LA-UR-21-30051

Title:	Transmittal of Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for new Radiological Liquid Waste Treatment Facility - Transuranic Liquid Waste (RLWTF-TLW)
Author(s):	Lattin, Rebecca Renee Fuehne, David Patrick
Intended for:	Environmental Regulatory Document
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Symbol: EPC-DO: 21-259
LA-UR: 21-30051
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Date: NOV 0 2 2021

Mr. George P. Brozowski
Senior Regional Health Physicist/Radon Policy Advisor
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Mail Stop: 6ARSI
Dallas, TX 75270-2102

Subject: Transmittal of Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for new Radiological Liquid Waste Treatment Facility – Transuranic Liquid Waste (RLWTF-TLW)

Dear Mr. Brozowski:

Please find attached to this memo an Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for the new Radiological Liquid Waste Treatment Facility – Transuranic Liquid Waste (RLWTF-TLW). This application is required by the Environmental Protection Agency (EPA) Region 6 to meet criteria in the National Emission Standards for Hazardous Air Pollutants (NESHAP) for emissions of radionuclides from Department of Energy (DOE) facilities.[1]

The subject of this application is the new source of radionuclide air emissions at Technical Area 50, adjacent to the existing RLWTF facility (TA-50-0001). This new facility will house equipment used for influent storage, primary waste processing, and secondary waste treatment and packaging to treat transuranic liquid waste. Construction activities for this new facility are planned to start sometime in the first quarter of calendar year 2022, and waste processing operations are expected to start in 2024 or later.

Using maximum annual design throughput of approximately 29 thousand liters of transuranic liquid waste, and worst-case concentrations of radioactive constituents based on the Waste Acceptance Criteria (WAC) for the facility, the maximum uncontrolled off-site dose is 19.3 millirem per year. This bounding dose represents the potential emissions from the operations, without taking credit for HEPA filtration. Current design plans call for HEPA filtration on individual tanks and process units where emissions may be

[1] Title 40, Code of Federal Regulations, Part 61, Subpart H. *National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities.* Referred to as the Radionuclide NESHAP or Rad-NESHAP.

generated, with an additional dual HEPA filtration system on the main building exhaust stack. With these controls in place, the actual off-site dose from TLW operations is anticipated to be less than 0.000005 millirem per year.

The level of potential uncontrolled emissions requires that the facility be equipped with continuous monitoring of emissions using sampling systems that meet ANSI/HPS N13.1-1999 requirements. In addition to emissions monitoring at the source, the Radionuclide NESHAP compliance team at LANL also integrates data from an extensive network of ambient air monitoring stations around the Laboratory and at public receptor locations in the White Rock and Los Alamos town sites. Emissions from this new source and from ambient air measurement stations around the Laboratory will be reported in the annual Radionuclide Air Emissions Report each year.

If you have questions or comments, please contact David Fuehne of LANL's Environmental Compliance Programs Group or Adrienne Nash of NA-LA. Mr. Fuehne can be reached by email at davef@lanl.gov or by phone at 505-699-5619; Ms. Nash can be reached by email at adrienne.nash@nnsa.doe.gov or by phone at 505-665-5026.

Sincerely,

Kristen Ann Honig — Digitally signed by Kristen Ann Honig, Date: 2021.10.25 21:22:47 -06'00'
for

Jennifer Payne
Division Leader
Environmental Protection and Compliance
Triad National Security, LLC

Sincerely,

Darlene S. Rodriguez — Digitally signed by Darlene S. Rodriguez, Date: 2021.11.02 14:19:36 -06'00'

Darlene S. Rodriguez
Assistant Manager for Mission Assurance & Infrastructure
National Nuclear Security Administration
U.S. Department of Energy

Attachment(s): Attachment 1 - Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for Radiological Liquid Waste Treatment Facility – Transuranic Liquid Waste Streams (RLWTF-TLW); LA-UR-21-30051

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Attachment 1

Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for Radiological Liquid Waste Treatment Facility – Transuranic Liquid Waste Streams (RLWTF-TLW)

EPC-DO: 21-259

LA-UR-21-30051

Date: NOV 0 2 2021

Application for Pre-Construction Approval
under 40 CFR 61 Subparts A and H

for Radioactive Liquid Waste Treatment Facility for
Transuranic Liquid Waste Streams (RLWTF-TLW)

Los Alamos National Laboratory
Radionuclide NESHAP Compliance Program

1. Name & Address

Los Alamos Field Office (NA-LA)
U.S. Department of Energy
National Nuclear Security Administration
Technical Area (TA) 3, Building 1410
3747 West Jemez Road
Los Alamos, NM 87545

2. Location of Source

Los Alamos National Laboratory (LANL)
Technical Area 50
Radioactive Liquid Waste Treatment Facility for Transuranic Liquid Waste (RLWTF-TLW)
Los Alamos, NM 87545

3. Technical Information

a. Nature of the project

The existing RLWTF is more than 50 years old and is nearing the end of its functional and operational life. The facility is experiencing an accelerating rate of equipment and facility failures that are threatening the availability of this system to support critical missions. The Radioactive Liquid Waste Treatment Facility Upgrade Project (RLWTF-UP) will relocate, upgrade, and consolidate existing treatment capabilities that are currently housed in the existing RLWTF at LANL Technical Area (TA) 50, Building 1. The proposed replacement of the existing RLWTF is being designed and constructed as two separate subprojects. The first subproject addressed the Low-level Liquid Waste (LLW) activities and included the LLW Treatment Building, a Utility Building, a Drum Storage Area Pad, and Effluent Storage Tank(s) (addressed in LA-UR-14-27898, with the facility start-up date to be determined). The second subproject (and focus of this Application) is the Transuranic Liquid Waste (TLW) facility, which will primarily address radioactive liquid waste generated from LANL's plutonium facility at TA-55. This subproject includes the Transuranic Liquid Waste Facility itself as well as the ancillary structures required to successfully integrate this facility into the existing infrastructure (e.g. roads, transport piping, etc.).

The new RLWTF-TLW facility is comprised of rooms and equipment to meet the following three primary functions:

1. TLW influent storage;
2. TLW main treatment; and
3. TRU secondary waste treatment and packaging.

The influent storage function will take place within the TLW Facility in the Influent Storage Area. The TLW facility will have the capability to receive and store both TRU caustic waste and TRU acid waste from LANL operations.

The main treatment function is the ability to remove transuranic (TRU) material from the liquid waste and to condense it into solid waste. The TLW Facility will accomplish this by using a TRU Neutralization System, a TRU Reaction/Precipitation System, and a TRU Media Filtration System. Once the TRU waste is removed from the liquid waste, the liquid waste will continue on to the LLW facility for further treatment.

The TRU secondary waste treatment and packaging function will take place in the Drum Preparation Area within the TLW Facility. The purpose of this function is to collect and concentrate TRU solids from the main TLW treatment process and package them for disposal. This is done through drum preparation, the Solids Collection and Concentration System, the Evaporation System, and the TRU Drum Loading System.

Groundbreaking for the TLW subproject is scheduled to begin in February of 2022. Actual waste processing operations in the new RLWTF-TLW facility are predicted to begin in 2024 or later. Normal notification of planned startup and actual startup will take place as required in 40 CFR 61.09.

b. Description of proposed facility

The RLWTF-TLW facility, TA-50 Building 269, will be located on the south central side of TA-50 and will have a service level and a process level. The TLW facility will consist of an influent storage area, a chemical storage area, a main process area, and a drum preparation area as well as several other rooms to support the functions of the facility. In addition, the TLW facility will have one monitored stack into which the four main areas as well as drum hoods and tanks will vent into after passing through process HEPA filters as well as a two-stage HEPA filter system. This stack will be monitored for emissions of airborne radionuclides.

Attachment A contains site maps, showing the locations of LANL in general and TA-50 and the new RLWTF-TLW facility in particular relative to the old RLWTF building (TA-50-1) and the RLWTF-LLW building (TA-50-230).

c. Size of operation/facility

TA-50 sits on Mesita del Buey in Los Alamos County, a mesa top situated between Cañada del Buey to the north and Pajarito Canyon to the south. The new RLWTF-TLW facility will replace the existing, outdated treatment facility and is designed to treat 29 thousand liters of transuranic liquid waste per year (about 7700 gallons/year) in approximately 400 gallon batches of either acid or caustic TRU liquid waste.

Attachment B shows the proposed process flow diagram for the new RLWTF-TLW facility. A schematic showing exhaust air flow and locations of HEPA filters is also shown in Attachment B. All illustrations are based on the 100% design submittal; minor changes may occur prior to construction but no major changes that would affect radionuclide emissions or off-site doses would be made without EPA notification.

Emissions sources at TA-50 are tracked in the LANL Radioactive Materials Usage Survey (RMUS) conducted by EPC-CP, and/or are monitored for radionuclide air emissions per the Rad-NESHAP Compliance Program, Program Implementation Plan[1].

d. Methods of operation

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

The new RLWTF-TLW facility is comprised of rooms and equipment to meet the following three primary functions:

1. TLW influent storage;
2. TLW main treatment; and
3. TRU secondary waste treatment and packaging.

(1) <u>Transuranic Liquid Waste Influent Storage</u>

The TLW facility will have an Influent Storage Area. Within this room, there will be three storage tanks: one to receive TA-55 acid TRU waste, one to receive TA-55 caustic TRU waste, and a contingency storage tank to be used as needed. Each of these tanks has a 2,017 gallon total capacity, with a working capacity of 1,777 gallons, and is equipped with its own HEPA filter. Each of these tanks then vents directly into the monitored stack ducting prior to the two-stage HEPA filter system.

(2) <u>Transuranic Liquid Waste Main Treatment</u>

The main treatment function is the ability to remove TRU from the liquid waste and to condense it into solid waste. The TLW Facility will accomplish this by using the following subsystems:

- TRU Neutralization System,
- TRU Reaction/Precipitation System, and
- TRU Media Filtration System.

Once the TRU waste is removed from the liquid waste, the liquid waste will continue on through the evaporation system before it is transferred to LLW for further treatment.

[1] EPC-CP-PIP-0101, Rad-NESHAP Compliance Program, Program Implementation Program (PIP), September 2019. This document and associated procedures describe LANL's approach for compliance with 40 CFR 61 Subpart H.

TRU Neutralization System neutralizes the acid or caustic TRU waste, depending on the waste stream being processed, using the appropriate chemicals in the Flocculation Tank. The purpose of this system is to adjust the pH of the liquid waste before processing.

TRU Reaction/Precipitation System removes radionuclides and other metal contaminants from the TLW influent by adjusting pH and adding ferric sulfate to co-precipitate radionuclide and metal contaminants. This is done in the Flocculation Tank. When the solids content of the Flocculation Tank reaches a predetermined threshold (as determined by visual observation via the installed sight glass), the waste is diverted to the Sludge Treatment Tank, which is part of the TRU Secondary Waste Treatment and Packaging system. The liquid content continues into the TRU Media Filtration System starting in the Filter Feed Tank.

TRU Media Filtration System removes precipitated solids (which may contain radionuclides and other contaminates) from the liquid waste in the Filter Feed Tank discharge stream. This is done by passing the liquid stream through the media filter. The filtered liquid waste is then fed into the Dryer Feed Tank which directs the liquid waste into the Dryer Package. The Dryer Package consists of a Hot Glycol System and a chiller that further separates the dissolved solid constituents from the liquid. The solid waste from this process becomes part of the TRU Secondary Waste Treatment and Packaging system while the liquid waste moves into the Effluent Sampling Tank, where the effluent will proceed into the LLW collection system only if it meets the associated Waste Acceptance Criteria (WAC[2]) for the LLW facility.

(3) Transuranic Secondary Waste Treatment and Packaging

The TLW secondary waste treatment and packaging function is to collect and concentrate solids from the main TLW treatment process, to package concentrated solids for disposal, and to dewater and package dewatered liquid waste for disposal. This function is met by the following four systems:

1. Drum Preparation,
2. Solids Collection and Concentration System,
3. Evaporation System, and
4. TRU Drum Loading System.

Drum Preparation consists of preparing 55 gallon drums with dry cement and zeolite. These prepared drums can then be used in the TRU Drum Loading System described below. The purpose of the cement and zeolite is to solidify the remaining liquid in the TRU waste to be packaged before shipping for offsite disposal. An additional 2.5 gallons of 40% by weight sodium silicate solution is added to the drum before any sludge is added. After the sludge is loaded and the waste has cured (described below), more zeolite may be added as a contingency.

[2] PA-AP-01039, R1, Waste Acceptance Criteria for Transuranic RLW, January 28, 2016. This procedure establishes criteria for transuranic radioactive liquid waste (RLW) that will be sent to the TA50 RLWTF.

Solids Collection and Concentration System consists of the Sludge Treatment Tank and the Sludge Metering Tank. Sludge is allowed to settle in the Sludge Treatment Tank. Supernatant liquid is decanted from the tank and transferred to the Filter Feed Tank. When enough sludge has accumulated in the Sludge Treatment Tank to perform a drumming campaign, the remaining decant liquid is sampled and pumped to the Filter Feed Tank. The settled sludge is then fed into the Sludge Metering Tank in 22 gallon batches. These batches are fed into the Drum Tumbler where they are packaged for offsite disposal.

Evaporation System is used to achieve nitrate reduction and consists of a Dryer Package made up of a Hot Glycol System and a Chiller. The Hot Glycol System evaporates the liquid from the Media Filtration System into the Chiller. Solutions remaining from this process are packaged into drums for offsite disposal. The liquid from the chiller is condensed and fed into the Effluent Sampling Tank.

TRU Drum Loading System consists of a Drum Tumbler where drums are packaged for offsite disposal. Solid waste processed through the Sludge Metering Tank is put into a 55 gallon drum, prepared as described above. That drum is then put through the drum tumbler which allows the sludge to fully mix with the cement and the zeolite within the drum. The mixed drum is then put into short-term storage to solidify. Once the contents of the drum have solidified, it is ready for offsite disposal. The solid waste that comes from the Dryer Package is packed into drums in the Drum Tumbler as well for offsite disposal.

e. Emissions controls equipment

All process equipment with potential to emit radioactive constituents to the atmosphere under normal operations will have at least one stage of HEPA filtration on the exhaust air stream. Specifically, the drum hoods in the Process Area each have a HEPA filter in-line with their exhaust as well as all of the tanks. In addition, the entire air stream that is being exhausted through the monitored stack will pass through a two-stage HEPA filtration system before being sampled and exhausted through the stack.

The in-line process HEPA filtration units will be managed according to the facility's established maintenance protocols and periodically replaced. However, since the in-line process filters are not routinely tested in-place for particulate penetration and removal, LANL is **not** taking credit for these process filters in the following emissions calculations. Only the stack HEPA filters are routinely tested and credit is taken for these filters in emissions calculations.

The exhaust stream will be directed into a monitored exhaust stack as indicated in Attachment B. Attachment B shows all air flow paths that are exhausted through the monitored stack.

f. Emissions monitoring equipment

The stack monitoring equipment will meet all requirements of 40 CFR 61 Subpart H. Installed monitoring equipment will be certified to meet design and sampling location criteria in ANSI/HPS N13.1-1999. A sample of the exhaust air stream will be extracted continuously using a shrouded probe as described in the ANSI standard. The sample location will be certified under ANSI/HPS N13.1-1999. Current plans are to monitor the stack only for particulate radioactive material; tritium and other gas- or vapor-phase nuclides do not make up a significant fraction of the potential dose from the TLW facility.

4. Emissions Calculations and Off-Site Dose Summary

a. Uncontrolled emission estimates and monitoring requirements

Calculations to determine the potential uncontrolled emissions from the new RLWTF-TLW facility are based on the following factors:

- Design water volume throughput of approximately 29 thousand liters per year (2.9E+04 L/year), split as 1.52E+04 L/year of acid wastes and 1.37E+04 L/year of caustic wastes;
- Worst-case concentrations of radioactive constituents, based on the 2016 Waste Acceptance Criteria (WAC) limits, the maximum concentration by sum of radionuclides as shown in Table 1 below;

Table 1.
2016 WAC Maximum Concentrations

Sum of Radionuclides (modeled as)	Acid Wastes WAC (Ci/L)	Caustic Wastes WAC (Ci/L)
Alpha (Pu-239)	1.00E-04	3.00E-02
Beta (Sr-90)	2.00E-05	7.50E-04
Gamma (Cs-137)	6.00E-06	2.70E-04
Tritium (H-3)	2.00E-07	2.00E-07

- o The radioactive material throughput is calculated by multiplying the design volume for each waste stream by the WAC levels for each waste stream. For example, Pu-239 acid waste amounts are:
  1.52E+04 L/year * 1.0E-04 Ci/L = 1.52 Ci/year Pu-239 acid throughput.
- o See Table 2 below for the worst-case calculated total throughput.

Table 2.
Calculated Total Throughput

Sum of Radionuclides (modeled as)	Acid Wastes (Ci/yr)	Caustic Wastes (Ci/yr)
Alpha (Pu-239)	1.52E+00	4.11E+02
Beta (Sr-90)	3.04E-01	1.03E+01
Gamma (Cs-137)	9.12E-02	3.70E+00
Tritium (H-3)	3.04E-03	2.74E-03

- The air emissions from this radioactive material throughput are calculated using 40 CFR 61 Appendix D methodology, as follows:
  - Pu-239/Sr-90/Cs-137: particulate/liquid release fraction of 1.0E-3
    (e.g. Pu-239 acid waste below)
    1.52 Ci/year throughput * 1E-03 = 1.52E-03 Ci/year air emissions Pu-239 acid waste
  - H-3: assume gaseous release fraction of 1.0 (100%) per LANL policy
    (e.g. H-3 acid waste below)
    3.04E-03 Ci/year throughput * 1.0 = 3.04E-03 Ci/year air emissions H-3 acid waste
  - See Table 3 below for the worst-case calculated air emissions.

Table 3.
Calculated Total Air Emissions

Sum of Radionuclides (modeled as)	**Acid Wastes (Ci/yr)**	**Caustic Wastes (Ci/yr)**
Alpha (Pu-239)	1.52E-03	4.11E-01
Beta (Sr-90)	3.04E-04	1.03E-02
Gamma (Cs-137)	9.12E-05	3.70E-03
Tritium (H-3)	3.04E-03	2.74E-03

  - Total air emissions = sum of acid and caustic wastes = 4.33E-01 Ci

Attachment D shows the year-by-year breakdown of historical throughput from the existing RLWTF, which includes both LLW and TRU liquid waste processing. In contrast, the calculations above are just for the TLW processing and assume the maximum source term as described above.

Off-site dose impacts are calculated using CAP88-PC Version 4.1, the latest EPA-approved analysis code at the time calculations were completed. CAP88 was used to generate a “millirem per curie” factor for a unit release (1.0 Ci) each of Pu-239, Sr-90, Cs-137, and tritium; this allows scaling of emissions and straightforward analysis of a variety of emissions scenarios. Table 4 contains the analysis and results of emissions and dose calculations. Input parameters for CAP88 and other calculation descriptions are contained in Attachment D.

The resulting off-site dose of 19.3 mrem/year meets the Subpart H threshold for continuous monitoring (0.10 mrem/year). Therefore, **continuous monitoring of airborne radionuclide emissions from the building exhaust stack is required**.

Table 4.
Annual Radioactive Materials Usage and Dose Summary
Uncontrolled Emissions

Radionuclide	Annual Usage (Ci/year)	Release Fraction	Emissions Source Term (Ci/year)	Dose Factor from CAP88 Model Run* (mrem/Ci)	Off-Site PEDE** (mrem/year)
Alpha (Pu-239) Acids	1.52E+00	0.001	1.52E-03	4.67E+01	7.10E-02
Beta (Sr-90) Acids	3.04E-01	0.001	3.04E-04	3.27E+00	9.94E-04
Gamma (Cs-137) Acids	9.12E-02	0.001	9.12E-05	2.39E+00	2.18E-04
Tritium (H-3) Acids	3.04E-03	1.0	3.04E-03	2.30E-04	6.99E-07
Alpha (Pu-239) Caustics	4.11E+02	0.001	4.11E-01	4.67E+01	1.92E+01
Beta (Sr-90) Caustics	1.03E+01	0.001	1.03E-02	3.27E+00	3.36E-02
Gamma (Cs-137) Caustics	3.70E+00	0.001	3.70E-03	2.39E+00	8.84E-03
Tritium (H-3) Caustics	2.74E-03	1.0	2.74E-03	2.30E-04	6.30E-07
Total annual off-site potential dose from uncontrolled emissions					19.3 mrem

*CAP-88 Model run with emission source term of 1.0 Ci/year; see Appendix D for details.
** Off-site PEDE is calculated by multiplying emission source term by CAP88 dose factor.

The stack effluent will be sampled for radioactive constituents according to ANSI/HPS N13.1-1999. All radionuclides that may 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 included in the monitored stack for the RLWTF-TLW facility; 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 LANL policy, the source will undergo biennial evaluation of monitoring requirements to verify the ongoing need to measure emissions of specific radionuclides.

Note that at the present time, tritium is **not** a radionuclide of concern (less than 10% of the potential effective dose equivalent, PEDE) and therefore the stack will not be monitored for emissions of tritium. If elevated levels of tritium are noted by facility operations, we will administratively include potential tritium emissions with the annual source term. If tritium is an ongoing issue, the stack sampling system will be modified to include tritium monitoring.

b. Controlled emissions estimates

Section (a) above and Table 4 are the analyses of *potential* emissions, without taking credit for any HEPA filters or other emissions controls. Per EPA methods in 40 CFR 61 Appendix D, the "controlled" emissions from HEPA filtered effluent streams will have an emissions reduction factor of 0.01 applied to the PEDE calculation. This is shown in

Table 5. Note that tritium emission are not affected by HEPA filtration, but the off-site dose from these emissions are insignificant relative to other sources in Table 4 and will not change the controlled emissions dose in Table 5.

Table 5.
Annual Dose Summary
Controlled Emissions

Total PEDE from Table 4	HEPA filter control factor	Controlled Emissions Off-Site Dose** (mrem/year)
19.3 millirem	0.01	0.193 millirem/year

** Controlled emissions off-site dose is calculated by multiplying the total PEDE from uncontrolled emissions by the HEPA filter control factor.

The controlled dose calculation is the driver for determining whether or not a source requires pre-construction notification and approval (this memo). Since the RLWTF-TLW facility controlled emissions dose exceeds 0.1 millirem per year, pre-construction approval is required for this new facility.

c. Estimate of actual anticipated emissions

The calculation in Section 4(a) above, as summarized in Table 4, analyzes the worst-case design basis scenario for operational throughput. These calculations use the maximum water volume anticipated by the facility and assume that each liter of water contains the maximum allowable radioactive material concentrations. This represents the upper bound on emissions that could come from the facility and establishes the operational envelope for the facility. However, it is informative to describe the level of emissions that is realistically anticipated from the transuranic liquid waste treatment facility.

The TLW stack is equipped with a two-stage HEPA filter that will be tested and certified by LANL's Industrial Hygiene & Safety program. Each stage will be certified to 99.95% particulate removal, corresponding to penetration factor of 0.0005. Two stages of HEPA filtration have a resulting penetration of 2.5E-7. Table 6 shows the off-site dose from anticipated actual emissions, still using the worst-case volume and radionuclide concentrations.

Table 6.
Annual Dose Summary
Actual Anticipated Emissions

Total PEDE from Table 4	Actual HEPA Penetration Factor	Controlled Emissions Off-Site Dose** (mrem/year)
19.3 millirem	0.00000025	0.000005 millirem/year

** Controlled emissions off-site dose is calculated by multiplying the total PEDE from uncontrolled emissions by the actual HEPA penetration factor.

5. Calculation Assumptions

a. Operations with potential emissions

Numerous individual operations have potential for radiological air releases. These operations include storage tanks, reaction tanks, filtration vessels, and drum loading operations. However, because we based our source term on releases of the entire annual throughput of liquid, at the maximum acceptable radiological concentrations, for this analysis the entire facility is treated as one process. This assumption of a single "opportunity for release" was discussed with and agreed upon by EPA Region 6 in August 2014. Any potential diffuse releases will be monitored by the EPA-approved LANL ambient air monitoring network.

b. Source term estimates

The source term in Section 4(a) and Table 4 was estimated using the maximum annual throughput for the time period, based on any consecutive 12-month period. Maximum planned design capacity of the system, and maximum concentrations of radiological constituents allowed in the liquid waste, per the Waste Acceptance Criteria (WAC) document for the RLWTF facility were assumed. Water is sampled in holding tanks before the RLWTF; any water in excess of the allowable WAC concentrations will not be allowed to enter the facility process lines.

c. Dose assessment estimates

Procedure EPC-ES-TP-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. CAP88-PC version 4.1 was used to calculate these values.

Dose assessment procedures are available upon request from the Electronic Document and Records Management System (EDRMS). Directions to access these documents via EDRMS are available on the internal web.

https://int.lanl.gov/org/ddops/aldeshqss/environmental-waste-programs/plans-procedures/all.shtml

General Quality Assurance (QA) documents are also available on EDRMS. For access outside the LANL firewall, please use the contact information in Section 6, below.

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.

Radioactive Air Emissions Management Team Leader: David Fuehne
505-699-5619
davef@lanl.gov

ATTACHMENT A
Site Maps

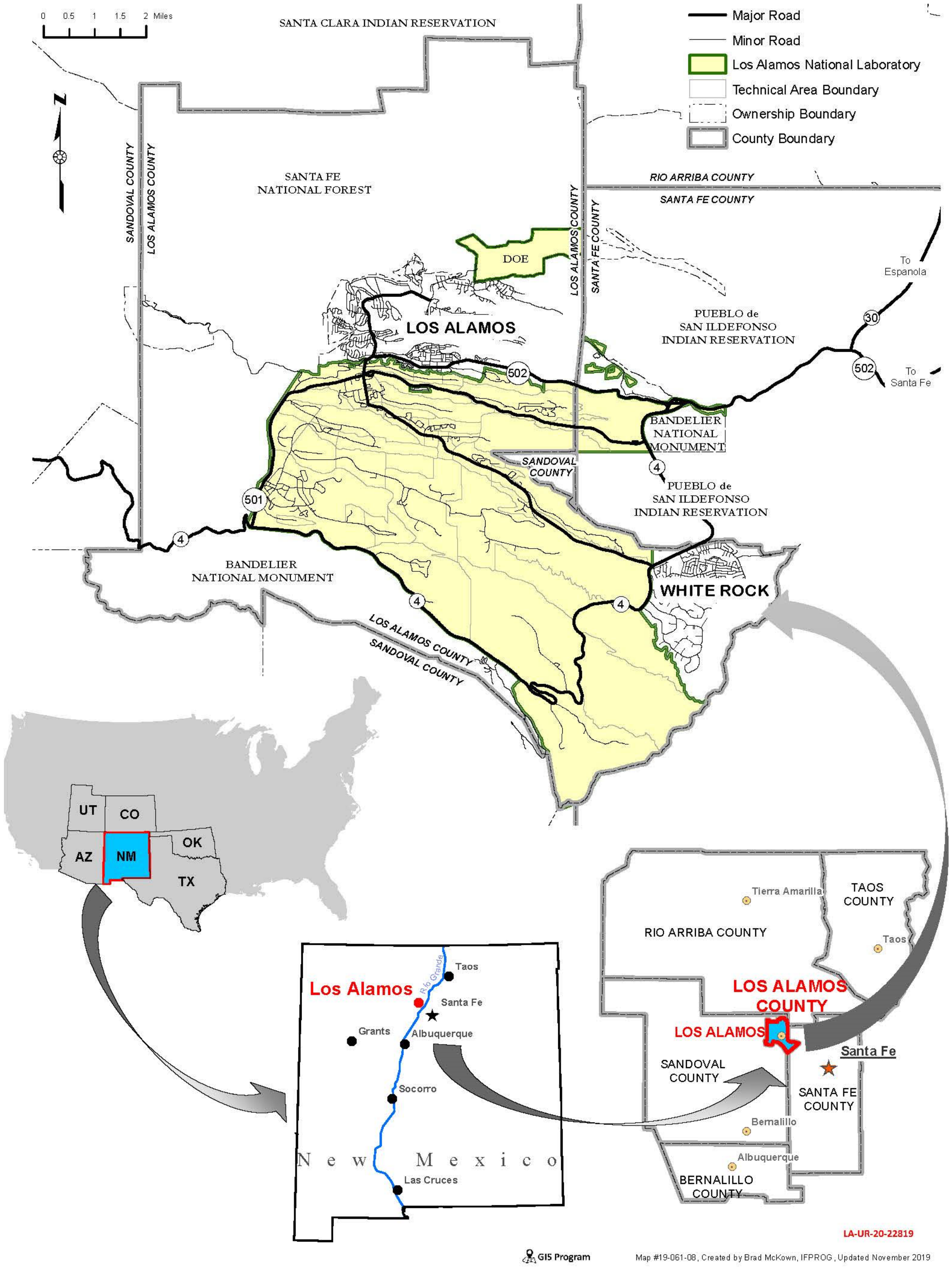


Figure 1.
Map of Los Alamos National Laboratory (LANL) on a national, state, regional, and county scale.

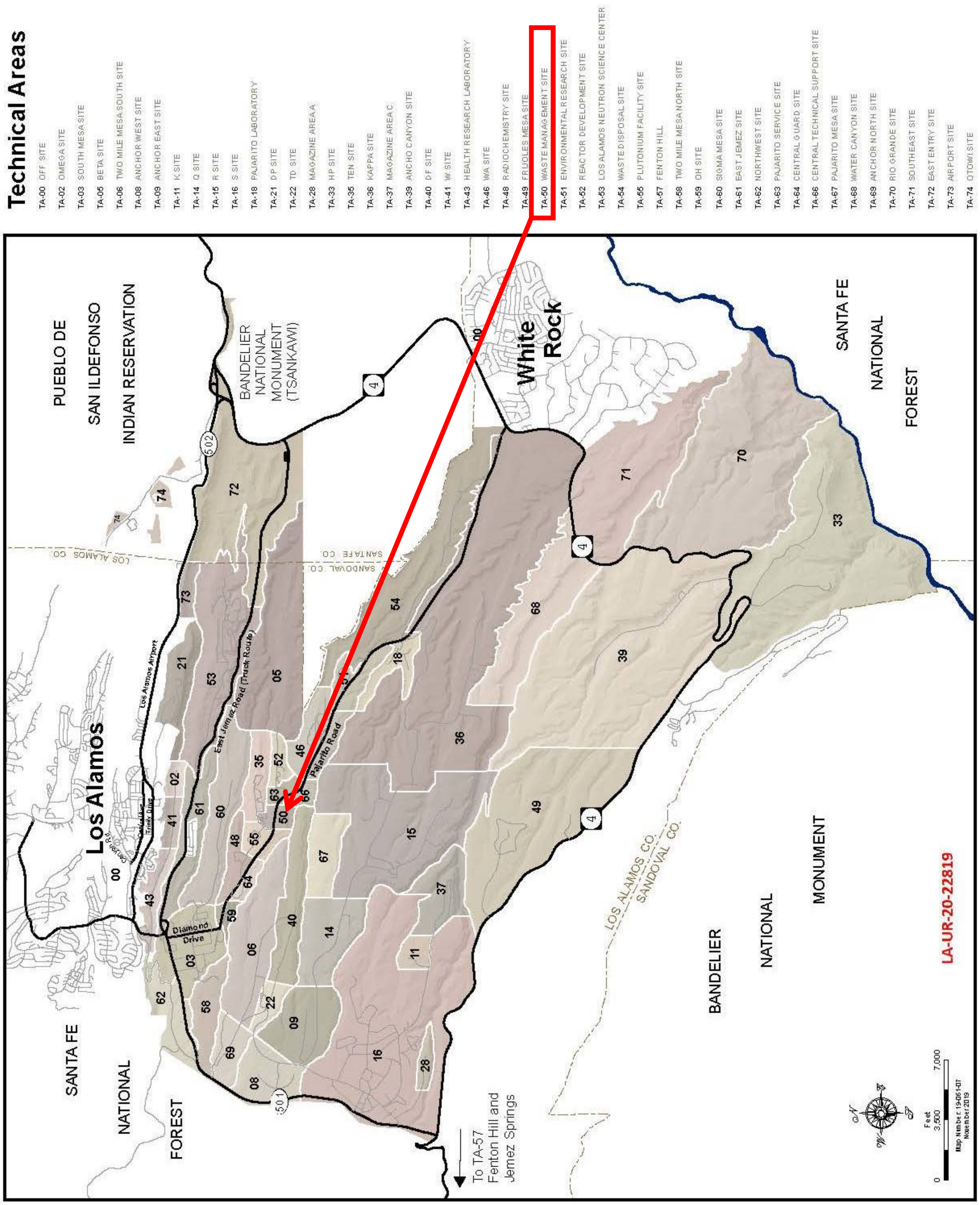


Figure 2.
Map of Los Alamos National Laboratory and TA-50.

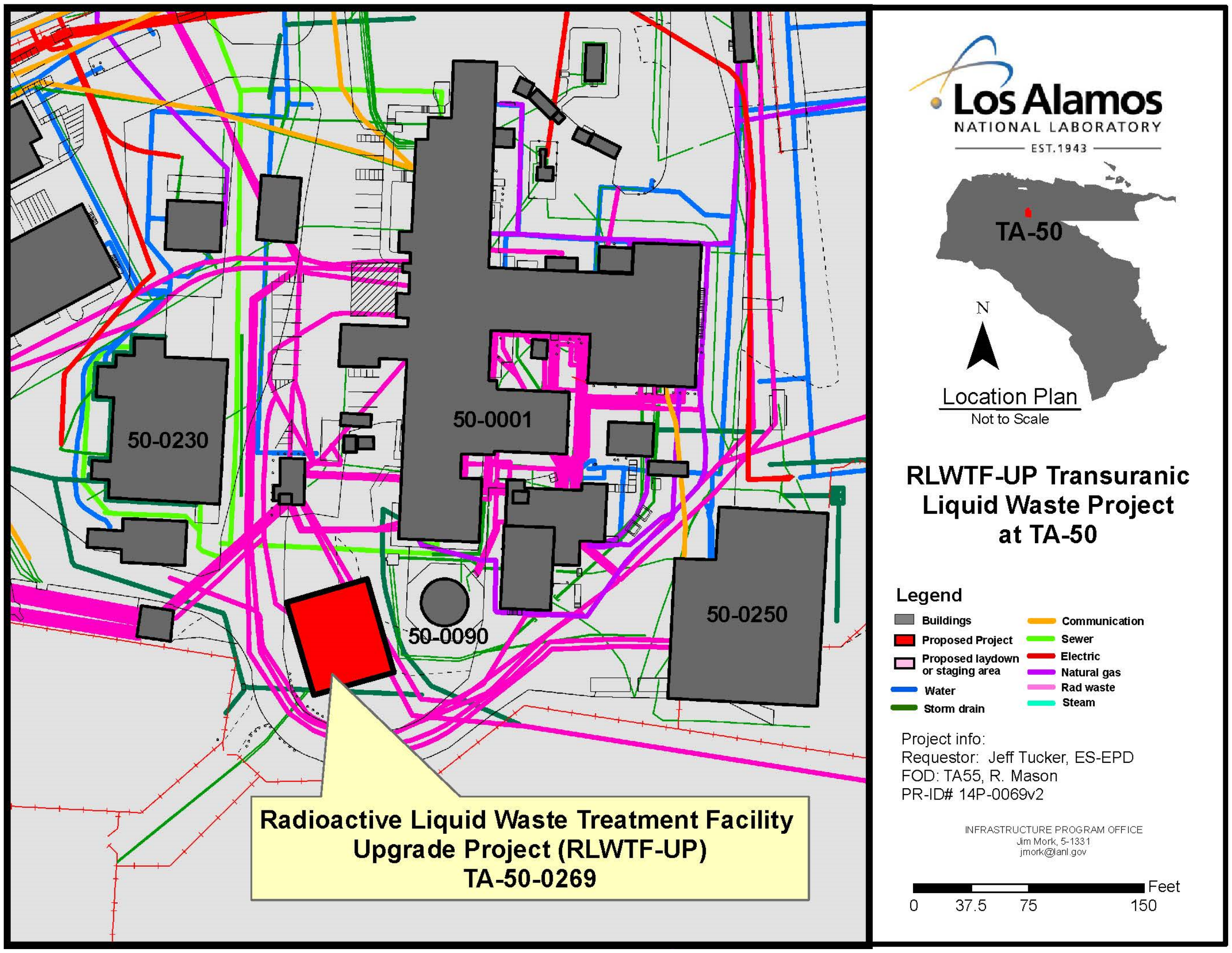
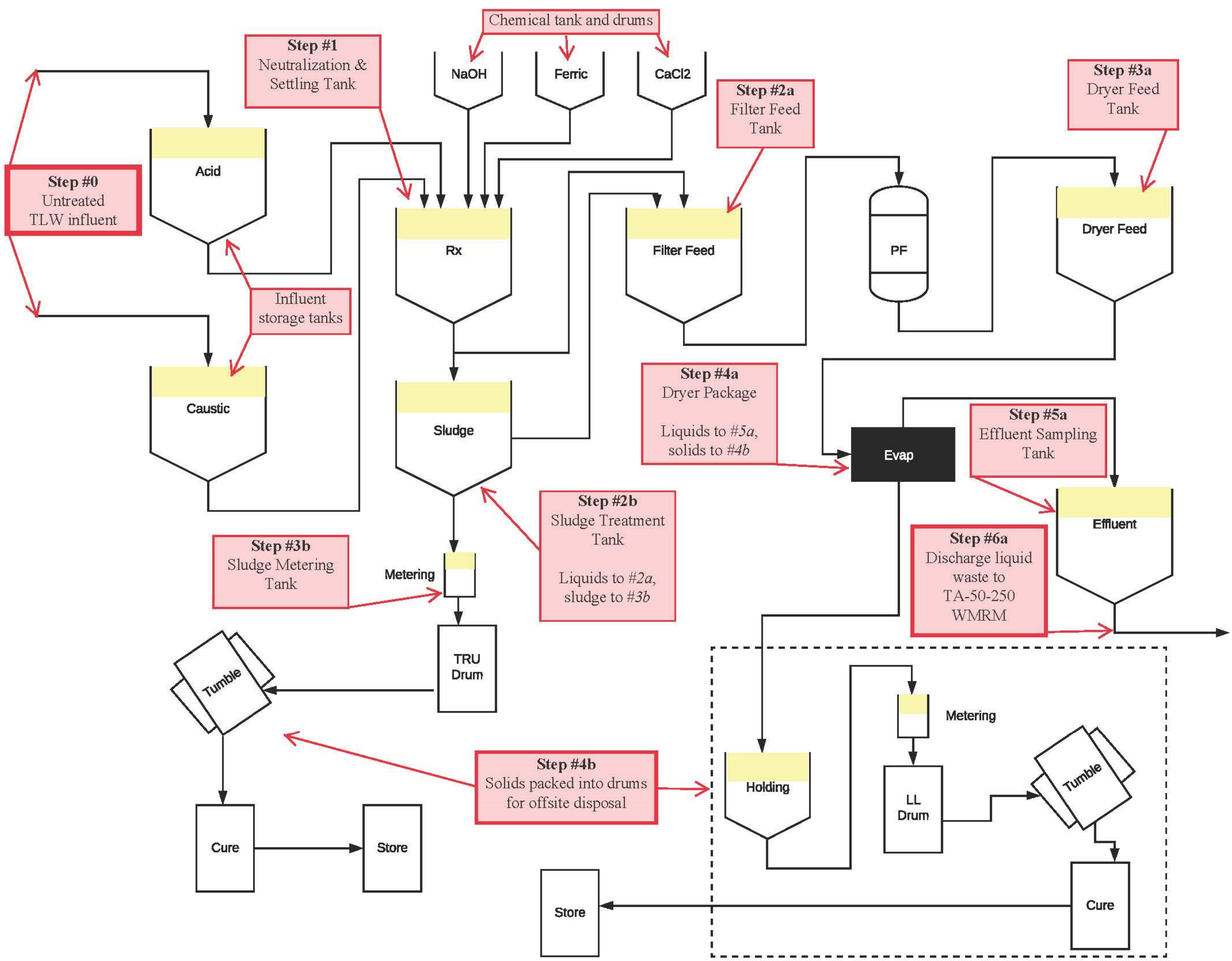


Figure 3.
Site Plan for New RLWTF-TLW Facility at LANL TA-50
North of Pajarito Road

ATTACHMENT B

RLWTF-TLW Process Flow for Transuranic Liquid Waste; within TA-50 Building 0269, TLW

- Excerpt from Sheet D-6000 of 100% RLWTF-TLW-UP Design Package.
- Yellow highlights indicate tanks & process units which are vented through HEPA filters into the monitored vent system.
- "a" steps follow primary waste material while "b" steps follow secondary waste material.
- Process room air is exhausted through the monitored stack; see Air Flow diagram on 2nd page this attachment.

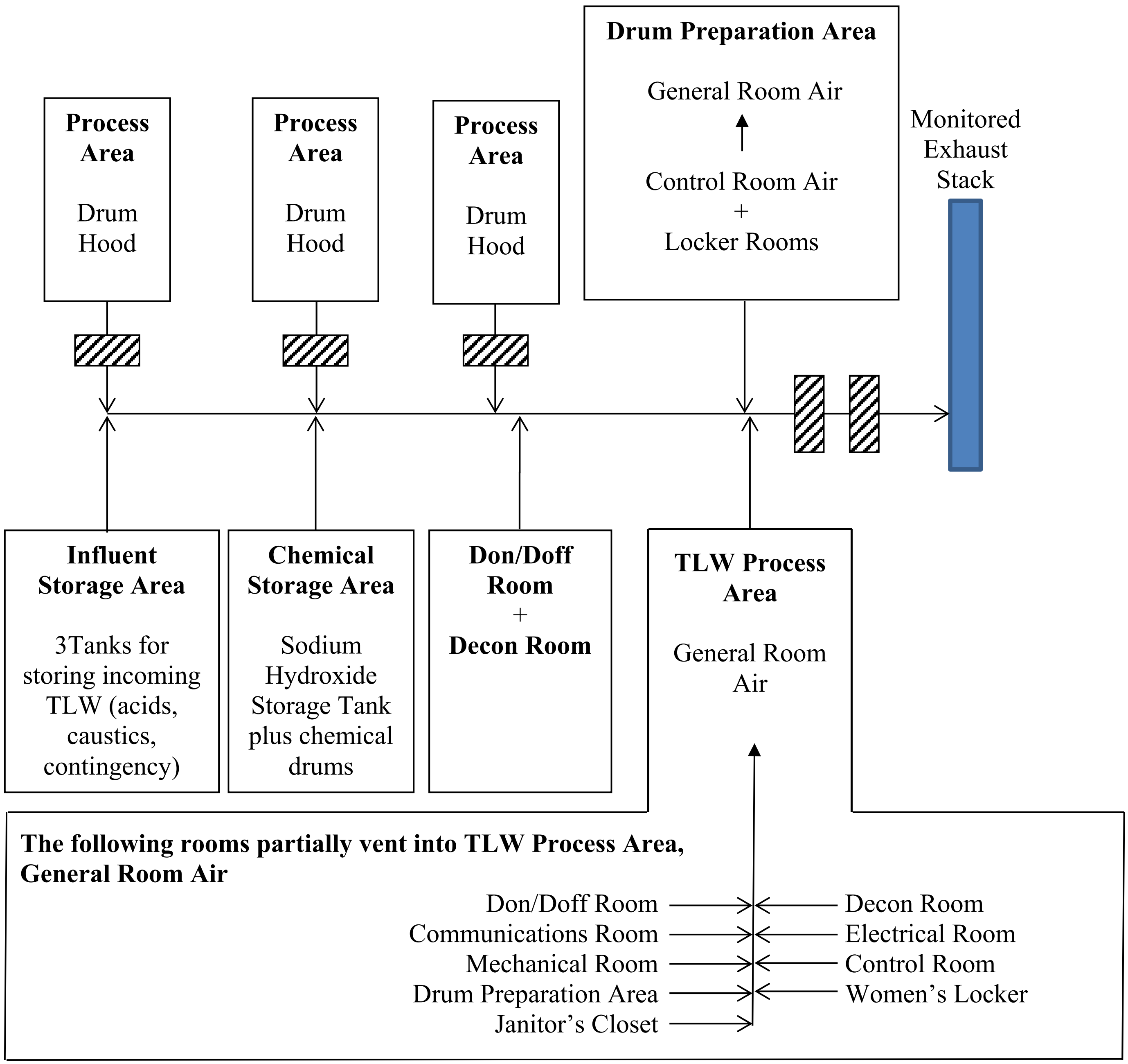


ATTACHMENT B, continued

Exhaust Air Flow for TA-50 Building 269, TLW Process Building (Per 100% Design Package)

Air from the TLW Process Area, Drum Preparation Area, Influent Storage Area, Chemical Storage Area, Don/Doff Room, and Decon Room are exhausted through the monitored stack.

Notes:
HEPA Filter installed in exhaust duct =



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
CEDE	Controlled Effective Dose Equivalent
EDRMS	Electronic Document and Records Management System
EPC-CP	Environmental Protection & Compliance Division-Compliance Programs Group
HEPA	High-Efficiency Particulate Air Filters. Standard emissions control systems, used to remove particulate radioactive material from exhaust air streams.
HVAC	Heating, Ventilation, Air Conditioner System
LANL	Los Alamos National Laboratory
LLW	Low Level Waste. Radioactive waste meeting specific criteria established by the Department of Energy
PEDE	Potential Effective Dose Equivalent
QA	Quality Assurance
RMUS	Radioactive Material Usage Survey
RLWTF	Radioactive Liquid Waste Treatment Facility
RLWTF-UP	Radioactive Liquid Waste Treatment Facility Upgrade Project
TA	Technical Area
TLW	Transuranic Liquid Waste
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.
WAC	Waste Acceptance Criteria
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.

WMRM	Waste Mitigation and Risk Management facility
ZLD	Zero Liquid Discharge Project

ATTACHMENT D
Supporting Documentation for Dose Calculations

CAP88 Input Parameters
Explanatory Notes

TA-50 New RLWTF-TLW Facility

Distance to critical receptor	1225 meters to the North (N)
Wind file used	TA-6 Meteorological Tower Years 2016 through 2020
Annual precipitation	45 cm per year
Average ambient temperature	9 degrees Celsius
Mixing height	1600 meters
Humidity	5.5 grams per cubic meter
Exhaust point diameter	0.51 meters*
Source height	8.23 meters*
Plume rise	20.32 m/sec*, momentum
Agricultural data	Local
Other terms	CAP88 default values
Source term input	1.0 curie of Pu-239 (Type M solubility)** 1.0 curie of Sr-90 (Type M solubility) 1.0 curie of Cs-137 (Type F solubility) 1.0 curie of H-3 (vapor phase)
CAP88-derived dose factor	46.7 mrem/Ci of Pu-239 3.27 mrem/Ci of Sr-90 2.39 mrem/Ci of Cs-137 2.30E-04 mrem/Ci of H-3

* Note: Stack height, diameter and exit velocity taken from the 15-002-MCAL-017-R0 Exhaust Stack Analysis Using ASHRAE Methodology calculation generated by FLUOR for the RLWTF-TLW Upgrade project.

** 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 summary 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 Table 4 illustrates 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, and a gaseous release fraction (RF=1.0) for gaseous radionuclides and also used for tritium per LANL Rad-NESHAP policy.

Historical PEDE from the Existing RLWTF*

For reference purposes only, historical potential effective dose equivalents (PEDE) were reviewed and are summarized here. This evaluation of PEDE from the existing RLWTF operations is completed every other year per LANL internal procedures. Note that the PEDE presented here is a result of both LLW and TRU liquid waste treatment operations and is not directly comparable to the PEDE presented in this document for the new RLWTF TLW facility.

Calendar Year (CY)	Operations Description**	Total PEDE* (mrem)
2019	LLW & TRU Liquid Waste Streams	0.002
2017	LLW & TRU Liquid Waste Streams	0.043
2015	LLW & TRU Liquid Waste Streams	0.438
2013	LLW & TRU Liquid Waste Streams	0.032

*Note that the PEDE presented in this table is from historical emissions that include both the RLWTF processing of Low Level Liquid Waste (LLW), and Transuranic Liquid Waste (TLW). Dose evaluation for this emission point is done every other year per LANL internal procedures.

**The proposed facility described in this pre-construction application is only for processing of TLW.