Public Comment on Idaho DEQ's Approval of Class 2 Permit Modification Request and Request for Temporary Authorization for the Idaho Nuclear Technology and Engineering Center and Radioactive Waste Management Complex (Hazardous Waste Management Act/Resource Conservation and Recovery Act Permit) Located on the Idaho National Laboratory, EPA ID NO. ID4780008952

Submitted by Tami Thatcher, November 19, 2019

To Brian English, Idaho Department of Environmental Quality

Location of Permit Modification Request Documents

The Fluor Idaho, LLC and Department of Energy RCRA Permit Modification Request is at the inldigitallibrary.inl.gov as document PRR 169438 at https://inldigitallibrary.inl.gov/PRR/169438.pdf , posted for the September 23, 2019 permit change notification. Note that several supporting documents are also found at the inldigitallibrary.inl.gov including RPT-ESH-014, Revision 10 with PRR 169440, and the Evaluation of the Safety of the Situation, ESS-137 as PRR 169441.

Summary

The Idaho Department of Environmental Quality has granted approval of this permit modification request (PMR) prematurely and before the public comment period had been conducted. In this PMR, Fluor Idaho and the Department of Energy put into effect some of the measures needed to more safety treat the waste. However, this PMR provides solid proof that very few of the needed corrective actions identified in the ARP V drum event (which involved four drums) causal analysis have been put into effect. And instead of clarity on the issue of SD-176 waste that contains uranium metal, that unsealed and exposed to air heated the waste, nullifying chemical compatibility ground rules, had a chemical compatibility evaluation even existed for the waste, this PMR further muddies the issue by assuming that any quantity of small fines of uranium, that have never been through the Rocky Flats incinerator, are not to be considered pyrophoric. This PMR provides a purported chemical compatibility evaluation that lists the SD-176 waste, yet does not provide any chemical compatibility evaluation for the waste. That's OK, says Fluor Idaho, because we can create other chemical compatibility evaluation documents, if we choose.

The same sort of muddy terminology and fuzzy thinking that allowed the breach of four drums at ARP V in April 2018 is used in this PMR, yet with a twist. A specific definition of pyrophoric is chosen that is intended to not include any quantity of uranium metal that has never been incinerated or treated to oxidize it.

Many of the needed corrective actions identified in the Fluor ARP V drum event causal analysis are absent. It appears that most of the identified corrective actions identified in Fluor's causal analysis have been ignored, and at the discretion of the very same managers who enabled the ARP V drum event.

Other corrective actions identified as having been put in place, have now been removed, such as the need for off-shift personnel to understand waste operations to assist other emergency responders. Identified problems in the causal analysis but not assigned specific recommendations include the consideration of precautions during operations other than "treatment." In handling SD-176 waste prior to or after treatment, inadvertently unsealing the sealed bag in the drums, could cause oxidation of the uranium that heats the waste and facilitates chemical reactions as in the ARP V drum event. Fluor responses that drum venting is a necessary action is not responsive to the unsealing of the bag of sealed waste that has not yet been treated in a tray with the new "rake and hold" process.

The PMR statement that changes are made to address the causes of the ARP V drum event are misleading because there is no evidence of a complete and thorough attempt to address all needed corrective actions. The ambiguity in the PMR about whether SD-176 is or is not pyrophoric and does or does not currently have an adequate chemical compatibility evaluation perpetuates known unsafe conditions. The terminology tango which means that the SD-176 would not require notification of the fire department that pyrophoric waste is present that would be worsened by application of water creates new hazards, as Fluor choses to call the waste "self heating" because its limited definition of pyrophoric would not be met.

Throughout all of this is still the acceptance that as they pretend to require a chemical compatibility evaluation, they don't conduct one is the waste constituents are unknown.

The Idaho Department of Environmental Quality displays an unwarranted trust in the Permittee, being Fluor Idaho and the Department of Energy and does not conduct compliance verification on issues important to protecting workers, Idaho citizens and Idaho's environment. Instead, the Idaho Department of Environmental Quality repeats excuses such as not being able to regulate radionuclides that are regulated under the Atomic Energy Act and not having any concern over Department of Energy nuclear facility safety weaknesses. If the Idaho Department of Environmental Quality understood its lawful role in the management of hazardous waste to prevent fires, explosions, and loss of containment of the waste, it would in fact take a serious interest in unresolved gas buildup issues in waste drums, whether or not the issues were being highlighted by the U.S. Defense Nuclear Facilities Safety Board.

Background

On September 23, 2019, Fluor Idaho, LLC and the U.S. Department of Energy Idaho Operations Office submitted this Permit Modification Request (PMR) with a Request for Temporary Authorization (RTA) to the Idaho Department of Environmental Quality. The State granted the temporary authorization prior to the public comment period for the permit.

This PRM modifies the Accelerated Retrieval Project (ARP) RCRA permit to provide additional operational actions to be taken in the event of a thermal reaction, and makes other changes in response to the April 2018 drum event at ARP V involving rupture of four drums.

The four drums that exploded April 2018 at Accelerated Retrieval Project (ARP) V due to rapid overpressurization leading to four drums popping their lids off and ejecting most of their waste

into a room normally occupied by workers, would have had tragic health consequences for the workers, even if they managed to find their way to an exit with basically zero visibility as the powdery chemically and radiologically contaminated waste made a blizzard in the room. [1] A large environmental release could easily have occurred as one ejected drum lid penetrated the inner fabric lining of the enclosure. In the response that followed, fire fighters responded to a fire alarm and there was no indication of a radiological contamination event. And when Fluor's staff for the waste facility were finally available, no staff had training on self-contained breathing apparatus, which forced the use of improper and inadequately protective breathing protection.

The ARP V, where the four drums exploded, was prohibited from treating pyrophoric material by its Idaho State approved hazardous waste permit, yet that was exactly what the facility was doing. The RCRA permit required a chemical compatibility analysis but there was none. ARP V was treating waste that contained known large amounts of unreacted, unroasted pyrophoric uranium as well as zirconium.

The Idaho DEQ granted Temporary Authorization in early October, weeks before the public meeting held October 30 to allow the public to ask questions about the permit and many weeks before the public comment period closes November 19.

The September 23 letter on this PMR states: *"This PMR/RTA for the RWMC [Radioactive Waste Management Complex] addresses the process changes identified in the corrective actions and lessons learned from the April 2018 drum event at WMF-1617 [ARP V] and recovery waste processing activities to move the sludge repackage process (SRP) from WMF-1617 to WMF-1619 at the RWMC. The Permittee [Fluor Idaho and the Department of Energy] is requesting an RTA to support continued RWMC operations to treat and ship existing legacy waste outside of the State of Idaho in support of the Settlement Agreement milestones."*

Further, the permit changes as summarized: *"For wastes to be accepted for SRP processing in WMF-1619 they must have Acceptable Knowledge (AK) documents, verification of approved (permitted) EPA Hazardous Waste Numbers and verified chemical compatibility evaluations. Waste to be processed will have verified chemical compatibility evaluations in RPT-ESH-014 Chemical Compatibility Evaluation for Wastes for the Advanced Mixed Waste Treatment Project or separate chemical compatibility evaluations will be completed prior to accepting the wastes for processing. The characterization data for these wastes may indicate reactions are possible but unlikely to occur. This revised characterization and waste acceptance process for SRP processing is being added to Attachment 2. In addition, clarification is being added to Attachment 2 that identified pyrophoric waste is not accepted for SRP treatment.*

All SRP waste processed in WMF-1619 will be processed utilizing the following operational controls developed to prevent drum over-pressurization after packaging:

- *Waste material will be raked when it is emptied out of the drums on the sorting table to mix the material and expose it to air, then placed in trays.*

[1] Idaho Cleanup Project Core, *Formal Cause Analysis for the ARP V (WFM-1617) Drum Event at the RWMC*, RPT-1659, October 2018. https://fluor-idaho.com/Portals/0/Documents/04_%20Community/8283498_RPT-1659.pdf

- *The waste material will be evenly distributed within the waste tray, to the extent practical, to form a uniform depth of the waste material, and will be staged for a minimum of 24 hours in the Retrieval Area.*
- *At the end of the 24-hour hold time, the waste will be monitored using thermal camera(s) for elevated temperatures (>4 °F above ambient). If the waste temperature variation is > 4 °F above ambient temperature, the waste will be reconditioned by thoroughly raking again and holding for another 24-hour period. Once the 24-hour hold is complete, the temperature will again be monitored using a thermal camera. If the temperature variation of the waste is verified to be < 4 °F above ambient temperature, the waste may be processed through the drum packaging stations (DPSs). If the temperature variation is > 4 °F then the reconditioning rake and hold process will be repeated until the temperature after a 24-hour hold is not > 4 °F above ambient.*
- *The waste will remain staged for a minimum of 24 hours to allow for any reaction to complete so that the reaction occurs in the Retrieval Area instead of the DPSs or in a newly packaged drum.*
- *By removing the significant heat source prior to packaging of the waste in a drum, the methane generation does not occur rapidly enough to generate sufficient gas/pressure to remove the drum lid.*
- *Pre-incident planning for areas where potential exists for airborne transuranic hazards has been completed. Firefighters responding to incidents in these areas will be in full protective clothing and self-contained breathing apparatus. Fire Department radiological worker training has been enhanced with emphasis on hazardous radiological conditions and the potential for airborne alpha contamination.*
- *Additional training is provided to all Advanced Mixed Waste Treatment Project (AMWTP) Emergency Action Managers (EAMs) regarding the RWMC ARP operations."*

1. Implementation of Needed Recommendations from the ARP V Drum event is Extremely Incomplete and Lacks a Thorough and Documented Corrective Action Plan

The PMR states: *"This PMR/RTA for the RWMC [Radioactive Waste Management Complex] addresses the process changes identified in the corrective actions and lessons learned from the April 2018 drum event at WMF-1617 [ARP V]…"*

But many, in fact, most of the needed corrective actions from the April 2018 drum event identified in Fluor's causal report (RPT-1659) have not been implemented. There is apparently no documentation of what has not been implemented and why. In fact, it appears that management discretion has largely been used to disregard many important issues raised by the ARP V drum event. This is in contrast to the more systematic treatment of accident causes from the 2014 accidents at the Waste Isolation Pilot Plant (WIPP). It appears that many of the causal report recommendations have simply been rejected as too costly or inconvenient — and by the same management who allowed the April 2018 drum event at ARP V.

There hasn't been a publicly available corrective action plan [2] to explain how each recommendation or judgement of need, etc. from RPT-1659 has been addressed. It appears that if such a document exists or were created, it would show that many of the identified issues have not been adequately addressed. And unfortunately, the Idaho DEQ is doing nothing to remedy this situation.

The identified needs and recommendations in Fluor's ARP V causal report, RPT-1659) isn't complete. The analysis of the debris from the ARP V drum event documented many waste constituents not identified in the waste stream or assumed to be present in negligible amounts. Corrective actions needed to address the highly flawed waste characterization process and flawed "Acceptable Knowledge" of the constituents in the waste remains lacking and needed improvements are not formally documented.

2. Permit Changes Still Requiring an Extensive Amount of Inadequately Specific and Clear Responsibilities and Criteria for Making Decisions for Waste Storage, Handling, Transporting, and Treatment and In Fact, Still Have Many of the Factors that Setup the ARP V Drum Event

The PMR states: *"For wastes to be accepted for SRP processing in WMF-1619 [ARP VII] they must have Acceptable Knowledge (AK) documents, verification of approved (permitted) EPA Hazardous Waste Numbers and verified chemical compatibility evaluations."*

The problem is that for the drum event at ARP V, there were Acceptable Knowledge (AK) documents, approved EPA Hazardous Waste Numbers and a chemical compatibility evaluation document the listed the SD-176 waste, the waste involved in the drum event at ARP V.

Basically, this is the same setup that allowed the ARP V drum event to happen. Experts can decide that the waste they want to treat has met the above requirements – this is what happened with the waste involved in the drum event at ARP V. There remains that lack of specificity, clarity and explanation of the hazards and how the hazards will be mitigated. The current PMR, by stating that roast oxide uranium will not be allowed in the RWMC facilities and creates a narrow definition of pyrophoric material based on Department of Transportation requirements, is misleading because this PMR allows any concentration of uranium that is more hazardous than roaster oxide.

Specifically, Fluor Idaho plans to treat SD-176 in ARP VII. SD-176 is listed in the Chemical Compatibility Evaluation document, RPT-ESH-014 and is not clearly indicated as an inadequate chemical compatibility evaluation. Fluor may intend to provide a new Chemical Compatibility Evaluation for SD-176, but this is not made clear in the permit or supporting documents.

While existing experts may understand the intent to require a new Chemical Compatibility Evaluation for SD-176, staff attrition or turnover could result in interpreting RPT-ESH-014 as

[2] For an example, see the Corrective Action Plans developed for the 2014 accidents at the Waste Isolation Pilot Plant (WIPP) at https://wipp.energy.gov/wipprecovery-plans_reports.asp

providing an acceptable Chemical Compatibility Evaluation for SD-176 or certain other waste streams. And even multiple signatures have not ensured adequate review by Fluor Idaho.

3. Permit Change Allows Any Concentration of Unreacted Uranium, and Doesn't Adequately Address the Pyrophoric Properties of the Uranium that may be Present in the Waste

The permit changes are unclear in regard to whether or not unreacted uranium is allowed. In fact, while "roaster-oxide" uranium is not allowed, the more hazardous unoxidized non-roaster oxide uranium is allowed in this PMR and all without proper explanation or mitigations. This PMR will allow the same waste stream to be treated that caused the ARP V drum event, waste stream SD-176. And because the small particle unreacted uranium, that never went through the incinerator at Rocky Flats, such as in the SD-176 waste, will not be considered pyrophoric, the fire department would not be notified when this waste is brought to the RWMC for treatment. The PMR would allow unlimited grams of this form of unreacted uranium to be brought to and treated at the RWMC all while not plainly stating or addressing its pyrophoric property of self-heating prior to its treatment. The new and narrowly defined criteria for pyrophoric waste does not explain the hazard of this waste and does not fully address the hazards and needed notifications for this waste.

The current PMR identifies RPT-ESH-014, Revision 10, which is titled Chemical Compatibility Evaluation and which includes all waste streams. Discretion is required to decide whether or not the waste streams listed in the Chemical Compatibility Table are deemed "acceptable" chemical compatibility evaluations, as Fluor Idaho indicated verbally that the RPT-ESH-014 chemical compatibility evaluation would not be considered "acceptable." It is a repeat of the "set up" that allowed the ARP V drum event to happen, which was that the uranium, not being the prohibited "roaster oxide" was considered acceptable even though it was more hazardous than roaster oxide.

The waste, inside a drum and sealed in a bag for many years has not allowed oxidation of the uranium, which commences when the bag is unsealed. The oxidation of the uranium when exposed to air includes "self heating" properties which facilitated the rapid methane gas generation of the companion waste in the same drum, the beryllium carbide. Transportation from storage at the AMWTP to the RWMC, handling and storage at RWMC prior to completion of treatment to oxidize the uranium has hazards that this PMR has failed to address.

Venting of drums for gas buildup by the filters installed in waste drums has required installing vents, yet can require not penetrating the sealed bags of legacy waste. This distinction does not appear to be recognized and is a needed aspect of hazard mitigation.

This PMR, at a minimum, must specify that uranium that is not roaster oxide is to be treated and state the waste streams this applies to such as SD-176. This PMR must make its documentation, such as RPT-ESH-014 state clearly when the implied chemical compatibility evaluation is not actually deemed "acceptable." This PMR is deliberately hiding the fact that uranium, in any concentration may be handled, whether or not other constituents in the waste are known. The Idaho DEQ must require steps or processes to ensure that an adequate chemical compatibility analysis is conducted **before treating the waste** or it continues to be complicit with inadequate,

unsafe and uncompliant chemical compatibility evaluations that put workers, the public and the environment at risk.

Every chemical compatibility evaluation requires maintaining the condition of ambient temperature. This is a fact that has long been understood and documented in chemical compatibility evaluations for transuranic waste. While hazardous waste numbers (HWNs) are only defined for the non-radioactive waste constituents, a chemical compatibility evaluation requires all significant waste constituents, include the radionuclides such as uranium and plutonium, to have an assigned reactivity group number, RGN. The RGN for transuranic radionuclides is typically small enough by percent mass to often be assumed insignificant. The RGN for uranium can be significant at 0.05 percent by mass. The unreacted uranium does have to be considered in the chemical compatibility evaluation for waste containing the unreacted uranium. A proper understanding of the hazards would show that the chemical compatibility evaluation issue is not limited to the mixing of drums of other waste codes, is not limited to consideration of mixing drums within the same waste code such as mixing SD-176 drums with other SD-176 waste drums and also includes the reactions initiated by drum heatup if the unreacted uranium commences oxidizing and heating up at some point during storage, handling, and commencement of treatment. Then, assuming the "rake and hold" process is adequate, the waste after treatment would not have significant "self heating" concerns.

The fire department and other responders must be informed of the unreacted uranium which by all normal understanding is a pyrophoric material, for handling, onsite transport, storage and until treatment has been successful to sufficiently oxidize the material during treatment.

And despite the Idaho DEQ repeatedly denying that it has any responsibility for radionuclides in the waste because the radionuclide portion of the waste is regulated under the Atomic Energy act, the hazardous waste RCRA permit in fact has long had to address radionuclides in the waste and must address the hazards posed by the form and quantity of the radionuclides in the waste if the hazardous waste laws are to be complied with. The pyrophoric and/or "self-heating" properties of uranium, in fact, cannot be ignored by the Idaho DEQ, as this agency often contends.

There are many chemical compatibility evaluations that explicitly states that the quantities and forms of radionuclides in the waste must be considered and be such as to preclude heating up the waste and initiating chemical reactions in the waste. See reports for RWMC buried waste

exhumation [3] [4] as well as the recent Fluor report RPT-1662 evaluating the debris from the ARP V drum event. [5]

RPT-1662 includes a chemical compatibility evaluation that recognizes that radionuclides such as uranium and plutonium must be addressed in the evaluation and assigned RGNs despite not being RCRA hazardous waste. The fact that RPT-ESH-014 lists SD-176 and expects significant amounts of unreacted uranium in SD-176 and yet fails to assign a Reactivity Group Number for the uranium shows one example of deliberate omission of vital information that is indefensible especially given the APR V drum event. Because this very flawed PMR has already been approved by the Idaho DEQ, and the updated RPT-ESH-014 remains inadequate, clearly this PMR does not address needed corrective actions from the ARP V drum event.

The Idaho DEQ continues to fail to demand adequate rigor in the chemical compatibility evaluations for its hazardous waste permits and continues to offer excuses for its regulatory carelessness as in the Idaho DEQ's responses to public comment and to the Petition for a Hearing for the Advanced Mixed Waste Treatment Project RCRA permits this year.

4. Another "Trust Us" We'll do an "Acceptable" Chemical Compatibility Evaluation When its Needed

"Waste to be processed will have verified chemical compatibility evaluations in RPT-ESH-014 *Chemical Compatibility Evaluation for Wastes for the Advanced Mixed Waste Treatment Project* or separate chemical compatibility evaluations will be completed prior to accepting the wastes for processing."

It is business as usual for the Idaho DEQ *to assume* that the Permittee will conduct adequate Chemical Compatibility Evaluations. Even when Fluor Idaho and the Department of Energy know already that a particular waste stream will be treated under this PMR, they are declining to prepare what would be termed by them, an acceptable chemical compatibility evaluation. Instead, the basically unchanged and flawed document in place during the 2018 drum event at ARP V is used and it still includes inadequate chemical compatibility evaluations for some of the waste, but without making it clear in the document that the CCE is not adequate.

The waste streams are already known, and Fluor does not make it plain which waste streams do not have an acceptable Chemical Compatibility Evaluation. With two significant accidents in 2018 involving Idaho DEQ approved hazardous waste permits at hazardous waste and

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[3] J. R. Dick, INEEL, "Chemical Compatibility and Inventory Evaluation for the Accelerated Retrieval Project for a Described Area within Pit 4," EDF-5307, 2004 and its revision John R. Dick et al., Idaho Cleanup Project, CH2M-WG Idaho, LLC, "Chemical Compatibility and Inventory Evaluation for the Accelerated Retrieval Project and the Accelerated Retrieval Project II," EDF-5307, August 9, 2006. https://ar.icp.doe.gov/images/pdf/200608/2006081600834TUA.pdf

[4] J. R. Dick, and Brent N. Burton, INEEL, Bechtel BWXT Idaho, LLC, Prepared for DOE EM, "Evaluation of Chemical Compatibilities of the OU 7-10 Glovebox Excavator Method Project," INEEL/EXT-01-01587, June 2002. https://ar.icp.doe.gov/images/pdf/200304/2003041100126KAH.pdf

[5] Rod E. Arbon et al., Idaho Cleanup Project Core, Prepared for DOE EM, "Technical Analysis of Drum Lid Ejections – ARP V," RPT-1662, December 2018. https://www.dnfsb.gov/sites/default/files/meeting/RPT-1662%20ARP%20V%20Technical%20Analysis.pdf

radiological facilities in Idaho, because of absent or inadequate Chemical Compatibility Evaluations, it is foolish to continue to assume that a proper CCE will be conducted. See the November 2018 accident at US Ecology Grandview, Idaho and the April 2018 ARP V drum event. [6]

5. Permit Changes Ignore the Need for More Waste Sampling to Assure Reactive or Explosive Combinations of Oxidizers and Metals Are Not Combined in Unsafe Concentrations

In addition to ignoring needed Reactivity Group Numbers (RGN) for radionuclides as discussed above, this Permittee has not adequately identified or responded to known weaknesses in waste characterization, learned from RPT-1662, to determine the concentrations, for example, of strong oxidizing agents such as nitrates (RGN 104) and "metals, other elemental and alloys…" such as zirconium (RGN 22, 23 and 24). Nitrates combined with zirconium are recognized as able to create heat generating and/or explosive hazards according to the EPA Hazardous Waste Compatibility Chart. There appears to continued use of proven wrong assumptions about nitrates and zirconium concentrations in the waste, as discovered in RPT-1662.

The applicable laws that the PMR doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.13, and 40 CFR 264.17.

40 CFR 264.31, Design and operation of facility.

Facilities must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

40 CFR 264.13, General waste analysis.

(a)(1) Before an owner or operator treats, stores, or disposes of any hazardous wastes, or nonhazardous wastes if applicable under §264.113(d), he must obtain a detailed chemical and physical analysis of a representative sample of the wastes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with this part and part 268 of this chapter.

(2) The analysis may include data developed under part 261 of this chapter, and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes….

40 CFR 264.17, General requirements for ignitable, reactive, or incompatible wastes.

a) The owner or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition ***(e.g., from heat-producing chemical reactions)****, and radiant heat. While ignitable or reactive waste is being handled, the owner or operator must confine smoking and open flame to specially designated locations. "No Smoking" signs must be conspicuously placed wherever there is a hazard from ignitable or reactive waste.*

[6] Idaho Cleanup Project Core, *Formal Cause Analysis for the ARP V (WFM-1617) Drum Event at the RWMC*, October 2018. https://fluor-idaho.com/Portals/0/Documents/04_%20Community/8283498_RPT-1659.pdf

(b) Where specifically required by other sections of this part, the owner or operator of a facility that treats, stores or disposes ignitable or reactive waste, or mixes incompatible waste or incompatible wastes and other materials, must take precautions to prevent reactions which:

(1) Generate extreme heat or pressure, fire or explosions, or violent reactions;

(2) Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment;

(3) Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;

(4) Damage the structural integrity of the device or facility;

(5) Through other like means threaten human health or the environment.

(c) When required to comply with paragraph (a) or (b) of this section, the owner or operator must document that compliance. This documentation may be based on references to published scientific or engineering literature, data from trial tests (e.g., bench scale or pilot scale tests), waste analyses (as specified in §264.13), or the results of the treatment of similar wastes by similar treatment processes and under similar operating conditions.

6. Permit Changes Don't Ensure Proper Fire Protection Because Unlimited Concentrations of Unreacted Uranium May be Handled and Treated

Given the muddled and misinterpreted documentation problems that contributed to the ARP V drum event, the PMR should be using much more clear language. The permit contains specific language to prohibit roaster oxide. The PMR must also contain specific language to explain that non-roaster oxide will be allowed and then explain how proper mitigations are put in place, including proper fire suppression system design and review, proper fire department notification and so forth.

Because the new definition for pyrophoric materials would not identify the uranium that the Permittee intends to treat at these facilities, it is a setup for inadequate communication to the fire department concerning waste contents and hazards.

Fire protection review following the ARP V accident had not been provided to the Defense Nuclear Facilities Safety Board last summer, [7] and it appears that the PMR would benefit from independent review, including allowing DNFSB review of fire protection at the RWMC. Fire prevention is a hazardous waste law requirement (40 CFR 264.31, 40 CFR 264.32, 40 CFR 264.33, 40 CFR 264.17, 40 CFR 264.51).

7. Waste Characterization Not Necessarily Adequate for Storage, On-site Transportation and Handling or Treatment of the Waste

The PMR states: *"The characterization data for these wastes may indicate reactions are possible but unlikely to occur."* It was learned from the ARP V drum event that the waste characterization for the waste had not identified all the waste constituents, had assumed several constituents were in insignificant amounts when they were in higher amounts, and had ignored the long-known

[7] Defense Nuclear Facilities Safety Board public hearing and related documents at https://www.dnfsb.gov/public-hearings-meetings/public-hearing-safety-management-waste-storage-and-processing-defense The May 2019 DNFSB presentation states about 40,000 drums awaiting shipment.

property of oxidation of uranium when exposed to air which was cause sparking or flames or the heating up of the material.

Specifically, RPT-ESH-014 still wrongly assumes beryllium, zirconium and uranium are in trace amounts. Other wrong waste characterization assumptions can be gleaned from the Fluor report that evaluated the ARP V drum event debris. [8]

While the spreading out of the waste and thermal imaging in the trays has been successful, it is not clear that all waste streams have adequately tested this approach.

Due to waste constituent variability, there appears to be the need to thermally image newly repackaged drums and this control is currently lacking.

There is also the need to understand that the transporting of drums that contain potential self-heating oxidation properties, particularly prior to treatment, if the drum is involved in a forklift or other transportation mishap may initiate another ARP V -like event, except outside of a filtered building. The consequences could be adding a thousand-fold or more to the typical annual radionuclide emissions from the Idaho National Laboratory. These long-lived radionuclides would forever be blowing in the air and in our soil within 50 miles or so of the INL.

Certain forms of beryllium may dominate the worker exposure chemical risk, and it is not clear that emergency responders would know about at-risk drums.

The applicable laws that the PMR doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.32, 40 CFR 264.33, 40 CFR 264.13, and 40 CFR 264.17.

8. The Revised Waste Characterization and Waste Acceptance Process is Inadequately Documented, Particularly for Incompatible Wastes Originating from a Single Drum

The PMR states: *"This revised characterization and waste acceptance process for SRP processing is being added to Attachment 2."* There are actually no requirement improvements to waste sampling and characterization identified in the PMR. The permit still states that incompatible wastes will not be mixed, but the incompatible materials may be contained within a single drum already is still not explicitly addressed.

9. The New Definition of Pyrophoric Narrowly Defines Pyrophoric Waste and Creates Higher Risk of Inappropriate Understanding of the Hazards Posed by the Waste

"In addition, clarification is being added to Attachment 2 that identified pyrophoric waste is not accepted for SRP treatment." Pyrophoric waste was prohibited in the previous permit, the one in effect when the ARP V drum event occurred.

[8] Rod E. Arbon et al., Idaho Cleanup Project Core, Prepared for DOE EM, "Technical Analysis of Drum Lid Ejections – ARP V," RPT-1662, December 2018. https://www.dnfsb.gov/sites/default/files/meeting/RPT-1662%20ARP%20V%20Technical%20Analysis.pdf

The new definition of pyrophoric is as follows:

"VI.C.1 The Permittee shall not perform treatment of waste containing pyrophoric radionuclides at the RWMC. which AK, RTR, or assay indicate as containing pyrophoric properties at the RWMC. For the purposes of this condition, pyrophoric waste shall be defined as wastes (including mixtures and solutions, liquid or solid) which, even in small quantities, ignite within five minutes of coming in contact with air. These wastes are the most likely to spontaneously combust and are considered to have pyrophoric properties."

The new revised definition in this PMR would not have prevented the very same material to be treated as was treated when the ARP V drum event occurred because Fluor Idaho stated that it does not consider SD-176 waste to meet this definition of pyrophoric. Importantly, the new revised definition cannot be tested until during treatment — and then it would be too late. So, based on expert judgement, unoxidized uranium that may be self-heating when exposed to air won't be considered pyrophoric. This means the fire department won't be notified of the handling of this uranium metal, not even in large quantities.

The "rake and hold" procedures do make treatment of the waste safer, but this PMR is not meeting the intent of hazardous waste laws nor is it adequately protecting workers, the public or the environment.

The permit says that "roaster oxides" will not be accepted for treatment. The permit says that metal fines, turnings and shavings will not be accepted for treatment. Yet, it is the Permittee's intent to treat SD-176 with uranium metal in fine particle form that initiated the drum event at ARP V. No where in the permit is it made clear that non-roaster oxide uranium, which is pyrophoric or now what the Permittee is calling instead of pyrophoric, calling it "self heating" — it is another complicated set of unclear special definitions not spelled out in writing and importantly, failing to provide procedurally clear requirements and failure to clarify the hazards. This PMR is not adequately addressing the causes of the April 2018 drum event at ARP V.

The fire department is supposed to be notified of pyrophoric material and this new definition implies that the fire department will not be notified of unreacted uranium metal in greater than 0.05 percent by weight amounts.

The Idaho DEQ argues that it has nothing whatsoever to do with control of radionuclides, illogically, even when the controls on radionuclides pyrophoric properties or "self heating" properties must be controlled in order to prevent chemical reactions that would cause a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or surface water which could threaten human health or the environment (40 CFR 264.31) and precautions must be taken to prevent accidental ignition or reaction of ignitable or reactive waste….which generate extreme heat or pressure, fire or explosions or violent reactions (40 CFR 264.17).

In nonsensically repeatedly arguing that the hazardous waste permit is not concerned with the radionuclides in the waste, the Idaho DEQ continues to set up its permitted facilities such as RWMC for more accidents.

To restate, this PMR and the Idaho DEQ violate the hazardous waste laws that require precautions to prevent heating up the material such that chemical reactions cause excessive, rapid gas buildup causing breaching of containers and ejecting of chemically laden and extremely high airborne radiological levels when implementing such an incomplete set of controls for pyrophoric materials in the waste as this PMR does.

In most transuranic waste, radionuclides present in less than one percent by weight have typically been called "trace" amounts and were assumed to be negligible. [9] The 1990 version of the safety analysis report for WIPP described the radionuclide inventory in a drum as having an average of 10 grams of uranium-238 compared with an average 14 grams per drum of plutonium-239. The waste drums have varying weights ranging from perhaps about 300 lbs to almost 600 lbs. But while a parent drum containing an enormous amount of uranium, 11,700 grams of uranium, was treated at ARP V, one of the four drums that blew off its lid April 2018 had less than 1 percent by weight of the unreacted depleted uranium, confirming the inadequacy of the 1 percent by mass guide.

This PMR ignores the important properties of "self heating" of the uranium even when radioassay finds greater than 0.05 percent by weight of uranium, which should be assumed to be unroasted. While the stated implementation of "rake and hold" is expected to sufficiently react the uranium during treatment, the hazardous waste controls are inadequate prior to treatment.

10. The Presence of Beryllium, Beryllium Carbide, and Other Carbides is Not Adequately Addressed Nor is Preventing Excessive Gas Buildup Adequately Addressed

The presences of beryllium, beryllium carbide as was in the SD-176, waste and other carbides that may generate methane is not adequately addressed in the PMR. While the Idaho DEQ repeatedly denies applicability of Defense Nuclear Facilities Safety Board concerns about excessive gas buildup in waste drums, the gas is generated from the hazardous waste portion of the waste. The Idaho DEQ is remiss in ignoring the issues of unexplained excessive levels of gas buildup, levels which are not easily remedied, have remained unexplained, and create fire/explosion hazards in stored waste.

The Defense Nuclear Facilities Safety Board (DNFSB) communicated in a letter to the DOE on March 12, 2019 that Fluor Idaho's "rake and 24-hour hold-time control" was inadequate and "would not reliably prevent the creation of new drums with high methane concentrations."

While the "rake and hold' may be successful in preventing the rapid gas generation that caused four drums to overpressurize within hours of drum repackaging, ejecting waste contents, the problem of developing flammable levels of hydrogen and/or methane has not been addressed. The Idaho DEQ is remiss in failing to understand the relevancy of excessive gas buildup in waste drums to the ability to comply with hazardous waste laws. The applicable laws that the PMR

[9] Matthew Silva, Environmental Evaluation Group, *An Assessment of the Flammability and Explosion Potential of Transuranic Waste*, ML031910324 EEG-48, June 1991. https://www.nrc.gov/docs/ML0319/ML031910324.pdf This report includes a discussion of the allowance of up to 1 percent by weight of pyrophoric radionuclides in a container and how this is not necessarily safe.

doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.32, 40 CFR 264.33, 40 CFR 264.13, and 40 CFR 264.17.

11. Waste Treatment "Rake and Hold" Practices are Important but Aren't Proven to be Enough and Don't Cover all Aspects of Waste Handling and Storage

The PMR changes address "rake and hold" during treatment of the waste. But because of known variability and uncertainty in knowing what constituents are in the waste and in what amounts, in a single drum or when mixed during treatment and drum packaging, there are lacking thermal monitoring of newly packaged drums. And there is lacking adequate precautions when handling legacy drums prior to treatment.

The PMR states the following: *"All SRP waste processed in WMF-1619 will be processed utilizing the following operational controls developed to prevent drum over-pressurization after packaging:*

- *Waste material will be raked when it is emptied out of the drums on the sorting table to mix the material and expose it to air, then placed in trays.*
- *The waste material will be evenly distributed within the waste tray, to the extent practical, to form a uniform depth of the waste material, and will be staged for a minimum of 24 hours in the Retrieval Area.*
- *At the end of the 24-hour hold time, the waste will be monitored using thermal camera(s) for elevated temperatures (>4°F above ambient). If the waste temperature variation is > 4 °F above ambient temperature, the waste will be reconditioned by thoroughly raking again and holding for another 24-hour period. Once the 24-hour hold is complete, the temperature will again be monitored using a thermal camera. If the temperature variation of the waste is verified to be < 4°F above ambient temperature, the waste may be processed through the drum packaging stations (DPSs). If the temperature variation is > 4 °F then the reconditioning rake and hold process will be repeated until the temperature after a 24-hour hold is not > 4 °F above ambient.*
- *The waste will remain staged for a minimum of 24 hours to allow for any reaction to complete so that the reaction occurs in the Retrieval Area instead of the DPSs or in a newly packaged drum.*
- *By removing the significant heat source prior to packaging of the waste in a drum, the methane generation does not occur rapidly enough to generate sufficient gas/pressure to remove the drum lid.*

The "rake and hold" analysis is documented in EDF-11124 "ARP-VIII Resumption and Supporting Thermal Analysis," April 25, 2019 but is not specific to the waste stream of legacy waste that is to be treated. Potential issues regarding current experience using the "rake and hold" method may not apply to all waste streams that may be treated under the PMR and merit additional precautions such as monitoring newly packaged drums for excessive heat up and monitoring for excessive gas generation and does not address hazard mitigations prior to waste treatment. The applicable laws that the PMR doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.32, 40 CFR 264.33, 40 CFR 264.13, and 40 CFR 264.17.

12. PMR Changes Pertaining to Emergency Planning and Related Problems Learned from the ARP V Drum event are Inadequately Addressed

The PMR states: *"Pre-incident planning for areas where potential exists for airborne transuranic hazards has been completed. Firefighters responding to incidents in these areas will be in full protective clothing and self-contained breathing apparatus. Fire Department radiological worker training has been enhanced with emphasis on hazardous radiological conditions and the potential for airborne alpha contamination."*

- *Additional training is provided to all Advanced Mixed Waste Treatment Project (AMWTP) Emergency Action Managers (EAMs) regarding the RWMC ARP operations."*

Section H of Attachment 5 of the PMR states:

"AMWTP Emergency Coordinators who assume responsibility for emergency response at ARP facilities, especially during off hours, will receive ARP-specific training. The following presents an overview of the emergency response training.

General emergency response training of TSD unit ERO personnel includes training on the ICP EP/RCRA CP which covers the following topics:

• Spill Control Plan"

Note that is only a single topic, not plural "topics," which is spill control. There will be no waste responders for spill control except on day shift. If there's a drum impacted by a transport accident or rapidly heating up because the inner bag is punctured now allowing in oxygen and allowing the uranium to heat up and promote other chemical reactions, which are enabled at temperatures above ambient, these workers would simply have to evacuate or face significant risk to their health because AMWTP and RWMC workers are not provided with self-contained breathing apparatus equipment or qualifications.

Given the handling and storage of drums outside of a filtered building, there is significant risk to the public and environment from even a single powdery drum ejecting waste into the air.

Please note that the Idaho DEQ stated in response to comments on April 18, 2019 that "the Training Plan in Attachment 5 of the AMWTP permit will be revised to include specific training for AMWTP Emergency Coordinators who respond to emergencies at ARP facilities, especially during off-hours." All of this has apparently been removed. As I stated above, there appears to be no documented explanation discussing the ARP V drum event corrective actions that are no longer in effect or were never put into effect.

The ARP V drum event cause report also points out that no waste handling staff have qualifications to use self-contained breathing apparatus (SCBA). They may have PAPR qualifications, but for chemical gases and fumes from hazardous waste, the PAPRs are of no value and the PAPRs are much less protective than SCBA for airborne radiological

contamination. In short, this is another instance of this PMR, which claimed to address the ARP V drum event causes, but it does not meaningfully and thoroughly address the identified ARP V drum event causes and contributing factors.

So, here we have another PMR prematurely approved by the Idaho DEQ that isn't addressing known deficiencies in waste handling and treatment and is putting workers, the public and the environment at risk. And this is coupled with no enforcement action for Fluor Idaho and the Department of Energy's multiple failures that caused the ARP V drum event. The applicable laws that the PMR doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.32, 40 CFR 264.33, 40 CFR 264.16, and 40 CFR 264.51.

13. The PMR Increases the Use of Unfiltered, Vulnerable Outdoor Storage That Lacks Constant Air Monitoring

The PMR increases the use of unfiltered, vulnerable outdoor storage and outdoor transfers to outdoor unfiltered storage.

The PMR states, with the new text in blue, the following: *"Five outdoor trailer container storage areas are located near the treatment and storage units for storage of waste pending return to AMWTP or shipment off-site. In addition, cargo containers and boxes are stored outside near WMF-1617 to support interim storage of non-liquid secondary waste streams that are shipped off-site for disposal. At Outside Storage Area (OSA) located south-east WMF-1619, one cargo container and 3 trailers are used for storage. Additionally, at the OSA located north of WMF-1619, sixteen (90 cubic foot) boxes are used for storage. The WMF-1619 OSAs are necessary to support interim storage of non-liquid secondary waste streams that are shipped off-site for disposal and to support storage of waste that has been repackaged (treated/solid waste) for return to AMWTP."*

While other states such as New Mexico work to limit outdoor storage of transuranic or radiological waste, the Idaho DEQ continues to embrace more and more outdoor storage of radiological waste. This waste storage would not filter a release. There would be no warning that the waste may be potentially "self heating." And as this PMR increases constant air monitoring equipment checks, there is no constant air monitoring available for the outdoor storage.

No radiological control technicians will be available except during day shift.

The applicable laws that the PMR doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.32, 40 CFR 264.33, 40 CFR 264.16, and 40 CFR 264.51.

14. The PMR Should Not Have Been Granted Due to Lack of Compliance by the Permittee, Lack of Meaningful Compliance Verification by Idaho Department of Environmental Quality and the Failure to Provide Thorough Implementation of Measures to Prevent Accidents

The Idaho Department of Environmental Quality displays an unwarranted trust in the Permittee, being Fluor Idaho and the Department of Energy and does not conduct compliance verification

on issues important to protecting workers, Idaho citizens and Idaho's environment. Instead, the Idaho Department of Environmental Quality repeats excuses such as not being able to regulate radionuclides that are regulated under the Atomic Energy Act and not having any concern over Department of Energy nuclear facility safety weaknesses. If the Idaho Department of Environmental Quality understood its lawful role in the management of hazardous waste to prevent fires, explosions, and loss of containment of the waste, it would in fact take a serious interest in unresolved gas buildup issues in waste drums, whether or not the issues were being highlighted by the U.S. Defense Nuclear Facilities Safety Board.

The applicable laws that the PMR doesn't adequately meet include 40 CFR 264.31, 40 CFR 264.13, and 40 CFR 264.17 despite the Idaho Department of Environmental Quality's many repeated excuses over the last year pertaining to Idaho Cleanup Project RCRA permits that Idaho DEQ has no regulatory authority pertaining to the radionuclide portion of the waste or to nuclear safety. When it is identified that the Department of Energy is not safely managing gas buildup in waste drums, that gas buildup is from the chemically hazardous waste, and the Idaho Department of Environmental Quality is absurd to then offer excuses that DEQ does not regulate nuclear facility safety such as in its June 2019 response on Docket No. 0105-19-01. Likewise, when the DNFSB points out that the likelihood and consequences of drum explosions has been underestimated and therefore needed barriers and mitigations may not have been put in place, the Idaho DEQ is absurdly remiss and displays extreme ignorance of the issues by giving excuses that it does not have a role in authorizing nuclear safety, despite obvious importance to the containment of hazardous waste.

40 CFR 264.31, Design and operation of facility.

Facilities must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

40 CFR 264.13, General waste analysis.

(a)(1) Before an owner or operator treats, stores, or disposes of any hazardous wastes, or nonhazardous wastes if applicable under §264.113(d), he must obtain a detailed chemical and physical analysis of a representative sample of the wastes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with this part and part 268 of this chapter.

(2) The analysis may include data developed under part 261 of this chapter, and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes….

40 CFR 264.17, General requirements for ignitable, reactive, or incompatible wastes.

a) The owner or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition ***(e.g., from heat-producing chemical reactions)****, and radiant heat. While ignitable or reactive waste is being handled, the owner or operator must confine smoking and open flame to specially designated locations. "No Smoking" signs must be conspicuously placed wherever there is a hazard from ignitable or reactive waste.*

(b) Where specifically required by other sections of this part, the owner or operator of a facility that treats, stores or disposes ignitable or reactive waste, or mixes incompatible waste or incompatible wastes and other materials, must take precautions to prevent reactions which:

(1) Generate extreme heat or pressure, fire or explosions, or violent reactions;

(2) Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment;

(3) Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;

(4) Damage the structural integrity of the device or facility;

(5) Through other like means threaten human health or the environment.

(c) When required to comply with paragraph (a) or (b) of this section, the owner or operator must document that compliance. This documentation may be based on references to published scientific or engineering literature, data from trial tests (e.g., bench scale or pilot scale tests), waste analyses (as specified in §264.13), or the results of the treatment of similar wastes by similar treatment processes and under similar operating conditions.

15. Inadequate Protections in This PMR Mean Potential Environmental Devastation Allowed by this PMR All with Idaho DEQ's Approval

Department of Energy criteria for the public allow radiological doses that are so high, in tens of rem, that are derived for a member of the public located miles from the release that a release yielding even a low dose to the public would be environmentally catastrophic to southeast Idaho. A "low" impact to the public as deemed by the Department of Energy criteria would have a lasting impact, forever basically, and would release 100 or 1000-fold or more than is typically being released annually by the Idaho National Laboratory.

That is why additional mitigations are typically put in place to limit the risk of a large release, even if the Department of Energy risk matrix doesn't demand it. The Idaho DEQ doesn't understand or doesn't care about attempting to put adequate mitigations in place, as it stands behind the excuse that it does not regulate radioactive and hazardous waste, as it once again rubber stamps the inadequate hazardous waste permit (PMR) from Fluor Idaho and the Department of Energy, putting workers, the public and the environment as risk of the release of airborne contamination that could never be remediated. Furthermore, the Idaho Department of Environmental Quality accepts claims from the Department of Energy and Fluor Idaho, without any proof or evidence, when either one says no workers were harmed and there was no release to the environment from the 2018 ARP V accident involving four waste drums overpressurizing and expelling waste contents. The Idaho Department of Environmental Quality, by accepting without evidence, such claims, when in fact evidence to the contrary exists, is nothing but a good-ole girl and boy rubberstamp for whatever slipshod operation the Department of Energy conducts.