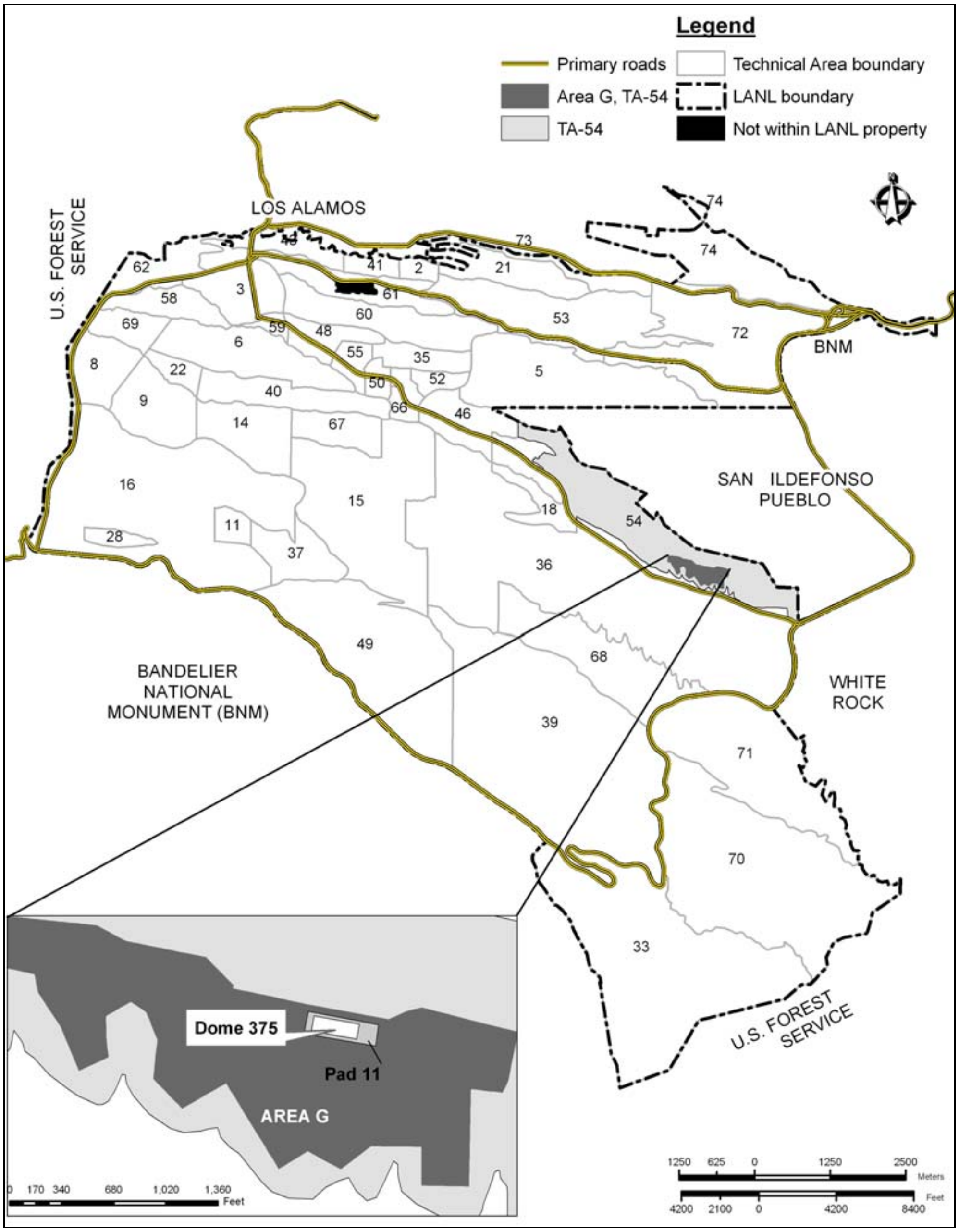

Figure 2.
Map of Los Alamos National Laboratory and TA-54, Area G, and Dome 375.

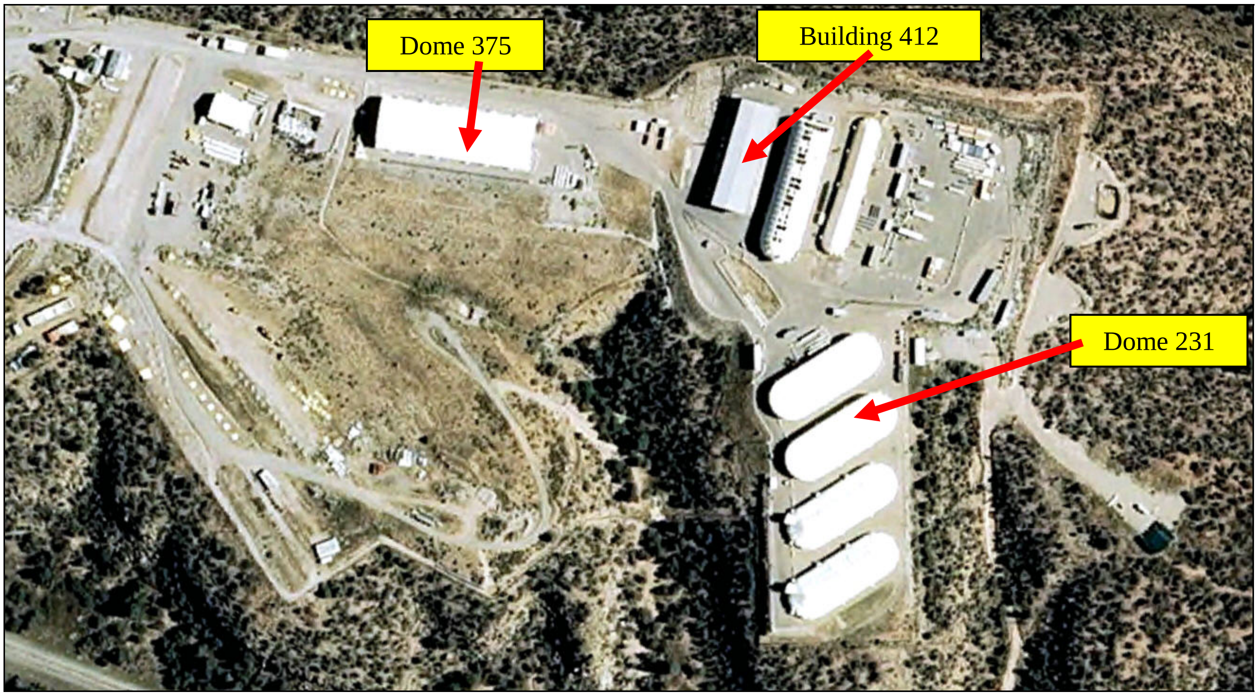

Figure 3.
Overhead view of TA-54 Area G, east end, highlighting Dome 375.
Building 412 and Dome 231 are also indicated, for reference

ATTACHMENT B
Dome 375 Layout

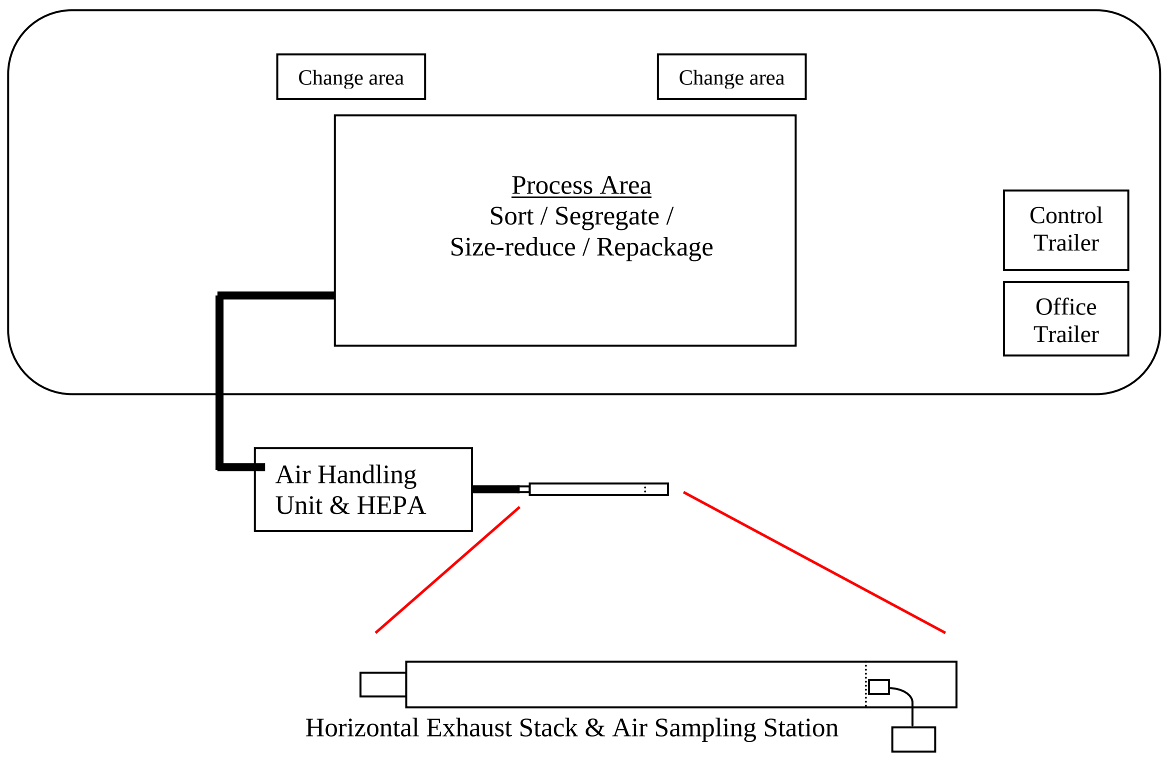

Figure 4.
General Layout of Dome 375. Final design is pending.
Horizontal stack and air sample station are indicated

ATTACHMENT C
Acronym List & Regulatory References

Rad-NESHAP	Radionuclide NESHAP. National Emissions Standards for Hazardous Air Pollutants, pertaining to emissions of Radionuclides from DOE facilities. 40 CFR 61, Subpart H.
ANSI/HPS N13.1-1999	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. Incorporated by reference into 40 CFR 61, Subpart H.
CAA	Clean Air Act. Specifically, the Rad-NESHAP regulation.
CMP	Corrugated metal pipes. Waste form in which concrete-fixed radioactive waste is sealed inside a metal pipe prior to disposal; Typically 20 feet long, 32 inches in diameter.
FRP	Fiberglass reinforced plywood. Waste form of large boxes, typically ranging from 4x4x7 feet (112 ft^3 or 3 m^3) up to 28x8x8 feet (1800 ft^3 or 50 m^3). Used to dispose of large items such as glove boxes, pencil tanks, or bulk debris.
HEPA	High-Efficiency Air Filters. Standard emissions controls systems, used to remove particulate radioactive material from exhaust air streams.
LLW	Low level waste. Radioactive waste meeting specific criteria established by the Department of Energy.
SWB	Standard waste box. Waste Container, typically 6 by 6 by 4 feet (144 ft^3 or 4 m^3) in size. Some SWBs are designed to be packed into TRUPACT waste shipment container.
TRU	Transuranic waste. Radioactive waste containing elements of atomic number 92 and higher; typically uranium, plutonium, americium, etc. Specific criteria are established by the Department of Energy.
WIPP	The Waste Isolation Pilot Plant in Carlsbad, NM. The DOE repository for transuranic (TRU) waste. Waste destined for WIPP must be thoroughly characterized and package to meet strict waste acceptance criteria.

Quality assurance documents are available on the LANL internal web site at:
http://int.lanl.gov/environment/air/qa.shtml

ATTACHMENT D
Supporting Documentation for Dose Calculations
CAP88 Input Parameters

TA-54 Dome 375

Distance to critical receptor	1783 meters to the southeast (SE)
Wind file used	TA-54 Meteorological Tower Years 2006 through 2010
Annual precipitation	45 cm per year
Average ambient temperature	9 degrees Celsius
Mixing height	1600 meters
Exhaust point diameter	0.914 meter*
Source height	0 meters*
Plume rise	0 m/sec*, momentum
Agricultural data	Local
Other terms	CAP88 default values
Source term input	1.0 curie of Pu-239 (Type M solubility)**
CAP88-derived dose factor	92.1 mrem/Ci

* Note: The stack discharge is in the horizontal direction, making the effective release height zero meters and release velocity in the vertical direction of zero meters per second. The diameter of the release duct will be 36" nominal, or 0.914 meters. Zero velocity and height will result in a conservative calculation of off-site dose.

** Note: The unit source term of one curie is used as a CAP88 input file to generate a "millirem per curie" factor. This factor is then multiplied by the actual source term of the operation to determine off-site dose from releases of radioactive material.

CAP88 Output

The CAP88 synopsis file will return a "millirem per year" value from the above calculation. Since this value assumes a unit source term (1.0 Ci), one can scale this number up or down to reflect the emissions level desired for calculation. The doses determined in Tables 1 and 2 illustrate these calculations.

Plutonium "Equivalency"

In order to streamline dose calculations and safety/authorization basis reviews at LANL, the concept of plutonium equivalency is used. When a wide mixture of radionuclides is used at a LANL facility, the quantity of each radionuclide is converted to the amount of plutonium-239 that would result in the same inhalation toxicity to an exposed individual. This is dubbed the "plutonium equivalency" of the material. Use of a single radionuclide input simplifies the dose calculation process. Amounts of radioactive material are referred to as "plutonium-equivalent" curies (PE-Ci) or plutonium-equivalent grams (PE-g) of material.

Assumed Release Fraction

Appendix D of 40 CFR 61 provides values of release fractions for different types of operations. These fractions are based on physical state of the processed material: gaseous, liquid, particulate, or solid. The typical assumption is to use the particulate release fraction (RF=0.001) for handling particulate radionuclides, handling contaminated material, or working with contaminated systems. The types of activities proposed for Dome 375 include repackaging of contaminated waste, size reduction (cutting) of waste material, and general waste handling. With no calculated or measured release fraction specific for this type of work, will use the particulate release fraction as recommended by EPA methods.

Annual Throughput Estimates

Project personnel have analyzed the waste volumes that are planned for processing in Dome 375. The "most aggressive" work schedule was used to evaluate the worst-case emissions consequence.

Calendar Year (CY)	Operations Description	Total PE-Ci processed in FY	% of planned value (rounded)
2011	Planning & equipment installation	0	0%
2012	Waste processing operations begin early in 2012	1390	16%
2013	Waste processing operations	5053	60%
2014	Waste processing operations	6463	75%
2015	Operations complete (planned date)	0	0% (unless schedule slips)
October 2013 - September 2014	PLANNING VALUE: Highest anticipated rad material throughput in consecutive 12-month period	~8616	100%
2012-2015	Entire planned throughput for Dome 375	12,906	150%

ATTACHMENT E
Scale Model Criteria from ANSI/HPS N13.1-1999

USE OF SCALE MODELS TO MEET SAMPLE LOCATION CRITERIA UNDER ANSI/HPS N13.1-1999

The box at right is an excerpt from ANSI/HPS N13.1-1999, discussing the use of scale models to certify stack sampling locations.

The four tests measure the level of cyclonic flow (swirl); uniformity of the velocity profile; and uniformity of aerosol and tracer gas mixing.

Terminology & Notes:

a) Tested stack is the model on which the tests are performed.

b) Candidate stack is the full size or as-built stack for which certification of location is desired.

c) For item (2), LANL uses the term "scaling factor" to describe the product of the mean stack air velocity and stack hydraulic diameter.

d) Item (4) is the step which "validates" the tested stack data on the candidate stack. The validation measurement is the COV of the velocity between the two systems. This means that the measured Coefficient of Variation of the velocity profile of the candidate stack must be within 5 percentage points of the velocity COV on the tested stack. For example, a COV of 8% on the tested stack and 12% on the candidate stack is acceptable (only a 4 percentage point difference between the two measurements).

ANSI/HPS N13.1-1999 Excerpt

Often nuclear facilities have multiple stacks or ducts that are of similar design. For such situations, it is not necessary to completely test the sampling location in a candidate stack or duct for compliance with the requirements given in clause 5.2.2 provided that:

1) A geometrically similar stack or duct (one with proportional critical dimensions) has been tested and the sampling location has been found to comply with the requirements of clause 5.2.2. Critical dimensions are those associated with components of the effluent flow system that can influence the degree of contaminant mixing and/or the velocity profile. The prior testing may be conducted either on a tack or duct in the field, or it may be conducted on a scale model.
2) The product of mean velocity (see eqn A-2) times hydraulic diameter of the candidate stack or duct is within a factor of six of that of the tested stack or duct, and the hydraulic diameter of the stack or duct is at least 250 mm at the sampling location. The Reynolds numbers based on hydraulic diameter of both the candidate stack or duct and the tested stack or duct are greater than 10,000 (see eqns B-1 and B-2 for examples of expressions that can be used for calculation of Reynolds numbers).
3) The velocity profile in the candidate stack or duct meets the requirements of clause 5.2.2.2.
4) The difference between velocity *COV*s of the two systems is not more than 5%.
5) The sampling location in the candidate stack or duct is placed at a geometrically similar location to that in the tested stack.

If these requirements are fulfilled, the sampling location in the second stack or duct is acceptable.

ANSI N13.1-1999, page 28.
Screen capture from page 38 of PDF from HPS web site at
https://hps.org/membersonly/committees/standards/n13_1-1999.pdf