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Title:	Notification of Operational Scope Change for the FTWC Venting Project at Los Alamos National Laboratory (LANL)
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Subject: Notification of Operational Scope Change for the FTWC Venting Project at Los Alamos National Laboratory (LANL)

Dear Mr. Brozwoski:

This letter is intended to provide you an update on the scope of work for the venting of the Flanged Tritium Waste Containers (FTWCs) at Los Alamos National Laboratory (LANL) Technical Area (TA-) 54. This project was described in the Application for Pre-Construction Approval[1] ("the Application") that was approved by EPA Region 6 on May 22, 2019.

As operational planning for this project has been finalized, the scope of work described in the Application has slightly changed. The project has now determined that each FTWC may be vented multiple times, and these venting activities may take place at more than one location. The original application only discussed a single venting operation for each FTWC at a single location, TA-54. However, the radionuclide inventory and expected air releases remain bounded by the values described in the Application.

Overview of Changes

In the approved Application, the described process flow involved venting one FTWC at a time, moving each FTWC out of TA-54 Building 1028 immediately after it was vented. Drums were to be transported for final inventory processing at LANL's tritium facility at TA-16, the Weapons Engineering Tritium Facility (WETF). The order of events has changed slightly, and

[1] LA-UR-18-26283 rev.2, "Application for Pre-Construction Approval under 40 CFR 61 Subparts A and H for Venting of Flanged Tritium Waste Containers (FTWCs) at TA-54." Issued 05-16-2019. Transmitted to EPA Region 6 as part of letter EPC-DO-19-137, 05-17-2019.

we have included the possibility that secondary venting may be required on one or more of the FTWCs.

All four FTWCs will be vented at Building 1028 prior to any of the FTWCs being moved to WETF. This venting process is currently estimated to take at least one workday for each FTWC. At the end of each FTWC venting, the drum will be evacuated to a slight negative pressure (about one-third of an atmosphere).

After all four FTWCs are vented, they will be moved, one at a time, to WETF. Prior to any FTWC being moved, the pressure in each FTWC in Building 1028 must meet certain criteria, indicating that no releases have occurred from FTWC internal components since the last venting. If the FTWC does not meet the established criteria, it will be vented again to ensure all drums have minimal tritium inventory in the headspace gas. Additionally, the pressure of a FTWC is checked at various points during the process of moving it to WETF. If the pressure is observed at any checkpoint to have risen above established pressure levels, the FTWC will be vented again before subsequent moves are made.

Possible Cause of Pressure Increases

In the Application, we discussed only generally how the tritium waste is stored inside each FTWC. The majority of the tritium is adsorbed onto high-surface area material, molecular sieve or "getter beds." Most of this adsorbing material is held inside containers called AL-M1's, which were welded shut at the time of placement within the FTWC. As the tritium inside the AL-M1 decays, the pressure inside these sealed vessels will increase. If the welds on the AL-M1 fail, the vessel may leak tritium into the FTWC headspace.

Additional adsorbing media and tritium contaminated material was placed into bags or into smaller sealed cans called "paint cans" inside the FTWCs. These additional containers may also have leaked tritium into the FTWC headspace.

In our Application, the emissions calculations referred to the "fraction liberated" of tritium to represent the amount of tritium which may have leaked from these inner vessels into the headspace of the FTWC. For this current operation, the first venting of the FTWCs within Building 1028 will address any tritium which has built up in the headspace up to that point. Venting the FTWC will remove this tritium and relieve pressure within the container, and also mitigate the potentially hazardous hydrogen mixture within the FTWC.

However, LANL safety analyses have raised concerns that movement of the FTWC after initial venting – during handling, loading onto the transport vehicle, or transportation – may jostle the inner containers and cause additional leaks from the inner containers. Such leaks may cause another buildup of tritium into the FTWC headspace, replicating the potentially hazardous situation that the venting is intended to alleviate.

Any such new leaks will be measured by a pressure monitoring manifold (PMM) that will be mounted onto each FTWC after the initial venting operation is complete. If operators notice that

pressure is again building up inside the FTWC above established thresholds, the container will go through the venting process again. This secondary venting will take place at whatever point it is discovered; this can be at any of the following locations.

- within Building 1028;
- the parking lot outside of Building 1028,
- on the transport truck at TA-54, prior to departure;
- on the transport truck at TA-16, after arrival;
- at the receiving facility at TA-16, outside WETF

If pressure increases are noted at multiple locations during FTWC movements, a secondary venting action will take place at each location where it is observed that the established pressure criteria are not met.

These secondary venting operations will have a nearly identical setup as the initial venting: the FTWC headspace gas will pass through an AL-M1 tritium adsorber and discharge into a rigid duct line; the rigid duct will allow for mixing and emissions measurements; a blower will provide air flow; and a flex duct connection will capture any tritium that may escape to the ambient air around the FTWC.

Note that these secondary venting operations will occur only if the pressure inside the FTWC increases sufficiently to indicate that an inner container has leaked; secondary venting is not a routine part of the process.

Operational Steps

The current operations flow will be as follows.

1. Activate the ventilation system to provide controlled exhaust and monitored emissions.
2. Operators enter Bldg 1028
3. Move the localized ventilation duct over the FTWC being processed
4. Remove the outer 85-gallon drum lid
5. Attach the vent rig to the FTWC
6. Leak test to ensure a seal between the vent rig and FTWC
7. Connect the vent rig to the exhaust duct
8. Loosen the VCR plug in the FTWC lid, allowing headspace gas into the vent manifold chamber. Observe the headspace gas pressure.
9. Open the vent chamber bleed valve, allowing gas to flow through the control system into the exhaust duct. Current plans call for pressure in the FTWC to be released in small increments, dropping 10 pounds per square inch (psi) at a time.
10. Continue venting until instruments indicate equilibrium has been reached with ambient pressure.
11. Pull a sample of the FTWC headspace gas.
12. Remove the vent manifold
13. Attach the Pressure Monitoring Manifold (PMM) to the FTWC and leak test the system

14. Move to the next FTWC and repeat steps 1-13. Continue until all four FTWCs are vented and equipped with PMMs. The venting of all four FTWCs will take place over multiple days.
15. At this point, all FTWCs have been vented and are still within Building 1028.
16. Pressure is observed on all FTWCs; any rise in pressure will trigger a repeat of the venting process in Steps 1-10, venting through the PMM instead of the original vent rig.
17. One FTWC is selected to prepare for transportation. The FTWC is moved in stages and checked for increasing pressure **at each step**. If pressure rise above established criteria is noted, the FTWC will be vented through the PMM. The different moves are:
    a. The FTWC is moved to the doorway within Building 1028.
    b. The FTWC is moved from Building 1028 to ground level, and secured to a pallet.
    c. The pallet and FTWC are moved to the transport vehicle in the parking lot outside of Building 1028.
    d. A final inspection of the FTWC at Area G is performed on the truck before the truck is closed and secured for transport. The truck drives to WETF. No stops are planned along the route between Area G and WETF. The route is shown in Attachment 1.
    e. At WETF, the truck is opened and the FTWC inspected again while still on the truck.
    f. The FTWC is moved from the truck to the WETF loading dock.
    g. The FTWC is moved from the loading dock into the WETF facility.
18. Return to TA-54 and repeat steps 16-17 for the next selected FTWC.
19. Repeat until all FTWCs have been transported successfully and are inside the WETF facility.

Once the FTWCs are inside LANL's Weapons Engineering Tritium Facility (WETF) at TA-16, they will be managed as other tritium containers in that facility and part of routine operations at WETF. Any emissions from further handling or repackaging will be measured by the WETF monitored stack.

Need for EPA Notification

EPA Region 6 put certain conditions on the May 2019 approval[2] for the Pre-Construction Application. Conditions 3 and 4 of that approval state:

3. Any change in the information of this approved Application, shall be provided in writing to EPA Region 6 within 30 days after the change.
4. Any revision to the plans and specifications of this approved Application, which may affect the radiation emissions to the outside air from the new construction, shall require prior written approval by Region 6 of EPA.

[2] Letter, May 22, 2019, Guy Donaldson, US EPA Region 6, to Peter Maggiore, US DOE Los Alamos Field Office, approving construction.

Since the emissions and off-site dose calculations in our May 2019 Application addressed the entire inventory of tritium in these FTWCs, those estimates remain conservative upper bounds. Tritium that is emitted during secondary venting represents material that was not emitted during the initial venting operations. Emissions estimates in the original Application remain bounding.

Per Condition 3, this notification of scope change is required, representing the plans to change the number of venting locations for this operation. This memo constitutes notification as required under Condition 3.

Since the air emissions estimates in the original approved Application remain applicable and radionuclide emissions will not increase above approved levels, no prior approval of this planned change is needed from EPA Region 6 under Condition 4 above. Also, no changes are needed to the approved emissions measurement system, as that system remains state-of-the-art for the level of source and type of emissions.

Please note that while emissions are bounded by the levels in the approved Application, the off-site dose received by a member of the public can change depending on the location of the venting operation and the meteorological conditions during the venting. To ensure off-site doses stay below authorized limits in 40 CFR 61 Subpart H, the Rad-NESHAP compliance program at LANL has developed an emissions management plan to evaluate the emissions and dose consequence at receptor locations. A copy of this plan is included in Attachment 2.

If you require further information, please contact us as soon as possible. The LANL Point of Contact for these issues is David Fuehne of my staff. David can be reached by email at davef@lanl.gov or by telephone at (505) 699-5619. While no written response by EPA Region 6 is required for this notification, we would appreciate acknowledgement of receipt via electronic mail.

Sincerely,

Taunia Van Valkenburg
Group Leader

TVV/DPF/RRL:jdm

Attachment(s): Attachment 1 Maps of FTWC Transportation Route
Attachment 2 Procedure EPC-CP-QP-0148, *Emissions Management Plan for the FTWC Venting Project*

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Attachment 1

Maps of FTWC Transportation Route LANL

EPC-DO: 20-068

LA-UR-20-22148

Date: MAR 0 5 2020

Enclosure 1 – Maps of FTWC transportation route

Figure 1: map of FTWC transportation route. Orange pins indicate existing ambient air stations.

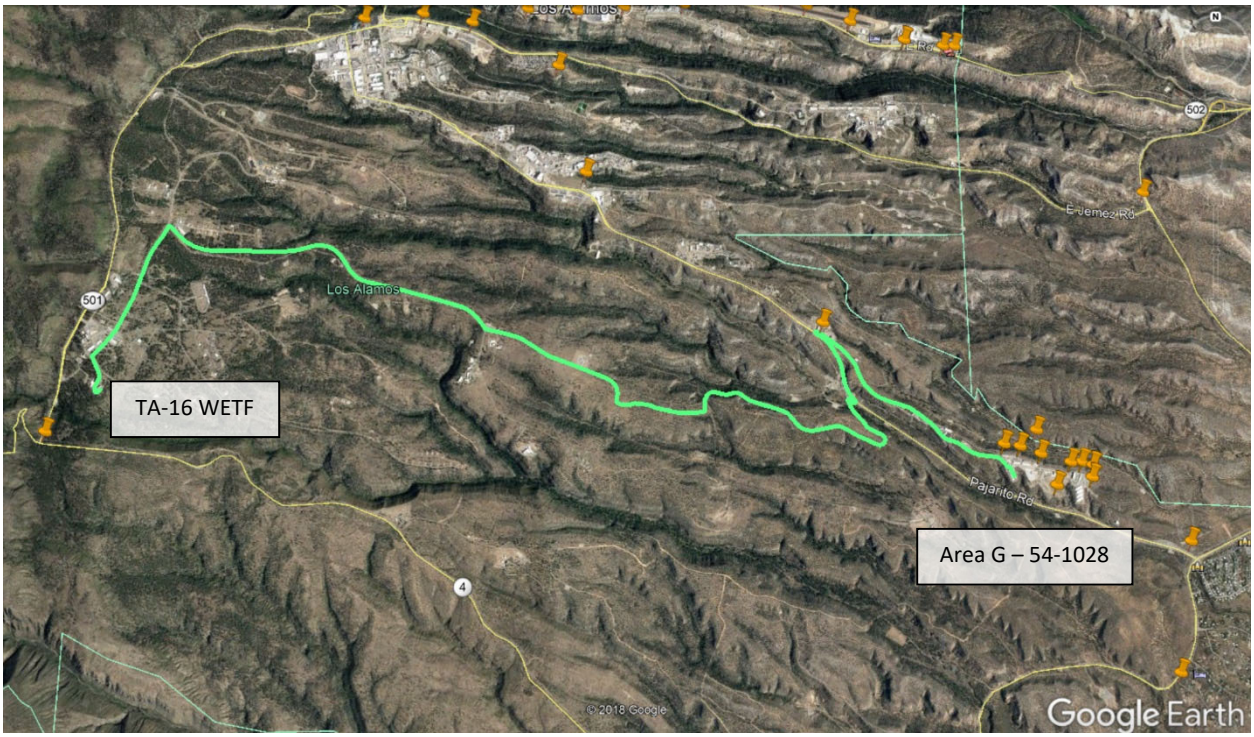


Figure 2: map of the start of the FTWC transportation route. Orange pins indicate existing ambient air stations.

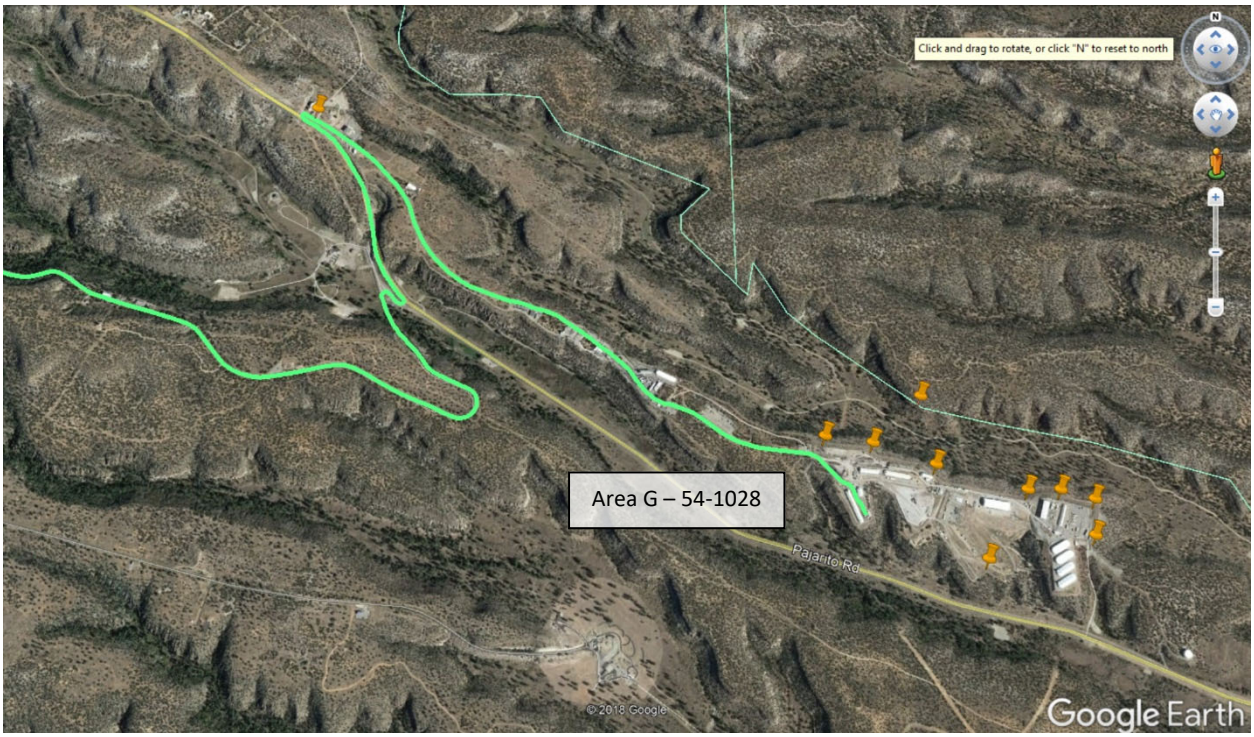
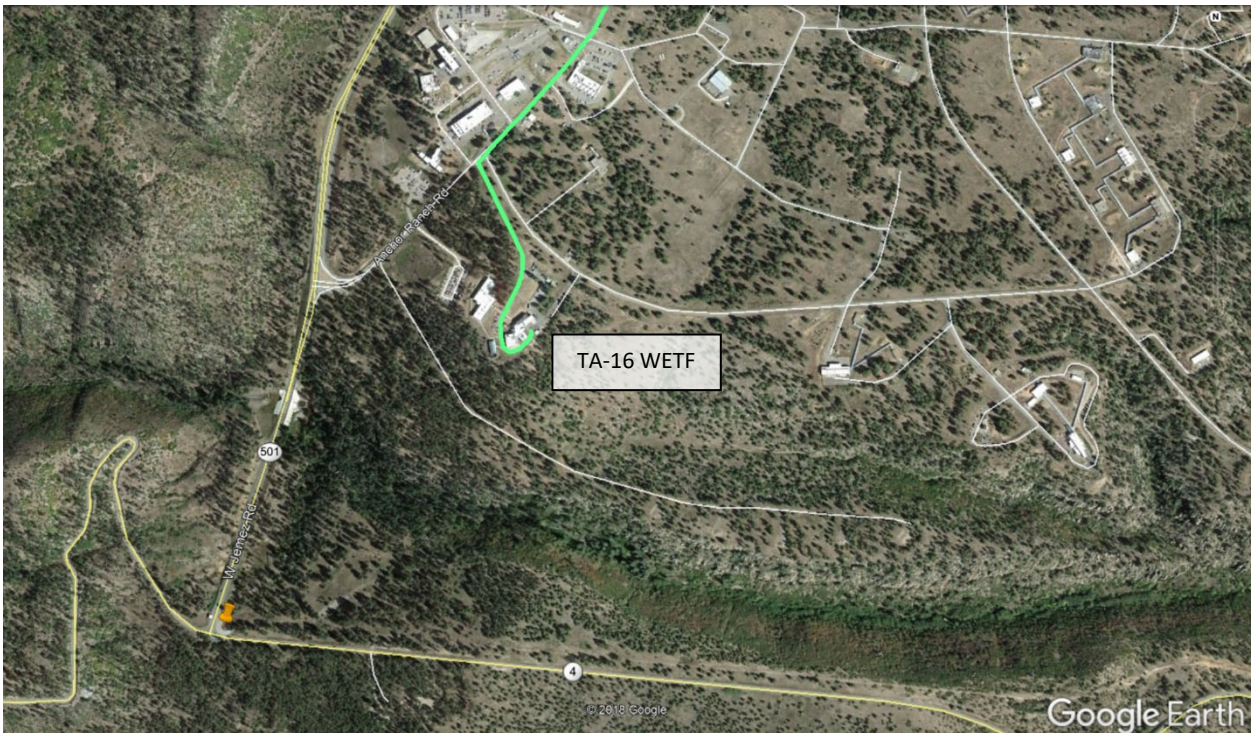


Figure 3: map of the end of the FTWC transportation route. Orange pins indicate existing ambient air stations.



Attachment 2

Procedure EPC-CP-QP-0148,
Emissions Management Plan for the FTWC Venting Project

EPC-DO: 20-068

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Date: MAR 0 5 2020

EPC-CP-QP-0148	Revision: **0**	Los Alamos NATIONAL LABORATORY EST.1943
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Environment, Safety, Health, Quality, Safeguards, and Security Directorate

Environment Protection and Compliance – Compliance Programs Group

Quality Procedure

Emissions Management Plan for the FTWC Venting Project

Hazard Grading: ☒ Low ☐ Moderate ☐ High/Complex

Usage Level: ☐ Reference ☐ UET ☒ Mixed: UET Sections: Attachments 3-4

Status: ☒ New ☐ Major Revision ☐ Minor Revision

☐ Review w/No Changes ☐ Other: _____

Safety Basis: ☐ N/A ☒ USQ ☐ USI Number: _____

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Name:	Organization:	Signature:	Date:
David Fuehne, RAEM Team Leader	EPC-CP	Signature on File	2-10-2020

Derivative Classifier: ☒ **Unclassified or** ☐ _____

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Approval Signatures:

EPC Reviewer:	Organization:	Signature:	Date:
Jeff Whicker, Dose Assessment Program	EPC-ES	Signature on File	2-10-2020
EPC-CP RLM:	Organization:	Signature:	Date:
Michael Saladen, Deputy Group Leader	EPC-CP	Signature on File	2-12-2020

REVISION HISTORY

Document Number and Revision *[Include revision number, beginning with Revision 0]*	**Effective Date** *[Document Control Coordinator inserts effective date]*	**Description of Changes** *[List specific changes made since the previous revision]*
EPC-CP-QP-0148 Rev. 0	02/12/2020	New Document for use in FTWC venting operations. Defines milestones and approvals required for operations.

Table of Contents

List of Tables

1.0 INTRODUCTION

This Environmental Protection and Compliance Division - Environmental Compliance Programs group (EPC-CP) Quality Procedure (QP) describes activities performed by members of the Radioactive Air Emissions Management (RAEM) team that are required to support the venting of Flanged Tritium Waste Containers (FTWCs). The FTWCs are tritium storage containers that need to be vented to reduce potential hazardous conditions within the containers. A full description of the FTWC venting process is contained in the LA-UR-18-26283, R2, *Application for Pre-Construction Approval under 40 CFR 61 Subpart A and H for Venting of Flanged Tritium Waste Containers (FTWCs) at TA-54*, sent to the Environmental Protection Agency (EPA) Region 6 in May 2019.

The RAEM team is responsible for the compliance of Los Alamos National Laboratory (LANL) in regards to regulations put forth in 40 CFR 61, Subpart H, the Radionuclide NESHAP (National Emission Standard for Hazardous Air Pollutants). The overall compliance program is described in EPC-CP-PIP-0101, *Rad-NESHAP Compliance Program - Program Implementation Plan* (PIP). Under the PIP, sources with the likelihood to exceed an off-site dose of 1 millirem to the maximally exposed individual (MEI) member of the public require an Emissions Management Plan, this document.

1.1 Purpose

This QP will document the emissions limits and calculation methodology for the FTWC project. Concurrence from affected LANL and Department of Energy (DOE) management is obtained by the signature page in Attachment 1. Following this document will ensure LANL does not exceed the 10 millirem per year emissions standard established by the EPA.

This QP also provides consideration of the all-pathway dose limits put forth in DOE Order 458.1, *Radiation Protection of the Public and the Environment*. This limit is 100 millirem per year, but is calculated to any public receptor rather than the Radionuclide NESHAP requirement that a receptor be a “residence, school, business, or office.” The higher limit in DOE O 458.1 is offset by the closer possible receptor distances. DOE O 458.1 also charges DOE facilities with keeping public radiation doses As Low As Reasonably Achievable (ALARA), and conducting ALARA reviews for planned operations. LANL’s compliance with DOE O 458.1 is managed by the Dose Assessment program within the Environmental Stewardship Group (EPC-ES). While this QP does not fully detail environmental ALARA or dose calculations under DOE O 458.1, it does document where in the process these calculations are performed by EPC-ES personnel.

1.2 Scope

This QP documents initial dose calculations and interim limits established for the FTWC venting project. It also provides methods for updating these limits based on actual emissions and actual meteorology. As dose milestones are reached, different actions are required.

1.3 Applicability

Initial dose calculations are provided for up-front planning purposes, using conservative or bounding assumptions. After each individual FTWC venting operation, the dose limits can be recalculated and the limits adjusted based on actual emissions and actual meteorological data encountered during venting operations.

1.4 Authority

Compliance with 40 CFR 61 Subpart H is the responsibility of the RAEM team within EPC-CP. Methods used by RAEM team personnel are established in Subpart H and referenced guidance. Approval for operations are authorized by LANL management and DOE/National Nuclear Security Agency (NNSA) personnel.

Compliance with DOE O 458.1 is the responsibility of the Environmental Health Physics program in EPC-ES, the Environmental Stewardship Group.

2.0 PRECAUTIONS AND LIMITATIONS

The work described in this procedure is office work and has a **LOW hazard** rating. This assessment has been performed by the RAEM team leader and is consistent with LANL procedure P300, *Integrated Work Management*. Note that the actual venting activity is performed under an Integrated Work Document (IWD), number EPC-CP-106-FTWC, *Flanged Tritium Waste Container (FTWC) Venting Setup, Sampling, and Takedown.* That IWD will reference this Emissions Management Plan in places, but the actions specifically described in this document are low hazard.

2.1 Precautions

Actions specified within this procedure, unless proceeded with “should” or “may,” are to be considered mandatory (i.e., “shall”, “will”, “must.”)

2.2 Limitations

Dose limits and levels apply only to the NESHAP reporting year(s) in which FTWCs are vented. Procedure ENV-ES-QP-610, *Radioactive Air Emissions Management Plan for LANSCE* will be updated prior to the 2020 run cycle and incorporate changes from this document as needed.

3.0 PREREQUISITE ACTIONS

Different portions of this document are implemented at different points in the FTWC venting process. Preliminary analyses are performed using bounding case scenario conditions, while follow-up assessments during the course of venting operations use actual conditions encountered during the venting operations.

In addition to training to this procedure, familiarity with the following documents is also required prior to performing this procedure:

- Procedure EPC-ES-TP-501, *Dose Assessment Using CAP88* is required to perform dose calculations and develop mrem/Ci factors; subsequent analysis using pre-generated factors does not require training to EPC-ES-TP-501.
- Emissions calculation methods in procedure EPC-CP-QP-0112, *Tritium Stack Emission Calculation and Reporting.*
- Procedure ENV-ES-QP-610, *Radioactive Air Emissions Management Plan for LANSCE* is required to ensure consistency with dose limit allocations throughout the Laboratory. This document is currently in the process of being updated; see references.

3.1 Planning and Coordination

Establishing Dose and Emissions Limits. Radionuclide NESHAP emissions standards are based on off-site dose consequence rather than emissions of specific quantities of radionuclides. As such, general dose limits (in millirem) are established for the FTWC venting project, and are translated into emissions limits (in curies) as described in Section 4 of this document.

NOTE: limits in this document supersede those in ENV-ES-QP-610 for the calendar year(s) in which the FTWC venting project takes place.

3.1.1 EPA Dose Limit – Air Pathway

Airborne radionuclide emissions under 40 CFR 61 Subpart H are limited to levels which result in 10 millirem in any year to the maximally exposed member of the public. "Any year" has been defined as any time period of 12 consecutive months. Note that emissions and doses are reported to EPA by calendar year, but a significant dose incurred in one calendar year can affect LANL operations in the next calendar year.

3.1.2 LANL Ongoing Facility Operations

In recent years, the worst-case off-site doses for different LANL facilities are shown in Table 1. The total for all sites if the worst-case doses all occurred in a single year to a single Maximally Exposed Individual (MEI) is about 1 millirem per year.

The DOE O 458.1 all-pathway dose over the past several years trends closely to the Radionuclide NESHAP MEI dose.

Table 1. Maximum Doses from LANL Facilities Since 2009*	
LANL Source	**Annual Dose, 10-Year Max**
LANSCE Facility	0.27 millirem
Airnet (all diffuse sources)	0.49 millirem
Minor Sources (potential)	0.25 millirem (potential dose)
Tritium Facility	0.03 millirem
TA-48 Hot Cell	0.01 millirem
Balance; sum of remaining sources	0.01 millirem
Total; all-sources max dose	1.06 millirem
EPA dose limit to Maximally Exposed Individual	10 millirem per year
*Dose values are calculated to individual facility Maximally Exposed Individual; Airnet doses exclude the MDA-B cleanup year of 2011.	

3.1.3 FTWC Emissions & Dose Limit

To allow for variation in meteorology and fluctuations in LANL operations, the administrative annual limit for FTWC emissions is **8 millirem** to any Radionuclide NESHAP receptor. When off-site doses meet this level, no further venting operations will occur for 12 consecutive months.

The overall emissions limit (in curies) is set to correspond to this dose limit. Daily curie emissions limits can change as dose is accumulated, as described later in this document.

The environmental ALARA administrative limit under DOE O 458.1 criteria is set at 90 millirem. Curie limits and hold points established for Radionuclide NESHAP compliance will be shared with EPC-ES Dose Assessment personnel for evaluation relative to this DOE O 458.1 all-pathway administrative limit.

3.1.4 Interim Hold Points

Two interim action hold points are established.

1. "Pause for evaluation." When the calculated off-site dose reaches **3 millirem**, work will temporarily pause to evaluate progress on venting operations; anticipated remaining releases; efficiency of emissions controls; adequacy of operational controls. Evaluators will consist of the venting operation Person-In-Charge (PIC) and the EPC-CP RAEM Team Leader or their designees.
2. "Pause for approval." When the calculated off-site dose reaches **6 millirem**, work will pause again. Stakeholders listed in Attachment 1 will be notified of the measured dose to date and best estimate of remaining dose. Work will only commence after verbal approval is received from Associate Laboratory Director for ESHQSS and Associate Laboratory Director for Weapons, or their designees.

3.1.5 Dose Assessment Parameters.

As inputs into the CAP88v4 program, the following parameters in Table 2 will be used for calculating dose conversion factors. Environmental ALARA calculations will use similar parameters as needed.

Table 2. CAP88 Input Parameters

Parameter	Value
Stack diameter	0.25 meter = 10 inches
Stack height	2 meters
Exit velocity	Bounding cases: 13.75 m/s (large blower) or 7.01 m/s (small blower); or Actual measured flow rate per ENV-ES-QP-127; or Estimated exhaust flow using real-time meter per LA-UR-19-32748.
Distance to receptor	2195 m ESE (for Area G releases); 740 m SSW (for WETF releases); Actual distance once specific exhaust location is known. ALARA calculations assume 500 m NNE to San Ildefonso boundary for Area G venting.
Wind file	Dec 1, 2018 daylight wind (bounding case) for planning Area G ventilation limits (wind file DF120118.WND); Jan 2, 2019 daylight wind (bounding case) for planning WETF venting operations (wind file 6DF10219.WND); or Actual wind conditions provided by EPC-CP meteorologist for actual dose calculations.
Radionuclide	1 Ci of H-3, form of tritiated water, type "V" (vapor), size 0.
Other Meteorological parameters: Precipitation, Temperature, Lid Height, Humidity	Per EPC-ES-TP-501. Lid height should be selected for actual month of venting operations; other parameters use annual averages described in procedure EPC-ES-TP-501.
Agricultural settings	"Local" food sources; New Mexico state defaults for other agricultural parameters.

3.2 Performance Documents

To perform this procedure, information from the following documents are needed:

- Emissions report from RADAIR database or equivalent calculation to document total tritium emissions from each FTWC venting operation, as described in EPC-CP-QP-0112, *Tritium Stack Emission Calculation and Reporting*.

- Knowledge of methods described in procedures EPC-ES-TP-501, *Dose Assessment Using CAP88*, and EPC-ES-TP-511, *Calculating mrem per Curie factors*.
- Knowledge of flow determination methods in ENV-ES-QP-0127, *Determination of Stack Gas Velocity and Flow Rate in Exhaust Stacks, Ducts, and Vents* and document LA-UR-19-32748, *Protocol for Determining Actual Flow Rate in FTWC Duct Systems*.

3.3 Special Tools, Equipment, Parts, and Supplies

For flow measurements:

- Equipment as described in ENV-ES-QP-0127, or
- Sierra Instruments 620s Insertion Thermal Mass Flow Meter; use this instrument in conjunction with methods described in document LA-UR-19-32748, *Protocol for Determining Actual Flow Rate in FTWC Duct Systems* to determine exhaust flow rate and subsequent air emissions.

For tritium emissions measurements:

- A tritium bubbler, operated in accordance with EPC-CP-TP-0106, *Collecting Tritium Stack Bubbler Samples*, and emissions calculated per EPC-CP-QP-0112, *Tritium Stack Emission Calculation and Reporting*.
- Real-time tritium meter(s), operated in accordance with the instrument manual(s) and with guidance from Radiation Protection Services (RP-SVS). Real-time emissions can be calculated based on these real-time readings. One or more instruments may be used to properly measure the range of expected emissions.

3.3.1 Special Tools

None.

3.3.2 Measuring and Test Equipment

RAEM team members ensure the following equipment is calibrated and available for the FTWC venting operations. Calibration documentation should be available upon request.

Description	Range	Accuracy	Calibration Category
Sierra 620s Flow Meter	300-3056 std cfm	+/- 75 std feet/min	Annual (LANL S&CL)
OS1700 Bubbler	n/a	n/a	Semi-Annual (RP-SVS)
Overhoff Triathalon 311	0-20,000 microCi/m^3	n/a	Annual (RP-SVS)
femto-TECH U24 high-range tritium monitor	0-20,000 milliCi/m^3	n/a	3yr (RP-SVS)

4.0 PROCESS DESCRIPTION

The following steps make up the FTWC venting process. Several steps can be repeated throughout the process as needed to determine dose impacts at various locations. Attachment 2 is a process flow chart which illustrates the order that these processes are performed or repeated.

For all steps: actions are to be performed and documented by the assigned RAEM team member or affiliate (e.g., EPC-ES Dose Assessment team member or WETF engineer) trained in the referenced RAEM procedure or methods.

Verification checks for all calculations are to be performed by a different RAEM team member or trained affiliate. Most referenced procedures have peer review built into the process. Ad hoc calculations that are not part of an independent procedure require complete independent review.

4.1 Establishing Initial Curie Emissions Limits

For the Area G FTWC venting operations and planning purposes, the worst-case wind file from 2018 was used. This represents wind during daylight hours of Dec 1, 2018, when the wind blew steadily from Area G towards the White Rock town site. This file, provided by EPC-CP meteorologists, is called DF120118.wnd.

[1] Run CAP88 v4 using wind file DF120118.wnd and other parameters as described in Section 3.1.5 for Area G. The resulting dose conversion factor should be 2.66E-4 millirem per curie of H-3 emitted. This dose conversion factor is used for up-front planning ***and*** for dose conversions when planning future FTWC venting at Area G.

[2] To determine the emissions limit, divide the off-site dose limit in Section 3.1.3 by the CAP88 dose conversion factor: 8 mrem / (2.66E-4 mrem/Ci) = **30,000 curies** (rounded). This is the initial "hard stop" emissions limit for the project.

[3] To determine the "Pause for approval" hold point in Section 3.1.4b, divide that dose value by the CAP88 dose conversion factor: 6 mrem / (2.66E-4 mrem/Ci) = **22,500 Ci** (rounded). This is the "Pause for approval" hold point described in 3.1.4b.

[4] To determine the "Pause for evaluation" hold point in Section 3.1.4a, divide that dose value by the CAP88 dose conversion factor: 3 mrem / (2.66E-4 mrem/Ci) = **11,300 Ci** (rounded). This is the "Pause for evaluation" hold point described in 3.1.4a.

[5] Note that actual doses will be calculated at the end of each operational day, using actual meteorology, flow, and curies emitted. This is described in Sections 4.4-4.7.

4.2 Define New Emissions Limit & Hold Points for Upcoming Venting Operations

Prior to each day of venting operations, curie emissions limits must be established and documented which correspond to dose limits from 3.1.3, 3.1.4a, and 3.1.4b. These curie limits will ensure that off-site doses to the MEI will not exceed EPA regulations. Attachment 3 shall be used to document the calculation process for these emissions limits and hold points.

Note that if venting operations have occurred at multiple locations (e.g., Area G and WETF), the process will have to be duplicated for each potential Radionuclide NESHAP MEI. The most conservative (lowest) emissions limits resulting from analysis at different MEI locations will be used for the daily emissions limits.

[1] Determine the integrated off-site MEI dose to date from FTWC venting operations. If this is the first day of FTWC venting, the integrated FTWC dose will start at zero. If this evaluation is done between venting of specific FTWCs, sum the doses from each day of operation together to determine the integrated FTWC dose.

Integrated FTWC dose = IFD = sum(DailyDose).

[2] Determine the planning Dose Conversion Factor (DCF_p) used for the MEI location in question. For Area G operations, this is the 2.66E-4 mrem/Ci calculated in Section 4.1 Step 1 above. Other MEI locations will have different values.

[3] Limit on dose and emissions.

[a] The new dose limit for daily operations is equal to this integrated MEI dose, subtracted from 8 millirem.

DoseLimit = 8 – IFD.

[b] The new curie limit corresponding to this dose limit is equal to the DoseLimit in Step 3a, divided by the planning Dose Conversion Factor for the MEI in question.

CurieLimit = DoseLimit / DCF_p

[4] Upper hold point – "Pause for Approval"

[a] The new dose hold point for "Pause for Approval" is the integrated FTWC dose subtracted from 6 millirem.

PauseForApprovalDose = 6 – IFD.

[b] The new curie hold point for "Pause for Approval" is the PauseForApprovalDose in Step 4a, divided by the Planning Dose Conversion Factor.

PauseForApproval_Ci = PauseForApprovalDose / DCF_p

[5] Lower hold point – "Pause for Evaluation."

[a] The new dose hold point for "Pause for Evaluation" is the integrated FTWC dose subtracted from 3 millirem.

PauseForEvaluationDose = 3 – IFD.

[b] The new curie hold point for "Pause for Evaluation" is the PauseForEvaluationDose in Step 5a, divided by the Planning Dose Conversion Factor.

PauseForEvaluation_Ci = PauseForEvaluationDose / DCF_p

[6] If venting operations have taken place in multiple locations, repeat the Steps 1-5 in this section for each MEI location. The most conservative (lowest) values for each hold point and limit value will be used for upcoming FTWC venting.

[7] Document and communicate the proposed curie limit and hold points to EPC-ES Dose Assessment personnel for evaluation of their adequacy for ALARA and public dose calculations under DOE O 458.1. Resolve any issues and determine a final set of values for use in upcoming FTWC venting operations. Document these limits.

[8] Prior to each day's FTWC venting operations, communicate the new dose and curie values for each interim hold point and the overall limit to the PIC and to other interested stakeholders upon request.

4.3 Calculate Air Emissions

Air emissions are tracked in real time using the Triathalon or femto-TECH instrument and formally measured (for EPA compliance purposes) using an Ortec OS1700 bubbler. Bubbler data will typically only be generated at the end of each individual FTWC container venting, usually at the end of each day of operation.

[1] The Triathalon and femto-TECH instruments will display tritium air concentration.

[2] Use flow information from the Sierra 620s velocity meter, duct diameter, and time interval to convert air concentration to determine integrated curies. Attachment 4 or similar form (e.g., field notebook or spreadsheet) can be used.

[3] Periodically (e.g., every 15 minutes), determine the integrated emissions reading with each incremental venting to determine total curies emitted.

[4] If emissions hold points or limits from Section 4.1 or 4.2 are met or exceeded based on real-time instrument readings, pause or stop work accordingly and take the steps described in Section 3.1. Document all communications via email to WFO-DO.

[5] At the end of each FTWC venting (or other logical extended break in operations), exchange bubbler samples according to procedure EPC-CP-TP-0106.

[6] Process and submit bubbler samples to the Health Physics Analytical Laboratory (HPAL) for analysis per procedure EPC-CP-TP-0106. Request accelerated analysis.

[7] If HPAL analysis of bubbler samples cannot be completed before the next scheduled venting operation, use the emissions calculated by the Triathalon or femto-TECH for subsequent analysis. Proceed to section 4.4, returning to this section as HPAL data becomes available.

[8] Using the HPAL electronic data deliverable or equivalent report, calculate emissions using the RADAIR database or hand-calculations per procedure EPC-CP-QP-0112. This calculation should use the actual flow rate as measured or estimated per LA-UR-19-32748.

NOTE: These calculated emissions as measured by the bubbler will be the emissions of record for further use in this procedure. The measured bubbler emissions will supersede emissions calculated by the real-time instruments. Real-time data will only be used if there is a quality problem with the bubbler data.

4.4 Calculate Dose from Venting Operations

Curie emissions calculated in Section 4.3 are converted into off-site dose using the EPA's CAP88 v4 software. LANL procedures for using CAP88 are EPC-ES-TP-501 and EPC-ES-TP-511.

[1] From the EPC-CP meteorology program, request a meteorological file representing the actual wind conditions during the FTWC venting activities for which dose is being calculated. For example, if operations were confined to daylight hours on a specific day, the wind file should reflect that time frame to most accurately calculate dose.

[2] Generate the CAP88 v4 wind file for the specific dates of venting operation.

[a] If the specific wind file is not able to be generated in time to perform these analyses, use the most appropriate wind file for the activity, e.g., a file representing average wind data for the month in question from the appropriate weather tower.

[3] Using CAP88 v4, the new wind file, and the actual exhaust flow rate, calculate off-site dose to the Radionuclide NESHAP MEI from the current day's FTWC venting.

[4] If venting has taken place at multiple sites (e.g., both Area G and the Weapons Engineering Tritium Facility, WETF), repeat the steps in this section for each site's MEI location.

[5] Communicate the results of these calculations to EPC-ES Dose Assessment personnel via email. Include CAP88 v4 output for verification.

4.5 Determine Total FTWC Dose to Date

[1] Add the dose calculated in Section 4.4 to the previous Integrated FTWC Dose from Section 4.2. This new sum represents the year-to-date dose from FTWC venting operations.

[2] Repeat Step 1 for any other MEI locations evaluated. The highest (most conservative) dose is used for reporting and tracking to the limits established in Section 3.1.

[3] Report the dose from Step 2 to the FTWC venting operations PIC and to other interested stakeholders upon request. Document via email to WFO-DO.

4.6 Repeat Processes

If more FTWC venting operations will be performed, this entire process will be repeated until all venting operations are complete.

If venting activities take place at multiple locations, the entire process must be repeated for each potential MEI location.

[1] Using the integrated dose from Section 4.5, calculate new dose limits and air emissions limits according to Section 4.2.

[2] Measure emissions according to Section 4.3.

[3] Calculate off-site dose to MEI location(s) according to Section 4.4.

[4] Determine integrated FTWC dose at the MEI location(s) according to Section 4.5.

[5] Repeat this process for each day of operation or at intervals determined by the RAEM team leader and FTWC venting PIC.

4.7 Responses to Exceeding Established Limits or Hold Points

Meeting or exceeding the dose limits or hold points from Section 3.1 will trigger certain responses.

[1] If the "Pause for Evaluation" hold point (3 millirem) is exceeded, all venting operations will temporarily cease.

[a] The RAEM team leader and FTWC venting PIC (or their designees) will consult and evaluate the operation. This evaluation includes:

- The overall progress of the FTWC venting process & number of FTWC drums remaining to be vented.
- The level of emissions from each FTWC, relative to the total tritium inventory of each FTWC.
- The efficiency of emissions controls systems at reducing tritium emissions.
- The anticipated level of emissions projected for the remainder of the FTWC project.
- Any other factors which may affect the venting and emissions.

[b] Take any actions deemed necessary in Step 1.a.

[c] Document the pause, evaluation, and any actions in an email to WFO-DO.

[2] If the "Pause for Approval" hold point (6 millirem) is exceeded, notification is made to parties listed in Attachment 1.

[a] Report the dose to date and updated projections of future dose to the Attachment 1 signatories to provide the best information regarding the project's likely emissions and off-site dose consequence.

[b] Prior to resuming operations, verbal approval to continue shall be obtained from the Associate Laboratory Director for ESHQSS and Associate Laboratory Director for Weapons, or their designees.

[c] Document all notifications and approvals received via email to the WFO Division Leader (WFO-DO).

[3] If the Emissions Limit is exceeded, it means the project has approached or exceeded a dose of 8 millirem to the MEI from the FTWC project. No further venting can take place until an updated dose assessment is performed. Pause work and perform the verification steps below.

[a] Determine emissions and integrated dose in accordance with sections 4.3, 4.4, and 4.5.

[b] If the actual dose is 8 millirem or more, FTWC venting operations must cease for the year.

[c] If the actual dose is less than 8 millirem, limited operations can resume, with the goal of keeping total FTWC dose less than 8 millirem for the year. Verbal approval to continue must be received from the Associate Laboratory Director for ESHQSS and Associate Laboratory Director for Weapons, or their designees.

[d] Document in an email to WFO-DO all analyses, including pause work actions, subsequent dose calculations, and decisions to proceed or not.

4.8 Annual Dose Reporting

The FTWC emissions will be included in the LANL Radionuclide Air Emissions Report, submitted to EPA Region 6 in June of each year. MEI locations in this section refer to Radionuclide NESHAP MEIs.

[1] When generating the annual EPA report, compare the dose(s) measured at the MEI(s) from FTWC venting operations to other potential MEI locations from other LANL sites.

[2] Use processes in ENV-ES-QP-507, *Preparation of the Annual Rad-NESHAP Report* to determine the LANL-wide MEI location for the year.

[3] If a FTWC dose needs to be calculated to different MEI locations, use the meteorological files generated in Section 4.4 to determine doses from individual FTWC venting operations at the new MEI location(s).

[4] Sum the doses from individual FTWC venting operations to determine the FTWC project dose for the year, as calculated to each MEI location.

[5] Repeat this section for all potential MEI locations.

5.0 TRAINING

The training method for this procedure is **self-study** training and is documented in accordance with ADESH-TPP-301, *ADESH Training Program Plan.* Annual retraining is required and will be by self-study ("reading") of this procedure. All training must be assigned and tracked using the institutional training records management system, UTrain.

Training is required to procedures referenced in individual work steps above.

- EPC-ES-TP-501, Dose Assessment Using CAP88
- EPC-ES-TP-511, Calculating mrem per Curie Factors.
- ENV-ES-QP-127, Determination of Stack Gas Velocity and Flow Rate in Exhaust Stacks, Ducts, and Vents (pending update; new number EPC-CP-TP-0127)
- EPC-CP-TP-0106, Collecting Tritium Stack Bubbler Samples
- EPC-CP-QP-0112, Tritium Stack Emission Calculation and Reporting
- ENV-ES-QP-610, Radioactive Air Emissions Management Plan for LANSCE (pending update; new number EPC-CP-QP-0610)
- ENV-ES-QP-507, Preparation of the Annual Rad-NESHAP Report (pending update; new number EPC-CP-QP-0507)

6.0 RECORDS

EPC-CP is the Office of Record for this document and must be maintained in accordance with PD1020, *Document Control and Records Management* and ADESH-AP-006, *Records Management Plan*. Records generated by this document will be submitted to the RAEM records center.

Below are records generated as a result of implementing this procedure. Records generated are identified by title and type.

Record Title	QA Record	Non-QA Record
CAP88 Dose Calculations	☒	☐
Documentation of notifications and verbal approvals to continue operations (via email to WFO Division Leader).	☒	☐
Attachment 3 Daily Emissions Limits Calculations Worksheet (or equivalent) for each day of operations	☒	☐
Attachment 4 Emissions Tracking Worksheet (or equivalent) for each day of operations	☒	☐
Briefing materials and supporting documents	☐	☒

7.0 DEFINITIONS AND ACRONYMS

7.1 Definitions

See LANL Definition of Terms.

Limit – Level of emissions or dose that is not to be exceeded.

Hold point – Level of emissions or dose that triggers an action.

7.2 Acronyms

See LANL Acronyms Database.

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
Ci	Curies, unit of radioactivity; a quantity of radioactive material
DCF	Dose Conversion Factor, millirem off-site per curie emitted, generated by CAP88
DCF_p	Planning Dose Conversion Factor, maximum for potential scenarios
DOE	Department of Energy
EPA	Environmental Protection Agency
EPC	Environmental Protection and Compliance Division
EPC-CP	Environmental Compliance Programs Group
EPC-ES	Environmental Stewardship Group
FOD	Facility Operations Director
FTWC	Flanged Tritium Waste Container
HPAL	Health Physics Analytical Laboratory, part of RP-SVS
IWD	Integrated Work Document
LANL or the Laboratory	Los Alamos National Laboratory
MEI	Maximally Exposed Individual member of the public
PIC	Person In Charge
PIP	Project Implementation Plan
POC	Point Of Contact
QP	Quality Procedure
Rad-NESHAP or RN	National Emissions Standards for Hazardous Air Pollutants, Radionuclides. Codified in Title 40, Code of Federal Regulations, Part 61, Subpart H
RAEM	Radioactive Air Emissions Management team
RP-SVS	Radiation Protection Services Group
TA	Technical Area
WETF	Weapons Engineering Tritium Facility, TA-16-205.

8.0 REFERENCES

LA-UR-18-26283, R2, Application for Pre-Construction Approval under 50 CFR 61 Subpart A and H for Venting of Flanged Tritium Waste Containers (FTWCs) at TA-54

40 CFR 61, Subpart H, *National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities*

DOE Order 458.1, *Radiation Protection of the Public and the Environment*

P300, *Integrated Work Management*

LA-UR-19-32748, *Protocol for Determining Actual Flow Rate in FTWC Duct Systems*

EPC-ES-TP-501, *Dose Assessment Using CAP88*

EPC-ES-TP-511, *Calculating mrem per Curie factors*

ENV-ES-QP-127, *Determination of Stack Gas Velocity and Flow Rate in Exhaust Stacks, Ducts, and Vents* (pending update; new number EPC-CP-TP-0127)

EPC-CP-QP-0106, *Collecting Tritium Stack Bubbler Samples*

EPC-CP-QP-0112, *Tritium Stack Emission Calculation and Reporting*

ENV-ES-QP-610, *Radioactive Air Emissions Management Plan for LANSCE* (pending update; new number EPC-CP-QP-0610)

ENV-ES-QP-507, *Preparation of the Annual Rad-NESHAP Report* (pending update; new number EPC-CP-QP-0507)

EPC-CP-106-FTWC, *Flanged Tritium Waste Container (FTWC) Venting Setup, Sampling, and Takedown*

PD1020, *Document Control and Records Management*

ADESH-TPP-301, *ADESH Training Program Plan*

ADESH-AP-006, *Records Management*

LANL Definition of Terms

LANL Acronyms Database

9.0 APPENDICES

None.

10.0 ATTACHMENTS

Attachment 1: Endorsement of Milestones, Actions, and Methods

Attachment 2: Process Flow Chart

Attachment 3: Daily Emissions Calculation Worksheet

Attachment 4: Emissions Tracking Worksheet

Attachment 1: Endorsement of Milestones, Actions, and Methods

Authorization is required to continue FTWC venting operations when accumulated MEI doses exceed 6 millirem. This authorization is required to ensure that LANL stakeholders are aware of the off-site dose and potential ramifications on other LANL operations.

If the 6 millirem hold point is met or exceeded, notification by telephone or email will be made to all parties below. A verbal briefing shall be made to ALDESHQSS and ALDW (or their designees); verbal approval from these two parties constitutes authorization to continue venting operations. These notifications and authorizations shall be documented in an email to the WFO Division Director.

Current FTWC Dose: _____ millirem to (MEI location): _____

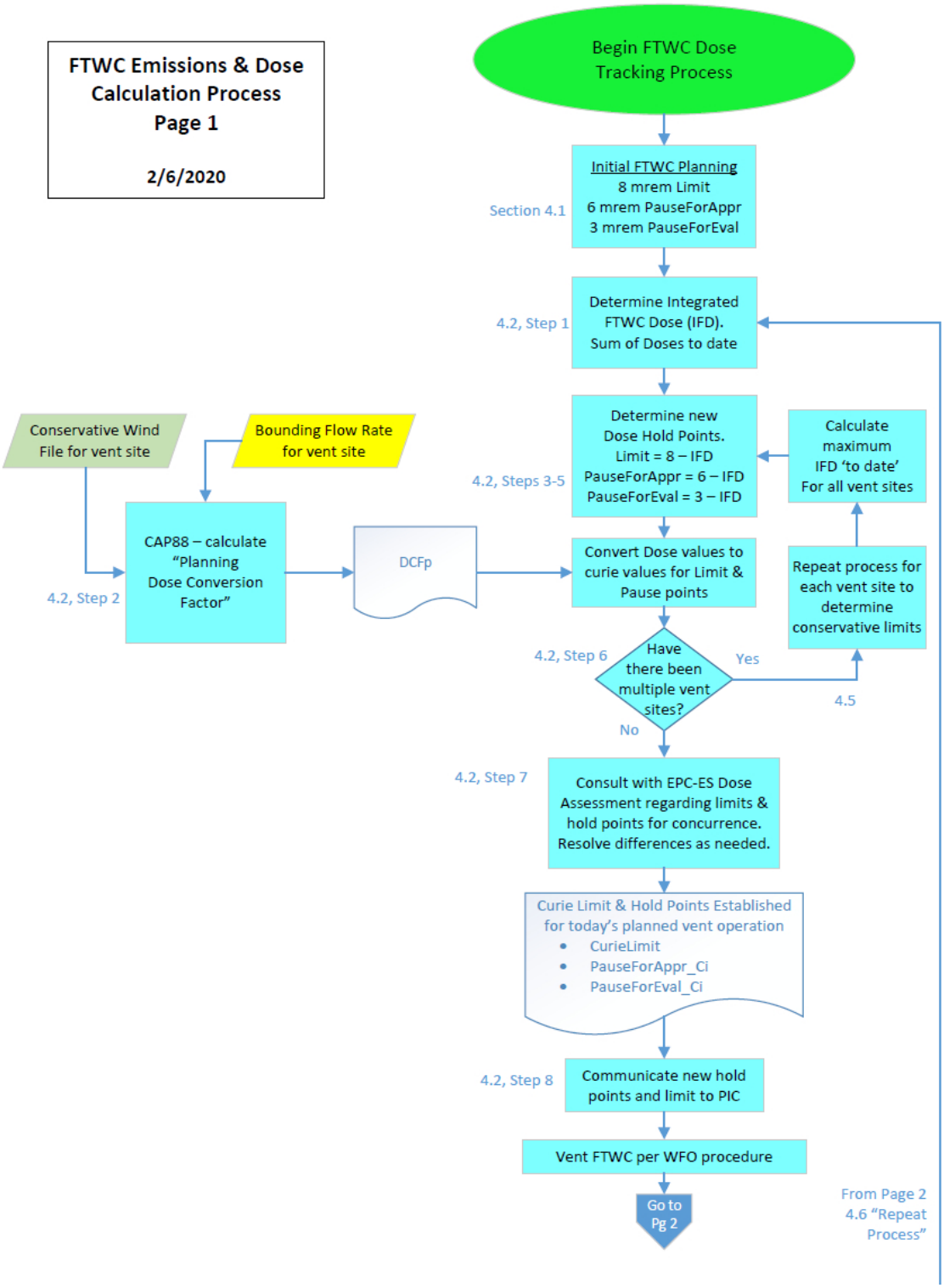
Projected Dose upon completion of venting: _____millirem.

Table 3. Endorsement of Milestones and Planned Actions

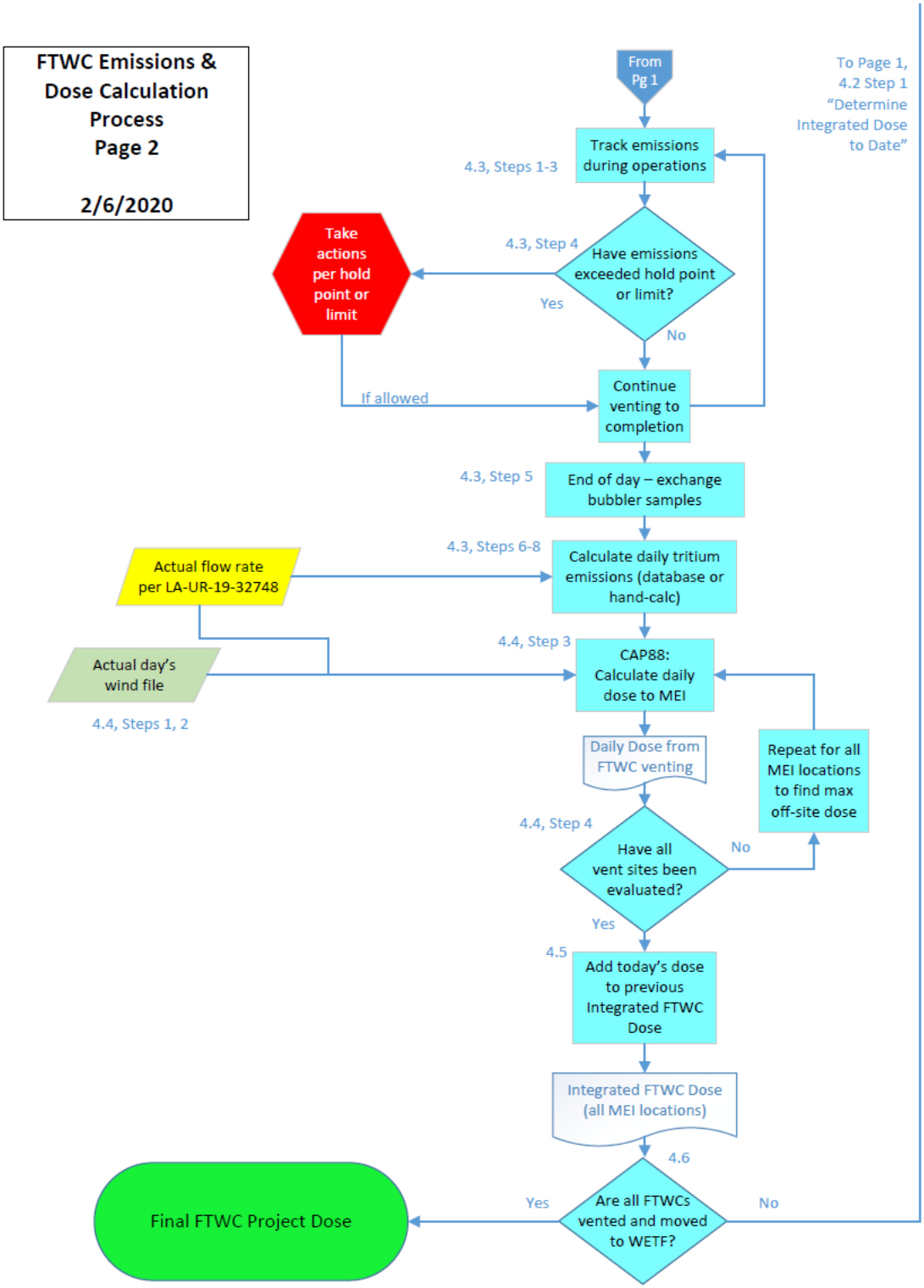
Role	Signature	Date
EPC-CP Group Leader	Signature on file Taunia Van Valkenburg	12 Feb 2020
EPC Division Leader	Signature on file Jennifer Payne	13 Feb 2020
Associate Laboratory Director, ESHQSS	Signature on file Michael Hazen	13 Feb 2020
FTWC Venting Person-in-Charge	Signature on file Don Hyatt	18 Feb 2020
WFO Division Director	Signature on file Brian Watkins	18 Feb 2020
Associate Laboratory Director, Weapons	Signature on file Derrick Montoya	18 Feb 2020
Engineering Services	Signature on file Derek Gordon	18 Feb 2020
Briefing for NA-LA personnel		18 Feb 2020
Briefing for EM-LA personnel		13 Feb 2020
Briefing for N3B personnel		13 Feb 2020

Attachment 2: Process Flow Chart

Visio file location: \\dcstorage.lanl.gov\ENV\CP\RAEM\RAD-NESHAPS\FTWC\Venting Procedure Docs



Attachment 2: Process Flow Chart, continued



Attachment 3: Daily Emissions Calculation Worksheet

This worksheet provides an example of information required to determine daily emissions hold points and limits.

FTWC Venting Process # _____ Start date & time: _____

FTWC WCATS ID: _____ End date & time: _____

Venting Location: _____

Integrated FTWC Dose (IFD) from previous ventings: IFD = _____ mrem *Enter 0 if first vent operation*

Calculating Today's Limit & Hold points:

CAP88 Planning Dose Conversion Factor = DCF_p = _____ mrem/Ci

DoseLimit: 8 mrem - _____mrem (IFD) = _____ mrem

Corresponding CurieLimit = DoseLimit / DCF_p = _____ / _____ = _____Ci

PauseForApprovalDose: 6 mrem - _____mrem (IFD) = _____ mrem

PauseForApproval_Ci = PauseForApprDose / DCF_p = _____ / _____ = _____Ci

PauseForEvaluationDose: 3 mrem - _____mrem (IFD) = _____ mrem

PauseForEvaluation_Ci = PauseForEvalDose / DCF_p = _____ / _____ = _____Ci

Concurrence on limits from EPC-ES Dose Assessment: (date/time/initials): _____

These levels communicated to the FTWC Venting PIC (date/time/initials): _____

Current Venting Operation Data:

GPS Coordinates of stack: _____ Latitude, _____ Longitude

Stack exhaust flow rate: _____ acfm.

Basis for flow rate determination: _____

Calculations by: _____ Date: _____
Printed Name / Signature / Z#

Verified by: _____ Date: _____
Printed Name / Signature / Z#

Attachment 4: Emissions Tracking Worksheet

This worksheet provides an example of ways to track FTWC stack emissions during venting ops.

FTWC Venting Process # _____ Start date & time: _____

This process: Log Sheet _____ of _____ End date & time: _____

Venting Location: _____

Stack Flow rate = _____ actual ft^3/min * 0.028317 m^3/ft^3 = _____ m^3/min

*Emitted Activity (Ci) = Concentration (uCi/m^3) * Δt (min) * Flow (m^3/min) * 1E6 (Ci/uCi)*

Time of Reading	Concentration microCi/m^3	Time Interval Δt; min	Flow (*above*) m^3/min	Emitted Activity microCi	Emitted Activity curies

Calculations by: _____ Date: _____
Printed Name / Signature / Z#

Verified by: _____ Date: _____
Printed Name / Signature / Z#