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July 18<sup>th</sup>, 2025

Secretary Kenney,

I am writing to summarize initial concerns that have come to my attention upon reviewing Los Alamos National Laboratory's plans for the venting of headspace gases in four Flanged Tritium Waste Containers (FTWCs).

I was recently asked, on behalf of community partners in New Mexico, to review the laboratory's proposed mechanism for mitigating risk and the potential for environmental release and public exposure during the venting process. My review of publicly available documents raises several concerns which I summarize here and wish to bring to NMED's attention. My comments on this topic are informed by a background in experimental physics in which I routinely performed tasks with high-pressure hydrogen gas, designed and built systems to handle and transport hydrogen, including large volumes where there was potential risk of deflagration, and in which I was responsible for maintenance and operation of continuous air monitors and hydrogen safety systems in an academic laboratory.

## **Sufficiency of Engineering Controls to Mitigate Release**

Upon reviewing information describing LANL's proposed approach for <sup>1</sup>penetrating the set of four FTWC's at TA-54 to reduce headspace pressure, I am struck by the apparent paucity of engineering controls being planned to mitigate accidental release. Schematics (Fig. 1) and photographs (Fig 2) suggest a lack of secondary containment around the FTWC during the venting process, which is the most fundamental level of risk mitigation strategy possible and which, in my opinion, could be <sup>2</sup>included without significant added burden.

The FTWCs sit within 85-gallon overpack drums (which, themselves, provide an opportunity for at least rudimentary secondary containment by employment of a gasketed flange). Documents suggest that a vent manifold will be installed on the FTWC to allow a controlled release through a molecular sieve (capture system) with simultaneous monitoring of release to the atmosphere using bubblers integrated in an overhead exhaust duct and stack (Figs. 1, 2).


<sup>3</sup>Although the schematic and associated description suggest the ability to perform a helium leak check of the system prior to venting (which is good practice), the act of penetrating the FTWC using the vent rig appears to present undue risk given the lack of secondary containment. The same is true for removal of the vent rig and installation of the pressure-monitoring manifold (which appears to exceed the height of the overpack container and therefore render it unusable for transport) (LANL 2022). The associated duct cannot be credited with capture of tritium, particularly in the event of an accident. The illustrated ductwork can only provide partial monitoring of potential leaks throughout the process and a modest amount of worker protection.

# Summary of Comments on UCS\_Tritium Memo for NMED\_July18\_LANL comments.pdf

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	Number: 1	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:05:08 AM
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Penetrating is misleading. We are using engineered systems to relieve the pressure in a controlled manner.

	Number: 2	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:09:31 AM
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Introduces adding to vibration/shock/ignition risk.

	Number: 3	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:10:37 AM
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The vented headspace will be a separate line directly into the vent cart, control system, and monitored stack.

General exhaust provides about one air change per minute in bldg 1028 which is more than adequate for capturing potential releases that could bypass vent system (highly unlikely/remote)

The ‘ancillary vent equipment’ (Fig. 1), which is housed on a portable cart, consists of a vacuum pump which draws gas through an AL-M1 molecular sieve. These sieves may have variable capture efficiency depending on the relative fractions of vapor and gas, which appear to be unknown for each of the four containers. According to LANL, such sieves are credited with ~90% removal efficiency for vapor in a gas stream (dependent on temperature and flow rate). Plans, photographs and an online video indicate that only one will be used rather than several sieves in series, which would seem to be a trivial means of achieving exponential efficiency. To my knowledge, even microporous aluminosilicate sieve media are largely inefficient at trapping hydrogen or tritium gas, which are both small molecules, meaning any gaseous fraction would likely bypass the sieve media with no additional means of capture. While the labs estimate 90% efficiency for vapor, that appears to represent an upper bound according to literature from manufacturers. Molecular sieve media are sometimes employed at very low temperatures (cryosorption) to capture tritium at other facilities, including within the DOE complex (Shmayda 2001; Kawamura et al. 2000), however I’ve seen no indication that low-temperature processes used elsewhere were considered for this procedure.

In addition to employing a single molecular sieve bed, the vacuum pump which draws effluents through the single sieve is vented directly to the environment via the outdoor exhaust stack rather than to a pressure vessel that could theoretically contain much of the gaseous fraction that is not trapped by the sieve.

In a set of responses to questions from the EPA, dated 2023, the NNSA suggests that use of additional containment is undesirable because it would add complexity and create additional waste (NNSA 2023). This is true, however the risk of venting tritium to the public hardly seems preferable to a modest addition to the laboratory’s already prodigious waste stream and the relatively low cost of adding additional sieves and secondary containment. In addition, the FTWCs being vented *already* contain AL-M1 sieves in addition to other waste, so the use of additional sieves in series would not constitute a new class of waste nor require disposal containers beyond those already designed and routinely handled.

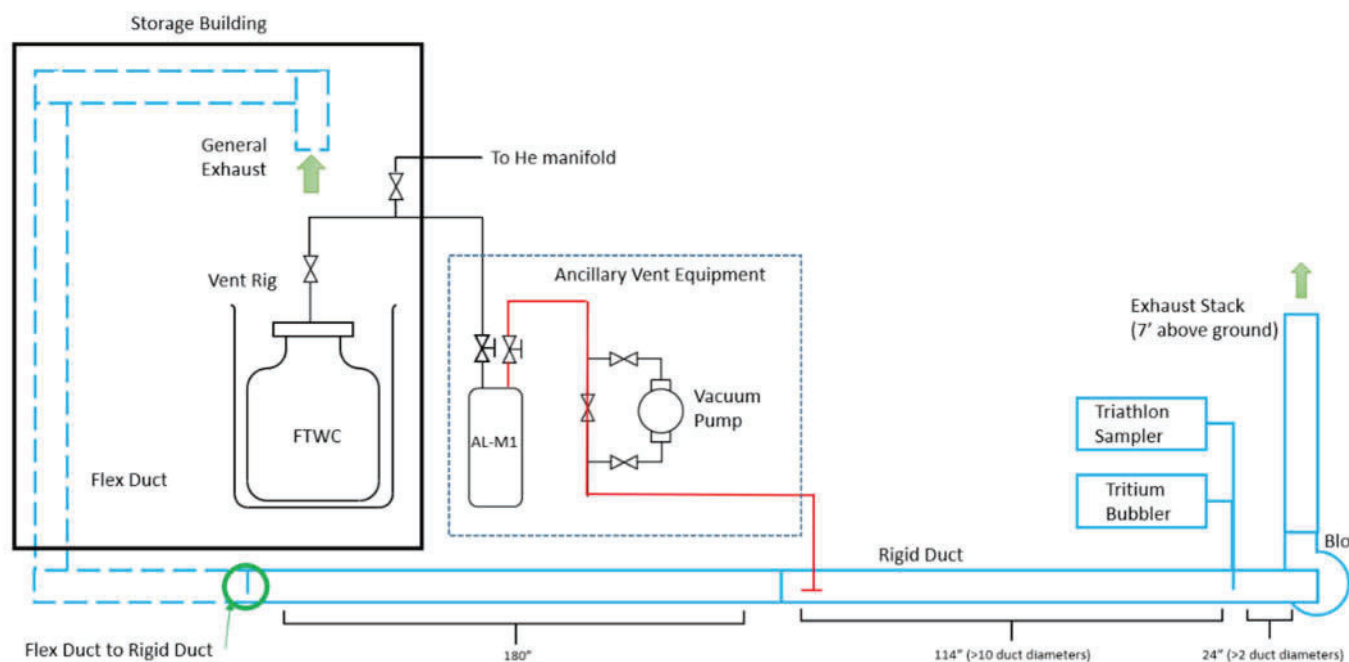








Fig. 1: Schematic of venting configuration for FTWC venting procedure. (Hyatt 2022)

	Number: 1	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:04:50 AM
Incorrect. The vacuum pump is there to pressure-test the PMM. Only the pressure within the FTWC provides driving force for the headspace gas to vent out the stack.				
	Number: 2	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:15:25 AM
Another AL-M1 would be trivial improvement when the HT elemental gas is unaffected. Very little benefit overall. LANL will ensure the capture system AL-M1 has adequate capacity between each FTWC.				
	Number: 3	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:05:37 AM
Cannot bring that level of infrastructure to this site without increasing risk of vibration/shock/ignition				
	Number: 4	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:20:47 AM
The pump configuration details are not technically accurate, and would still have ignition concerns with hydrogen/oxygen mix.				
	Number: 5	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:05:57 AM
At the level of emissions we are expecting, the risk to the public will be zero				
	Number: 6	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:06:07 AM
It's not the class of waste, it's the quantity of waste if secondary containers are used. As mentioned, additional AL-M1 units will have a negligible impact				

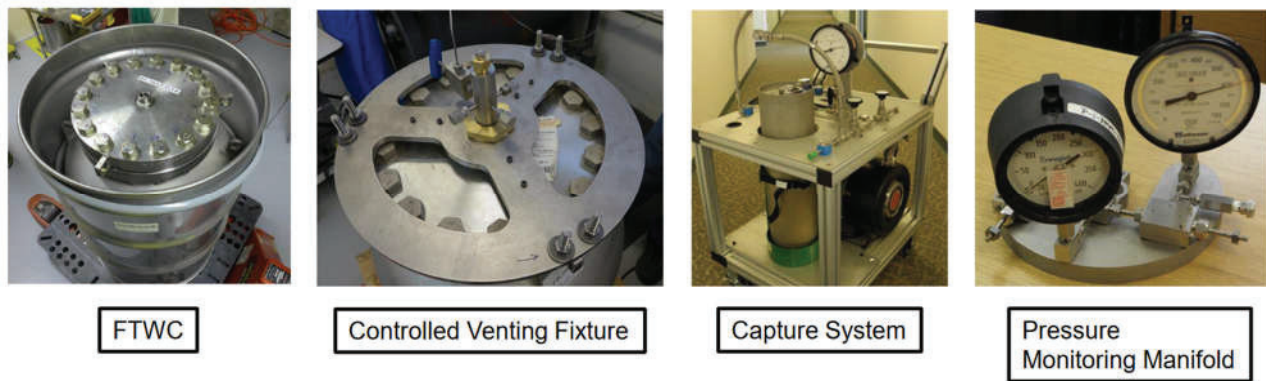


Fig. 2: Photographs of the hardware produced for the venting procedure. (NNSA 2022)

Even rudimentary secondary containment and capture would be preferable to the apparently ‘open-air’ approach being planned. This could include the use of low-cost glove bags or portable boxes attached to a gasketed cover on the overpack container, the addition of secondary gas capture, or the incorporation of low temperature ‘getters’ which may improve capture of gas at the cost of added complexity.

In summary, a review of LANL’s venting proposal and associated equipment suggests that additional engineering controls exist that could contribute to keeping public exposure “as low as reasonably achievable” (ALARA). Given the time and expense already put towards this issue, it is difficult to believe that a more comprehensive system that includes secondary containment cannot be implemented, particularly given the laboratory’s capabilities, increases in budget and staffing since this issue was first identified (Coghlan 2024), and associated public controversy.

### Modeling of Potential Release and Public Impact

While I am not in a position to independently assess estimates of public exposure from the proposed venting, dose conversion factors, nor the associated CAP88 model (Hyatt 2022; Franke 2024; Makhijani 2024), I do concur with outside assessments that question the use of annually averaged weather data for dose estimates. I also concur with recommendations to consider effective doses to the most vulnerable members of the general population.







Area G is close to residential areas in White Rock as well as San Idelfonso and Santa Clara Pueblos which are already frontline communities for laboratory contamination, including chromium (Batu et al. 2024), plutonium (Spaulding 2025), and historic airborne releases. It is the laboratory’s duty to ensure that ongoing and future activities do not exacerbate existing contamination and the lab should seek to minimize or eliminate the potential for public exposure where engineering and administrative controls allow.

Although the containers should (individually) represent less than the 10 mrem statutory exposure limit for members of the public, it is indisputable that catastrophic release from just one of the containers would represent a significant fraction of this, which is an unacceptable public burden, regardless of modelled assumptions or chosen dose conversion factors.

### A Track Record of Bypassing Measures for Public Protection

As NMED is aware, there is significant public concern over the potential for tritium release to the environment. Regardless of the technical details of present plans, such concerns are validated by the laboratory’s documented willingness to circumvent regulatory restrictions in the recent past.

Accounts of past practices in which monitoring systems were knowingly and routinely bypassed to allow direct tritium venting are exceptionally concerning (Luke Bartlein Legal Affidavit 1996). In 2022, the NNSA cited “exigent circumstances” to justify handling quantities of plutonium-238 for which engineering controls were deemed inadequate to protect the public in the event of a worst-case accident scenario. In this instance, potential offsite exposure levels from 490 to 3,175 rem were projected, which would be more than 100 times the federal guideline under DOE standard 3009-2014 (Spaulding 2025). When asked in a 2022 public hearing about whether increased plutonium pit production could lead to further invocation of “exigent circumstances”, NNSA

	Number: 1	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:06:18 AM
Incorrect - not an open-air operation				
	Number: 2	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:24:01 AM
None of these additions would reduce tritium emissions in the slightest. The operation already has an AL-M1 molecular sieve system; glove bags/boxes do nothing to capture emissions because the contents of those enclosures must also be processed/vented.				
	Number: 3	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:06:38 AM
Low-temp (cryogenic) getters require extensive infrastructure which cannot be safely implemented at Area G due to potential shock/vibration/ignition concerns				
	Number: 4	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:24:54 AM
Dose conversion factors in LANL's Application reflect annual average, per standard practice for these Applications. Planning data in the emissions management plan are based on bounding weather conditions. Actual reported doses will be based on on actual wind conditions at the time.				
Age-dependent dose conversion factors vary by a factor of 3 (worst-case). Doses remain a hundred-fold BELOW levels at which there is any added risk to the public.				
	Number: 5	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:27:29 AM
LANL believes staying well within regulatory limits is prudent and compliant, and therefore is not an "unacceptable public burden" The purpose of this operation is to prevent the catastrophic release scenario referenced. This paragraph is misleading.				
	Number: 6	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:28:32 AM
Completely unrelated to the FTWC project.				

<sup>1</sup> administrator James McConnell replied, “I would like to say, but I can’t, that this will be the last time that we use exigent conditions” (DNFSB 2022).

This response suggests that the laboratory views compliance with regulatory limits to be contingent on convenience and expediency and feels that <sup>2</sup> such limits can be exceeded if inconvenient or when required for mission-driven productivity. These cases and others have damaged public trust and underscore the importance of independent monitoring and scrutiny of environmental releases from the lab.

### Future Considerations for Waste Management

The present situation involving excess headspace gas in the FTWCs arose from a failure to adequately predict changes that could occur in packaged waste over time, including decay of tritium to 3-He, desorption of bound tritium, and radiolysis, which can contribute to a potentially explosive combination of hydrogen and oxygen. In addition, the need to repackage the containers appears to have been instigated by a need to separate lead waste which was improperly mixed with sieve media in the FTWCs to begin with (Hyatt 2022).

<sup>3</sup> A <sup>4</sup> failure to anticipate the chemical and physical evolution and chemical compatibility of packaged waste mirrors two other recent instances in which excess pressure in waste containers resulted in radiological releases. One of these incidents, in 2014, was responsible for a multi-year shutdown of the Waste Isolation Pilot Plant in 2014. The other occurred in 2018 at Idaho National Laboratory (Dunlevy et al. 2020). Had the 2014 incident occurred before the container arrived at WIPP, while it was being handled, or while in transit, the consequences could have been much worse.

Given this pattern of problematic waste packaging, NMED should be aware that such issues may be about to multiply many-fold. LANL’s burgeoning plutonium pit production mission is expected to significantly increase waste production at the laboratory over the coming years. The recent site-wide environmental impact statement (SWEIS) predicts up to 1500 shipments annually over the next 15 years and suggests that up to four additional waste staging areas will be prepared across the lab in order to handle waste and enable greater onsite capacity (DOE 2022). The recent draft SWEIS states that these staging areas are “to minimize the potential for a long-term WIPP shutdown to affect pit production activities at LANL” (DOE 2022). This either suggests that production takes precedent over safe and effective disposition of the waste stream or that a repeat of the 2014 WIPP incident is sufficiently probable to merit a back-up plan, which is further onsite accumulation of transuranic waste.

The FTWCs are presently located at Area G (TA-54), where a large volume of additional waste is simultaneously stored, being remediated and/or prepared for shipment offsite. The large aluminum and fabric dome structures and temporary containers used for waste staging do not have significant physical safety systems in place, including fire suppression nor continuous air monitors, according to the lab’s current safety basis for the site (Dunlevy et al. 2020). Accumulated waste in such facilities is undoubtedly more vulnerable to accidents, including fire, inclement weather, and industrial accidents that could result in ruptured drums and material release. Proper waste handling, packaging, and tracking will therefore become increasingly important as the lab’s mission expands. Without this, the potential for future scenarios like that involving the FTWCs may become more commonplace and the risk of public exposure more likely.





My observations here are very preliminary reactions to an initial review of available information. I would be happy to follow up with a more detailed assessment if new or more extensive documentation of the tritium venting process should become available.

I appreciate the New Mexico Environment Department’s attention to this issue and commitment to protecting communities across the state, particularly those who have been or will be most directly impacted by nuclear weapons production.

Respectfully,  
Dr. Dylan Spaulding



Union of Concerned Scientists

	Number: 1	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:29:20 AM
Completely unrelated to the FTWC project.				
	Number: 2	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:30:19 AM
This paragraph is false, and intentionally misleading. LANL is taking extraordinary measures to ensure regulatory limits are not exceeded.				
	Number: 3	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:08:13 AM
FTWCs have no chemical incompatibility issues. This is a misleading comment.				
	Number: 4	Author: LANL	Subject: Comment on Text	Date: 8/27/2025 11:31:04 AM
Completely unrelated to FTWC project.				



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