

Public Comment Submittal from Tami Thatcher to the Defense Nuclear Facilities Safety Board (DNFSB) Regarding the Public Hearing on Los Alamos National Laboratory held in Santa Fe, New Mexico on November 16, 2022

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I wish to comment on the nuclear safety problems at the Los Alamos National Laboratory (LANL) at the plutonium facility known as PF-4 and in regard to transuranic waste.

The Public Hearing on LANL

The Defense Nuclear Facilities Safety Board held a public hearing on November 16 on legacy cleanup, on existing heat source plutonium (Pu-238) for space missions, and on increased nuclear weapons pit production at the Los Alamos National Laboratory (LANL) in New Mexico.

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The Defense Nuclear Facilities Safety Board asked direct and important questions regarding nuclear safety issues at LANL of the National Nuclear Security Administration (NNSA), the Field Office and its contractors at LANL who were panelists at the November 16, 2022 hearing. Ongoing delays in 10 CFR 830 compliant documented safety analysis, performing needed safety upgrades and the recent retraction of previous commitments for safety upgrades at the LANL plutonium facility known as PF-4 were among the topics of the hearing.

The “documented safety analysis” (DSAs) are the analysis for Department of Energy nuclear facilities and are relied upon to protect workers, the public and the environment.

Regarding the status of documented safety analyses and safety upgrades at LANL, the panelist’s responses can be summed up as, “we are being very thoughtful and working very hard,” “it’s costly to make safety upgrades,” “it’s a difficult time now, in the U.S. for construction projects,” “surprises, are by definition, surprises,” and “there’s nothing we would rather do than meet all the requirements...” Unstated is that NNSA will not be attempting to meet the requirements deemed needed for protection of the offsite public.

Some improvements to the plutonium facility at LANL, known as the PF-4 facility, have apparently been made such as improvements to the building structure to prevent its collapse in a seismic event.

Specific gloveboxes that handle molten materials were seismically upgraded so that these gloveboxes would not topple over in a modest seismic event. But other gloveboxes were not made seismically capable of withstanding even modest Performance Category 2 seismic events.

¹ Defense Nuclear Facilities Safety Review Board website at dnfsb.gov, November 16, 2022 meeting on the Los Alamos National Laboratory, see meeting agenda, videos, exhibits for cleanup and increased pit production and other information on the dnfsb.gov webpage <https://www.dnfsb.gov/public-hearings-meetings/november-16-2022-public-hearing>. As of November 30, 2022, no meeting transcripts had been provided yet. Announced during the meeting but not on the website, public comment is allowed until December 16, 2022 to hearing@dnfsb.gov

Delayed Safety Analysis and Safety Upgrades at LANL

Safety upgrades identified as needed at PF-4 since 2009 continue to be delayed or eliminated completely from project planning.²

I think there is reason to believe the delays in providing needed nuclear safety upgrades at PF-4 may continue beyond the now-stated 2026 timeframe (See Exhibits for the NNSA session, particularly Exhibit 30.) And I see the elevated risks to the public and to workers from LANL's PF-4 as unacceptable. The permanent loss of lives and homes due to a large radiological release from PF-4 could be the result if NNSA's shortcutting safety prevents an accidental release of radionuclides from the facility. Large radiological releases to the offsite public are unacceptable. Large as well as lesser accident conditions will likely result in unacceptable worker intakes of radionuclides as well.

The panelists tended to deflect DNFSB questions and to defend the slow progress on safety upgrades and the retraction of previously planned upgrades to the confinement ventilation system. There may be "lots of other things LANL is doing" for safety, but the panelists did not coherently explain what these things were or what the present status of these upgrades was at the time of the hearing. The Department of Energy nuclear safety regulations do not require a coherent assessment of facility accident risk.

Over two decades ago, in January of 2001, the Department of Energy's Code of Federal Regulations 10 CFR 830, "Nuclear Safety Management" for Department of Energy nuclear facilities. DOE nuclear facilities were to have submitted a compliant nuclear safety basis to DOE by October 10, 2001. And these submittals were to include all types of facilities accidents, including seismically induced accidents and other natural phenomena hazards specific to the location of the facility.

And although many submittals were later than October 2001, LANL is setting records in tardiness in completing upgraded "documented safety analysis" for LANL's plutonium facility, PF-4 (as well as LANL's cleanup operations).

Some DOE nuclear facilities in the DOE Complex sought and achieved updated nuclear safety basis documents that met the intent of 10 CFR 830 and did so before 2005.

Other DOE nuclear facilities, such as plutonium facilities in Idaho at the Materials and Fuels Complex at the Idaho National Laboratory and at the plutonium facilities at the Los Alamos National Laboratory in New Mexico, did not prepare nuclear safety basis upgrades that met the intent of 10 CFR 830 and had not done so by 2011 and even now.

For LANL, in 2022, they still have not prepared an submitted for approval nuclear safety basis documents that would meet the intent of 10 CFR 830 for cleanup of existing above-ground

² Los Alamos National Laboratory, *SSUP* [Safety System Upgrade Project] *Project Implementation Plan*, Revision 0, Los Alamos National Laboratory, Los Alamos, NM, March 2009

waste. LANL lacks the plans and processes, as well as the safety analyses for needed LANL waste exhumation and disposal of problematic legacy radioactive (transuranic) waste.

Continued Fiddling With Accident Severity Estimates

Nuclear safety basis documentation for DOE nuclear facilities is relied upon for the protection of workers, the public and the environment. At the Idaho National Laboratory, the facilities that were tardy in submitting upgraded seemed to search for clever ways to lower estimated worker and offsite public radiation doses. Year after year, they searched for ways to excuse themselves from making safety improvements and ways to avoid the inconvenience and cost of making safety improvements to mitigate accidents and prevent significant offsite radiological releases.

A similar thing seems to be continuing at LANL, even now, in 2022. The analysis to obtain a desirable building leak path factor for PF-4 remains an ongoing effort at LANL. The objective is to achieve the lowest offsite public dose by “pencil whipping” the problem to claim that the offsite dose to the public is below 25 rem.

At the Idaho National Laboratory (INL), at its Materials and Fuels Complex (previously known as ANL-West), indefensible choices were made in the documented safety analysis in the selection of DOE handbook values (DOE Handbook, DOE-HDBK-3010-94). The airborne release fraction from the DOE Handbook is used to determine the amount of material that could become airborne during an accident. Technically indefensible choices made by INL’s contractor Battelle Energy Alliance were approved by the Department of Energy when the choices lowered the estimated accident consequences. Despite considerable expertise around the DOE Complex, these problem plutonium facilities seem to prefer in-house teams dedicated to do whatever finagling possible to lower the estimated accident consequences (and likelihoods). The DOE’s documented safety analyses are typically not made publicly available.

At the INL, technically indefensible estimates of accident likelihood were made and approved by the Department of Energy. The accident likelihood and consequence at the Materials and Fuels Complex Zero Power Physics Reactor facility, in 2011, had been low-balled in technically indefensible ways. Analysis of potential worker doses were not evaluated at any appropriate level of detail, yet the documented safety analysis was approved by DOE.

Discoveries of Potential Inadequacies in the Safety Analysis

When it is discovered that an accident at a DOE nuclear facility is more likely to occur or would have worse consequences than previously stated in the approved documented safety analysis, this is called a “Potential Inadequacy in the Safety Analysis” or PISA. There have been two dozen PISAs associated with LANL’s cleanup operations. The LANL cleanup operations documented safety analysis has still not been upgraded to meet the 10 CFR 830 regulations issued two decades ago. Excuses that the older safety analysis are adequate yet just not “modern” display ignorance of the importance of adequate documented safety analyses to protect workers, the public and the environment.

Unwise Reliance on Integrated Safety Management to Compensate for Inadequate Nuclear Safety Analysis

At the Idaho National Laboratory, at MFC, unrealistic assumptions regarding worker evacuation and doses to workers were made, despite many unheeded recommendations to provide more thorough evaluations of worker safety. At INL, the philosophy was adopted that rigorous “Integrated Safety Management” of work processes would compensate for the inadequate nuclear safety basis or documents referred to as “documented safety analysis” or DSAs.

In practice, at INL’s MFC, the documented safety analysis that was known to not meet the intent of 10 CFR 830 but this documentation was used and in fact relied upon to train workers and nuclear facility management. And the technically indefensible safety basis was effective in providing false reassurance to workers and work planners and radiological control personnel.

When these DOE nuclear facilities take years or decades to attempt to upgrade their documented safety analyses, why would DOE expect that adequate nuclear safety expertise would somehow become abundantly available for ad hoc work planning? But this assumption was repeated at the meeting, the assumption that rigorous Integrated Safety Management (or work planning that requires identifying and mitigating the hazards) would save the day and compensate for the inadequate nuclear facility documented safety analysis.

At the INL’s MFC, some accidents were documented incorrectly as being “extremely unlikely” that actually were “anticipated” events and were actually even more likely “expected” events.³ Yet, events deemed “extremely unlikely” were a rationale for work planners to ignore the worker safety mitigations for the accident, although likely other factors were involved.

At INL, technically indefensible calculations that underestimated the potential accident radiation doses also can and did mislead facility managers as well as work planners at INL’s MFC for handling plutonium materials.

So, it is deeply troubling to hear LANL’s cleanup contractor defend the lack of updated documented safety bases or DSAs because they assume that rigorous Integrated Safety Management processes will compensate for the, now two decades of failure, to provide safety analysis for cleanup operations that meet the intent of 10 CFR 830. Certainly, Integrated Safety Management is essential, but it may not compensate for errors and deficiencies in the older safety analyses. Integrated Safety Management would not typically initiate a seismic analysis. But more importantly, the safety analysts who are years behind on completing the safety analysis upgrades are not necessarily available or qualified to assist with work planning. What are facility

³ Typically, in nuclear facility safety analysis, an “anticipated event” is deemed less likely than 1-in-100 years. However, an “expected event” would be deemed less likely than 1-in-10 years recurrence interval. The important distinction between an anticipated event and an expected event, however, is not required by the Department of Energy.

managers, operations personnel and radiological control people qualified on, if they are trained on the facility with the inadequate, older, safety analyses?

The accident at the Idaho National Laboratory on November 8, 2011 at the Materials and Fuels Complex (MFC), at the Zero Power Physics Reactor (ZPPR) where defective plates were handled in a malfunctioning fume hood, involved the DOE-approved yet inadequate documented safety basis for the facility.⁴ DOE had declared that rigorous “Integrated Safety Management” would compensate for the inadequate safety documentation but in fact the inadequate safety basis documentation was used as a rationale for not putting needed worker protections in place. With qualified nuclear safety analysts in such short supply that documented safety basis documents were delayed for years, why would DOE expect experienced and qualified nuclear safety analysts to be involved with work planning? And why aren’t the lessons learned from the INL’s MFC accident at the ZPPR understood around the DOE Complex?

Deficient Worker Safety Analyses

The Department of Energy at INL had for years recognized that worker safety for workers in the workroom at the MFC ZPPR facility regarding the plutonium inhalation hazard had not been properly addressed.⁵ Yet year after year, this was not addressed. Despite the problem in the safety analyses of the lack of defensible radiological dose consequences to in-facility workers being identified as recently as 2005, as of 2011, no in-facility dose evaluations for the Zero Power Physics Reactor facility had been conducted.

The Department of Energy, who approved of the unverified assumptions and inadequate analyses in the ZPPR safety analyses, would later, after the 2011 plutonium inhalation event, continue to direct blame to the workers in the facility who were doing exactly what they were directed to do. The training material developed after the 2011 plutonium inhalation event would be directed to those workers rather than to the management of the facility at INL’s MFC, the safety analysts or the radiological control management.⁶ The fact that DOE did not correctly and

⁴ U.S. Department of Energy Office of Health, Safety and Security Accident Investigation Report, *Plutonium Contamination in the Zero Power Physics Reactor Facility at the Idaho National Laboratory, November 8, 2011*, January 2012. See page 14, page E-6, and E-8.

⁵ Robert Boston et al., Department of Energy, “Department of Energy Review of the Materials and Fuels Complex Documented Safety Analysis,” Conference preprint, circa 2006. This paper states that in 2005 (when Battelle Energy Alliance took over ANL-W), it had been found that Materials and Fuels Complex documented safety analysis reports did not meet the safe harbor provisions of 10 CFR 830 Subpart B, Nuclear Safety Management Rule and upgrades would be a multiyear process. The problems identified include the use of mitigated accident evaluation rather than unmitigated and the lack of in-facility work dose consequence analysis. The ZPPR risk ranking is prioritized as the second highest of 7 facilities. The paper describes how the safety analysis process was to intentionally defer to the future any problems such as references that cannot be found to support the accident analysis or quality or seismic capability of structures, systems and components. Reliance was to be placed on rigorous “Integrated Safety Management.”

⁶ Department of Energy, Radiological Safety Training for Plutonium Facilities, DOE-HDBK-1145-2013, March 2013. This training material only faintly addresses the hydride problem with ZPPR fuel, the radiological control failures, the years of safety analyses errors, the misuse of the DOE-HDBK-3010 guidance and fails to address that management refused to act to protect workers from an identified expected event. The problem of underestimating the amount of buildup of radioactive powder and the health harm is not actually addressed by this terribly

comprehensively provide lessons learned from the 2011 plutonium inhalation event at INL's MFC to the DOE Complex is also telling of the delusional safety culture prevalent within DOE.

Expanding Plutonium Pit Production at LANL's PF-4

At LANL, the plutonium handling facility, PF-4, is expected to increase operations and staffing for weapons pit production, continue heat source plutonium (Pu-238) operations for defense and space missions, and other plutonium research.

At PF-4, safety deficiencies were certainly recognized by 2001, although a detailed plan was not published until 2009.⁷ The safety upgrades are needed to protect the offsite public from a large airborne radiological release that would exceed 25 rem. Worker safety was not mentioned at the November 16 public hearing, but would also be affected by the inadequate documented safety analyses for cleanup of transuranic waste operations as well as PF-4 operations.

The heat source Pu-238 is used for National Aeronautics and Space Administration (NASA) missions and defense missions.⁸ The plutonium glovebox work for the heat source (Pu-238) creates the risk of very high radiological releases to the offsite public and was stated in the hearing on November 16, 2022 as posing the offsite public radiation dose **roughly 200 times higher than for weapons pit production.**

NNSA Acceptance of Obscenely High Accident Offsite Public Doses

An August 2022 letter from the DNFSB to DOE states that the National Nuclear Security Administration (NNSA) has accepted **the extraordinarily high mitigated offsite dose consequences range from 490 to 3175 rem, via the "exigent circumstances processes."** Typically, radiation doses above about 400 rem are considered lethal. Vast areas would become permanently uninhabitable and citizens will die because of the extraordinary and irresponsible lack of adequate safety mitigations.

Again, let me emphasize, that the mitigated offsite dose consequences far exceed 25 rem and range from 490 to 3175 rem for certain heat source Pu-238 operations at PF-4.

The true horror of the extraordinarily high radiological risks from radiological releases to the offsite public that may far exceed 25 rem from PF-4 operations that the NNSA is accepting at LANL was not made clear during the meeting.

inadequate document which grossly misrepresents causes and consequences of the November 8, 2011 accident at the Idaho National Laboratory's Zero Power Physics Reactor facility.

⁷ Defense Nuclear Facilities Safety Board letter to the Department of Energy, Secretary James Richard Perry, dated November 15, 2019, which transmits the DNFSB Staff Report "Safety Basis for the Plutonium Facility at Los Alamos National Laboratory," August 16, 2019, at DNFSB.gov

⁸ Defense Nuclear Facilities Safety Board letter to the Department of Energy, Secretary Jennifer Granholm, dated August 11, 2022, which transmits the DNFSB Staff Report "Receipt and Repackaging of Large Amounts of Heat Source Plutonium at the Los Alamos National Laboratory Plutonium Facility," May 27, 2022, at DNFSB.gov

New Mexico's citizens are being offered excuses by NNSA that appropriate safety class and seismically capable nuclear safety systems are too expensive and too difficult to construct, especially now.

The slipping of the schedule to complete needed safety upgrades was mentioned at the November 16 hearing, but the extent that this has been going on for over a decade and actually for at least two decades was not emphasized enough.

Why hasn't the Department of Energy or the National Nuclear Security Administration (NNSA) complied with the intent of DOE regulations? Because it is costly and inconvenient to provide appropriate protection of workers and the offsite public.

And importantly, because they can choose to not comply. These agencies are not being made to comply with their own regulations. Yet, they continue to parade these regulations in documentation such as is included in Environmental Impact Statements for NEPA and it is implied that these agencies actually comply with these regulations rather than exempt themselves from complying.

Rather than comply with 10 CFR 830 for Department of Energy nuclear facilities and meet the intent of these regulations to protect the offsite public, DOE and/or NNSA have invoked the "exigent circumstances processes." At PF-4, rather than ensure the offsite public dose remains well below 25 rem, they are accepting the offsite public dose **consequences range from 490 to 3175 rem. Despite the mitigated radiation doses to the offsite public being far above 25 rem, they are refusing to upgrade the confinement ventilation system. They are also refusing to implement meaningful and enforced combustible loading limits and by reducing the amount of material at risk, the grams of material in vulnerability storage or processes, to reduce the risk.**

The failure, for two decades, to make more substantial progress on providing adequate protection of the public and the workers at PF-4 is not excused by recent difficulties due to COVID and worker shortages, despite the excuses from NNSA Administrator Jill Hruby. The acceptance of further high-hazard operations at PF-4 is an egregious act.

These managers may be rewarded for their foolishness. Their retirement pensions may not be adversely affected. But their recklessness could result in an accident that permanently contaminates parts of New Mexico. Workers and the public may pay with their lives or face illnesses and shortened life spans.

Is part of the reason for the unsafe decisions based on the reality that the DOE contractors know they can control much of the information about the monitoring and the declared severity of the event?

Radiation Dose Estimation is Controlled by DOE Contractors Who Caused the Accident

At the Idaho National Laboratory, regarding the 2011 plutonium inhalation event at MFC (operated by Battelle Energy Alliance), the radiological control manager assured a formal citizens advisory board for INL that no curtailment of radiation work would be needed for any of the workers exposed to the 2011 accident at MFC. This would imply a radiation dose below 100 millirem for the intake. Yet, the reality was that bioassay results would prevent more than one worker from returning to radiation work for many months and there was no technical basis for such a claim.

The accident investigation report by DOE headquarters for the 2011 MFC plutonium inhalation event would not include the finding that the fume hood fan in operation had a substantially closed damper and this was only documented in an update of the DOE occurrence report.⁹ The DOE headquarters report also left many inconsistencies regarding nasal swab results and lung count irregularities unexplained.

Lung counts performed by DOE contractors are often the determining factor used to then claim that no inhalation occurred. Yet, in fact, manipulations to lower the lung count results can be made without those manipulations being documented in the lung count report. Also, for the 2011 plutonium inhalation event at MFC, the highest lung count result in the group would have yielded an estimated dose over 5 rem.

Inexplicably, the highest lung count result was not included in the dose estimates made for the lung count results for the group of workers involved. And it was made to appear that all lung count results had been assessed. The DOE has stated that no skin contamination occurred nor was there any miscalibration issue.

Radioactive material particle size as well as solubility is often not accurately known and can influence the estimated dose by a factor of 10 or more. Dose conversion factors for actinides such as plutonium have changed over years and have increased (around 2018).

Needed Safety Upgrades at LANL's PF-4

At LANL, year after year, and actually for at least two decades, needed safety upgrades to protect the public have been talked about but very few changes made. There have been improvements to the seismic capability of the PF-4 building and to certain gloveboxes, but only to the glove boxes that handle molten material.

At LANL, completion of the improvements to the fire suppression system has been delayed to 2026 (see Exhibit 30 for the hearing). Completion of efforts to address aging components for the ventilation system have also been delayed to 2026 (also see Exhibit 30).

Despite some seismic bracing for some gloveboxes at PF-4, many, probably most gloveboxes at PF-4 remain vulnerable to seismic events because they are not seismically braced. And some of these gloveboxes handle powders or solutions of material.

⁹ Department of Energy Occurrence Report, NE-ID—BEA-ZPPR-2011-0001, "ZPPR Workroom Pu Contamination Event in MFC-775," Update September 25, 2012.

It is telling that at INL, the dismantling of a Pu-238 glovebox shipped to Idaho from Mound — an empty glovebox — coincided with elevated detections of Pu-238 miles from the operation of preparing the glovebox for disposal, in 2018. DOE never has admitted to the source of the elevated environmental contamination.

The amount of material at risk, or MAR, is the amount of radiological material that is handled and can be involved in an accident leading to airborne release. And the NNSA has approved very large amounts of material at risk that will be allowed to be handled and in vulnerable conditions, despite the gloveboxes not being seismically braced and the fire suppression system not being seismically capable and the confinement ventilation system not being safety class or seismically capable.

And the DNFSB points out that even the relatively easy measures to help reduce the offsite public dose consequences were not taken. These measures include specific, meaningful and enforced combustible loading limits that were not put in place for high hazard heat source plutonium (Pu-238) work. These measures also include limiting the amount, (grams or curies) of material-at-risk allowed in unsafe configurations and this would have reduced the offsite public dose consequences but also were not put in place at PF-4.

The years of delays in making needed safety upgrades to protect workers, the offsite public and the environment display an erroneous LANL and NNSA group think that seismic events and other accidents won't happen. Or is it related to a perverse discounting of the true harm to people's health and lives from these events?

The DNFSB is allowed to make recommendations but has no authority to make DOE or NNSA act responsibly. The vigorous responses by the panelists that included NNSA, LANL and its contractors were intended to defend the lack of progress in completing needed safety upgrades and acceptance of outrageously high levels of risk. The excuse making was extensive but the progress on needed safety upgrades was not.

While building structural improvements are said to have been made to LANL plutonium facility, PF-4, the Department of Energy allows meeting seismic performance category 3 (PC-3) for non-reactor facilities. The actual amount of plutonium that could be released and high likelihood of an accident at PF-4 would actually require, by technically appropriate rationale, meeting the more stringent PC-4 seismic performance category required of nuclear reactors.

And in reality, much of the equipment in PF-4, both safety related and non-safety related, it appears, will likely not survive a PC-2 seismic event. And non-safety equipment that falls may be able to degrade the performance of safety equipment.

It can be easy for managers to be motivated to dismiss the importance of a large seismic event that may be very expensive to mitigate.

Smaller PC-2 Seismic Events Should Not Be Ignored

The problem often overlooked is that the more frequent but less severe seismic events also need to be mitigated. Preventing the failure of equipment at the PC-2 seismic event (less severe than the PC-3 or PC-4 seismic event) may be very important to worker and public safety.

This means that equipment, including gloveboxes, that is likely to topple or not function following a rather mild or moderate (PC-2) earthquake, and at the relatively high likelihood of a relatively mild PC-2 seismic event. **This means that the PC-2 seismic events need to be carefully considered for worker and offsite public protection, as well as larger seismic events (such as PC-3 or PC-4).**

Instead, decisionmakers may convince themselves that the worst earthquake, coupled with a fire, is not likely to occur and therefore, they can ignore it along with all other seismic events. So, along with ignoring the PC-3 or PC-4 seismic event, they also tend to ignore the more likely PC-2 seismic events.

The earthquake level that would take out commercial power, with possible vulnerabilities at a switchyard ought to be estimated, particularly for older switchyard equipment. The adequacy of backup power for radiation monitoring, as well as fire suppression systems and confinement ventilation need to be considered. Requirements for backup power for radiation monitoring have been relatively loose at DOE facilities.

Seismic Failure or Movement of Non-safety Equipment Should Not Be Ignored

The unrestrained large rolling tool boxes and other seismically unrestrained equipment at PF-4 indicates a lack of understanding and a lack of comprehensive accident scenario evaluation of seismic vulnerabilities at PF-4.

“Two-over-one” analyses have long been recognized in the nuclear industry and even by the DOE. The “two-over-one” analyses are the need to recognize when non-safety equipment can degrade safety equipment, and that would include impeding safe and prompt evacuation. Data on how fast workers can evacuate, when the workers are primed and ready for the drill has little meaning in a real event, no matter how deftly a panelist can avoid directly answering the question.

Status of Safety Upgrades for PF-4

During the November public hearing, the status of safety upgrades and prudent safety controls was not always clear. Certain upgrades may be in progress but yet not be slated to be completed until 2026.

At PF-4, remaining safety upgrades include needed fire barriers, fire sprinkler lines, and the removal of firewater lines to buildings that are not non-seismically capable of PC-3 events. The upgrade of fire suppression system power supplies from diesel generators and their often-deficient fuel supply lines, is also apparently needed.

At PF-4, it has long been known that many gloveboxes still need safety upgrades for seismic restraint (rated to PC-3), including gloveboxes containing liquid solutions of plutonium and powders and other forms.

And at PF-4, remaining safety upgrades for the confinement ventilation system are needed, but may never be performed. If there was ever a DOE facility that needed a safety class confinement ventilation system, LANL's PF-4 is such a facility because (1) of the far greater than 25 rem offsite dose without it and (2) there are about 1000 workers in PF-4 now and that number is expected to grow.

A procedure to evacuate and to verify closure of the doors to the facility PF-4 facility would still be needed, in case this was a PC-4 earthquake or other adverse condition. But the closure of the doors at PF-4 would not be as important if a confinement ventilation system were collecting the airborne plutonium in HEPA filters rather than spewing it to the offsite public living near PF-4.

What happens if the door won't close due to structural damage or just a bad latch? What is odd about PF-4 is that while they are claiming that the structure has been upgraded to PC-3, this typically does not mean that the building would remain leak tight.

What happens if the HEPA filters are damaged, say by a fire in the building. Are the fans going to blow the contamination out the stack? There is a need for systems that can detect what is happening and what areas are contaminated. There needs to not be reliance on the fortuitous failure of the fans, should they continue to be operable. And there is a need to monitor the door closure status and the need for effective radiological monitoring.

I am curious as to how the evacuating workers will know where the radiological releases are blowing to. And where will contaminated workers go to be decontaminated, chelated and lung counted?

The high levels of many decay products from Pu-238 and uranium tend to create the need for tailoring constant air monitoring systems to avoid alarming during routine operations. A constant air monitor set to alarm on high levels of plutonium-239 may not alarm on high levels of Pu-238 or of high levels of americium-241.

At the Idaho National Laboratory, the handling of americium-241 and its airborne spread in a laboratory was missed because the constant air monitor was set to alarm on Pu-239. And although the CAM did alarm on the Am-241, its error message of "poor fit" made the facility workers believe it was a false alarm. It was only weeks later when the filter for the air monitor were examined, that they realized there had been an elevated release that exposed workers.

The challenges of detecting the different plutonium isotopes and associated progeny and associated radionuclides that may accompany the plutonium should not be dismissed at PF-4, especially for the wide variety and evolving missions at PF-4.

Seasoned professionals trained to recognize and monitor ‘weapons grade’ pit plutonium-239 may not expect the radionuclide compositions present in ‘fuel grade’ materials that have higher plutonium-240, plutonium-241 and higher americium-241. Worker intakes of plutonium-241 were ignored in the 2011 plutonium event at INL, yet this can be a significant dose impact for ingrowth of Am-241 in the body after inhalation.

The multiple missions existing at PF-4 and the evolving and increased level of pit production and other missions at PF-4 will complicate the detection of radiological releases and the needed preparation for medical attention for workers who inhale various plutonium airborne materials.

And as with the radiological emergencies that have occurred at Idaho at MFC in 2011 and the four waste drums that popped their lids and expelled their contents due to incompatible materials in 2018, workers were put in harms way. Inadequate characterization of the waste materials in the drums was allowed, despite warnings that the materials could contain beryllium. Addressing beryllium in the waste was inconvenient, and so the incompatible materials had been deliberately ignored. And despite the unusual waste composition of unreacted uranium metal, less care rather than more care was taken with the unusual waste stream. Care was taken to not refer to the pyrophoric metal uranium as a pyrophoric material, however. My point is that accidents can happen without a seismic event and subsequent fire.

At the 2018 event at the INL cleanup project with four drums that ejected their contents (operated by Fluor Idaho), the radiological air monitor was so clogged with material it did not alarm. There was a fire alarm and emergency responders had no idea that they were responding to a radiological event. And once there, there were no personnel who knew what operations had been performed that day and no operations personnel with self-contained breathing apparatus qualifications.

What’s At Stake at LANL’s PF-4?

What is at stake if PF-4 has a large release of airborne radionuclides? The meaning of even a 25-rem dose to the offsite public may sound benign to some people. The 25-rem guideline was the level at which, when exceeded, safety class mitigations would be expected to be implemented. With a plutonium-239 or plutonium-238 inhalation dose of 25 rem to the offsite public, the amount of release is enormous. And the contamination, practically speaking, will never be remediated.

The radioactive half-life of Pu-238 is far less than Pu-239. However, both of these radionuclides decay through many additional decay progeny before eventually becoming non-radioactive lead. In the case of Pu-238, once it decays to uranium-234, the tendency is for DOE to ignore it and assume it is from naturally occurring uranium-238 decay. Environmental monitoring programs may monitor Pu-238 but DOE or state programs typically do not monitor airborne radium or radon or thallium or lead levels. Yet, these radioactive particles are still harmful.

The ability for DOE to plan ahead to obscure the true level of its environmental releases should not be ignored. In Idaho, the state monitoring programs in Idaho National Laboratory releases are coordinated with the Department of Energy to minimize the association of the elevated contamination levels with the INL, and I say this after studying decades of environmental monitoring data associated with the INL.

DOE and state monitoring programs have gaps in monitoring data that often coincide with elevated releases. The Environmental Protection Agency radiological air monitoring in Idaho and the northwest also has blackouts in air monitoring that may coincide with operations, accidents and elevated releases. To reduce the growing contamination levels by a factor of ten, they know that they only need to switch to a different analytical laboratory to send the environmental samples to.

There are many reasons to suspect that the LANL safety posture is extremely precarious for the many types of accidents that may occur there. They may rationalize that a serious earthquake and a fire are remote possibilities. But there are many potential accidents at PF-4 and at LANL and the NNSA, the Field Office and its contractor's responses to DNFSB's questions give me, with my background as a nuclear safety risk analyst and my study of INL accidents, no reason for confidence in LANL's safety posture.

LANL Transuranic Waste

Regarding the cleanup of legacy waste at LANL, it is positive that there have recently been increased shipments of waste to the Waste Isolation Pilot Plant (WIPP) also in New Mexico. It was LANL's noncompliant packaging of waste that caused the breach of a waste drum inside the underground disposal facility at WIPP and years of recovery, at very high cost to the taxpayer, from that accident. An unstated number of similar drums remain in Texas, also from LANL that pose the risk of chemical reactions of incompatible materials packaged in the drums, which were excluded from the November 16 hearing's discussions.

There may be a lack of understanding of the high consequences of radiological releases that can occur from a transuranic waste drum. After all, the public is not told the radionuclide inventory of these drums and DOE itself has underestimated these amounts. The drum from LANL that exploded inside the WIPP facility was found to contain far more radioactive material and to release far more radioactive material than the documented safety analysis for WIPP had assumed possible.

Despite the cleanup panelist's responses that reflected their desire to appear competent, the difficulties and challenges that remain at LANL regarding waste cleanup were not presented. Why LANL is decades behind other DOE facilities was not described.

At LANL, the processes and facilities for remediation of above-ground waste drums do not exist. And the processes and facilities for addressing the buried waste at LANL do not exist. The amount of buried waste at LANL was not discussed.

The now planned expansion of nuclear weapons pit production will greatly add to amount of newly generated waste. LANL officials steadfastly and adamantly refused to disclose the current amount of LANL's newly generated waste from existing operations.

Cleaning up legacy waste at LANL does not appear to be a priority at LANL. Legacy and newly generated waste may pose higher risks than people realize, as the safety analyses, even the old and not updated safety analyses are not available to the public.

Wildfire risks at LANL are claimed to be addressed by removal of brush and vegetation. And yet, the standoff areas appear to be far too small to protect facilities. (See DNFSB exhibits 2 and 9 for the EM session.)

LANL's Worker Shortage and High Attrition Rate

Hiring new workers is already challenging at LANL and it takes time to train workers and even longer for workers to mature and understand their safety roles. Attrition is high, with worker attrition acknowledged to be 25 percent at LANL's cleanup project. Increased pit production work at LANL will require even more workers. The importance of a mature and well-trained workforce in preventing accidents at nuclear facilities cannot be overstated. The training programs newly implemented at LANL may be a positive step in the right direction but line management turnover and the brief training programs are not going to be as effective as naval operations and training programs LANL is attempting to emulate. The panelists understand there's a problem, but refuse to concede that it compromises safety.

Conclusion

If the new employee training is half as effective as described by Dr. Thom Mason, Laboratory Director, Triad National Security, LLC, for the PF-4 facility, at helping workers not be pressured to perform work unsafely, perhaps NNSA Administrator Jill Hruby and NNSA Associate Principal Deputy Administrator James McConnell should be required to attend those classes.

It is clear to me that Hruby is succumbing to Department of Defense pressures to continue the two decades long tradition of egregiously inadequate protection of workers and the public from LANL radiological releases, particularly at the plutonium facility, PF-4. McConnell is among those who approved the "exigent circumstances" provisions to allow immorally and obscenely high radiological offsite public doses, far exceeding 25 rem, from accident radiological releases from PF-4. Sacred lives and sacred land are poised to be lost, by the mistakes of managers who by now should know better.

These comments are from Tami Thatcher, a mechanical engineer, who was a qualified nuclear safety analyst for a Department of Energy nuclear reactor facility at the Idaho National Laboratory. Her specialty was in nuclear risk assessment for DOE and Nuclear Regulatory Commission (NRC) nuclear reactor facilities. Her work included nuclear reactor probabilistic

risk assessment and included seismic event nuclear accident risk assessment. Risk assessment is not required of non-reactor DOE nuclear facilities, but the insights from performing a systems analysis of the failure causes are relevant to non-reactor DOE nuclear facilities, despite it not being a requirement of the Department of Energy or the National Nuclear Security Agency (NNSA). She has an interest in radiological releases in Idaho, given the extensive radiological contamination from the Idaho National Laboratory in the past, and its ongoing radiological releases. She cares about and writes about past, ongoing, and future radiological releases in Idaho and outside of Idaho that are posed to workers and the public. Many of her reports and articles are at www.environmental-defense-institute.org.