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Fluor Idaho Releases Causal Analysis of Why the Four Drums of Transuranic Waste Overpressurized in April

A causal analysis ¹ has been issued for the four transuranic waste drums that blew off their lids last April at the U.S. Department of Energy's Radioactive Waste Management Complex. The causal analysis states that "Management failed to fully understand, characterize, establish and implement adequate process controls for treating waste which lacked documented origin or process information." DOE's cleanup contractor, Fluor Idaho, gave a presentation about the causal analysis at the October Idaho Cleanup Project Citizens Advisory Board meeting October 25, in Sun Valley, Idaho. ²

The first smoldering drum set off fire alarms. **The fire department responded, unaware of the radioactive airborne contamination inside the fabric tension membrane enclosure because of radiation monitor malfunction.** Radiation levels reached 5 million disintegrations per minute per 100 cm². It is no small miracle that workers and emergency responders were not present inside the enclosure when the drums exploded.

Of about 20,000 drums of waste that had been exhumed from burial in the 1970s, a few thousand drums of waste had been characterized for years simply as contents "unknown." The drums involved in the event were exhumed after 1973. Then a few years ago, the waste known to have resulted from various processes for weapons production was designated as SD-176 waste. Dozens of possible chemicals were ascribed to this catch-all category for powdery material considered "homogeneous solids." It was not unusual for Rocky Flats to apply Portland cement-like material to drums with various chemical, radionuclide and metal wastes. ^{3 4}

The Accelerated Retrieval Project V at the Idaho National Laboratory had more commonly dealt with less reactive depleted uranium in the form of "roaster oxide." The unreacted uranium in the drums was not visible as material was raked and repackaged. But uranium oxidation caused the newly repackaged drums to heat up.

¹ 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

² Idaho Cleanup Project Citizens Advisory Board (formerly the Idaho National Laboratory Citizens Advisory Board) meeting schedules and presentations at <https://energy.gov/em/icpcab/idaho-cleanup-project-citizens-advisory-board-icp-cab> Meeting held October 25, 2018 in Sun Valley. Presentation "Discussion with Citizens Advisory Board ARP V Drum Event," Fred Hughes, Fluor Idaho participating.

³ North Wind Inc. for U.S. Department of Energy, Environmental Management, "Historical Background Report for Rocky Flats Plant Waste Shipped to the INEEL and Buried in the SDA from 1954 to 1971," ICP/EXT-04-00248, Revision 1, February 2005. <https://ar.icp.doe.gov/images/pdf/200504/2005040400022KAH.pdf>

⁴ See the July 2017 EDI newsletter for a timeline for the burial ground at the Radioactive Waste Management Complex and other cleanup information at <http://www.environmental-defense-institute.org/publications/News.17.July.pdf>

The elevated temperatures facilitated the reaction of another material, beryllium carbide. The beryllium was later found in much higher levels than expected. Methane gas was released from the reaction which overpressurized the drums within a few hours of repackaging after workers had gone home.⁵

The integrity of the enclosure was nearly compromised by the heat and also by one of the ejected lids which penetrated a layer of the enclosure.

Contrary to the RCRA permit approved by the Idaho Department of Environmental Quality for processing this hazardous waste, this SD-176 waste repackaging was conducted **without** the preparation of a chemical compatibility analysis, or reactivity or pyrophoric material analysis.

Contrary to Department of Energy regulations, no nuclear safety analysis was conducted for this new waste stream. The DOE also violated its radioactive waste management order by not having a plan for disposing of the waste prior to processing it. **Current Waste Isolation Pilot Plant (WIPP) waste acceptance criteria were not being applied at ARP V where the drums exploded.**⁶ After the Idaho drum explosions, a law was passed requiring the Government Accountability Office to report on the event.⁷

The SD-176 waste was exhumed from pits 11 and 12 during the Initial Drum Retrieval (IDR) Project in the 1970s after 1973. The wastes were stored above ground at the RMWC. The Site Treatment Plan is a document required by law that specifies what waste is at the INL and where the waste is going to be disposed of.^{8 9}

⁵ Environmental Defense Institute newsletter article for May, "Several Barrels of Waste Overpressurize Within Hours After Being Repackaged at the Idaho Cleanup Project ARP V," and for August, "Potential Unreviewed Safety Question Affecting Department of Energy Complex Concerning Hydrogen Generation in TRU Waste Drums."

⁶ Department of Energy, Carlsbad Field Office, WIPP Waste Acceptance Criteria, DOE/WIPP-02-3122, Revision 8 Effective July 5, 2016. http://www.wipp.energy.gov/library/cra/CRA-2014/references/Others/US_DOE_2002_WIPP_Rev_6_TRU_Waste_Acceptance_Criteria_02_3122.pdf

⁷ S. Rept. 115-262 – The John S. McCain National Defense Authorization Act for Fiscal Year 2019, 115th Congress (2017-2018), accompanies S. 2987, Armed Services Committee. On April 11, a drum of transuranic waste ruptured at the Idaho National Laboratory's Radioactive Waste Management Complex, resulting in spilled sludge in the facility and the contamination of several responding firemen with plutonium. In the immediate aftermath of this incident, the Department of Energy (DOE) found three other drums with similar contents that had also ruptured, and additional investigations on the cause of the event are ongoing. Additionally disturbing, however, is the confirmation from DOE officials that at least the initial ruptured drum had already undergone remediation to prepare it for shipment to the Waste Isolation Pilot Plant (WIPP), although it had not yet been certified for shipment. After a 2014 accident in which a transuranic waste drum prepared at Los Alamos National Laboratory ruptured in the WIPP underground, the DOE required that all of its cleanup undergo a complete review of waste preparation and certification procedures to ensure such an accident was not repeated. However, if these drums had not ruptured at the Idaho National Laboratory, it is conceivable that the incident could have occurred at the WIPP, causing further setbacks for the waste repository that is still recovering from the prior incident. Therefore the committee directs the Government Accountability Office (GAO) to report on the repackaging of transuranic waste at the Idaho National Laboratory and determine the extent to which there are procedures in place to prevent such an incident and whether deficiencies exist in these procedures or their implementation that must be remedied. The GAO shall work with the committee on a date suitable to both parties for the final report with interim briefings on the findings. (See congress.gov)

⁸ "Site Treatment Plan" for the Idaho Site is difficult to find but the 2016 report is at the Idaho DEQ website at <https://www.deq.idaho.gov/media/60179380/inl-annual-site-treatment-plan-report-1116.pdf> and the 2017 report is on the Fluor Idaho website at https://fluor-idaho.com/Portals/0/7519317_SiteTreatmentPlan.pdf Note that a 55-gallon drum holds 0.208197648 cubic meters.

Following the Site Treatment Plan, with its annual updates and the practice of not displaying previous revisions or showing any tracking of the changes made to the document is pretty confusing. It's pretty confusing to attempt to track the waste with its shifting names as waste is treated, and names that don't seem to correspond to the names used in the RCRA permit. But Idaho DEQ has indicated that the SD-176 waste is represented by one of any of 26 name codes, a baffling list they provided to me by email.

The contents of one drum were mixed into four other drums in order to reduce the level of radioactivity all without knowing the contents of the drums. No special precautions had been put in place and the assumption that any unreacted uranium would be visible during raking through the waste turned out to be incorrect. Despite the DOE saying that the repackaged drums had not been certified for shipment to WIPP, it appears that no effective process was planned that would have reacted the uranium in the drums. Unreacted uranium was prohibited in the WIPP Waste Acceptance Criteria.

It appears that Fluor Idaho was performing the work exactly the way the Department of Energy Idaho Field Office wanted. The report found that some personnel stated that “they did not feel comfortable identifying issues that were not consistent with management direction, would delay mission-related objectives, or would otherwise impact cost or schedule.”

The causal analysis identifies that numerous RCRA requirements had not been met. **The waste had not been adequately characterized and there was no plan to characterize the waste in order to ship the waste to the Waste Isolation Pilot Plant.** No attempt was made to meet earlier revisions or the current WIPP Waste Acceptance Criteria.¹⁰ No chemical compatibility analysis had been conducted. No assessment of reactive and pyrophoric materials had been conducted. This is despite the illusion presented by hundreds of pages of RCRA documentation in approved permits and for proposed permit renewal.

The hazard of pyrophoric and unreacted uranium was not recognized even though its RCRA permit for ARP V prohibited pyrophoric material. According to the causal analysis, opportunities to understand that the unreacted uranium was pyrophoric included the box line fire event of December 2017 at the AMWTP discussed at the February 2018 ICP Citizens Advisory Board meeting.

An opportunity to understand the beryllium carbide reaction was missed when several drums had high methane levels in the 2015 or 2016 timeframe, according to the causal report. The

⁹ The “Site Treatment Plan for the Idaho Site states: “The United States Department of Energy (DOE) is required to prepare a plan for developing treatment capacities and technologies for each facility at which DOE generates or stores mixed waste (MW), pursuant to Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), 42 USC 6939c(b), as amended by Section 105(b) of the Federal Facility Compliance Act, Pub. L. 102-386 (1992) (FFC Act). Upon submission of the Idaho National Engineering Laboratory (INL) plan to the appropriate regulatory agency, the Idaho Department of Health and Welfare (IDHW), Division of Environmental Quality (DEQ), the FFC Act requires the DEQ to solicit and consider public comments, and approve, approve with modification, or disapprove the plan within six months. The regulatory agency is to consult with the U.S. Environmental Protection Agency (EPA) and any state in which a facility affected by the plan is located. Upon approval of a plan, the regulatory agency must issue an order requiring compliance with the approved plan.”

¹⁰ Department of Energy, Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, DOE/WIPP-02-3122, Revision 8.0, Effective Date: July 5, 2016. <http://www.wipp.energy.gov/library/wac/WAC.pdf> Section 3.5 Chemical Properties states “Radioactive pyrophorics in concentrations greater than 1 percent by weight and all nonradioactive pyrophorics shall be reacted (or oxidized) and/or otherwise rendered nonreactive prior to placement in the payload container.”

elevated methane levels disqualified sending those drums to WIPP. Those drums, the causal report states, are at the INL but I was unable to determine where or what the plan for their disposition is from the INL Site Treatment Plan that is updated annually. The intent of the Site Treatment Plan is to always know that waste has a plan for its disposal and that this information is reviewed by the Idaho DEQ and made publicly available. Because it appears that the contents of those high methane drums were never understood, how can a plan to properly dispose of the drums have been created?

The absence of required analyses to properly mitigate the hazards of processing the SD-176 waste stream apparently did not concern the DEQ who approves the RCRA permits for the site. The DEQ also has stated its intent to approve renewal of the RCRA permit of the Advanced Mixed Waste Treatment Project, where the SD-176 drums came from, without consideration of the drum rupture investigation. DEQ displays rubber-stamping RCRA approval mentality.^{11 12} There are penalties for a person who operates a RCRA facility and knowingly omits material information or makes any false statement in a RCRA permit — 2 years jail time and/or up to \$50,000 per day violation (42 U.S.C. 6928(d)(3)). I wonder if the person who signs the cleanup project RCRA permits for the cleanup at the Idaho National Laboratory conducted by Fluor Idaho, Fred Hughes, is worried about this. And if he isn't, why isn't he?

The causal report also proves my concerns raised to the DEQ last year that the **RCRA permits needed specific fire hazard planning documents to be reviewed prior to issuing RCRA permits** because of the Idaho National Laboratory's longstanding deficiencies regarding integrating fire protection planning with nuclear facility hazards.

Inadequate Medical Response to Puncture Wound in Transuranic Waste Facility Last June

A Department of Energy Occurrence Report has been issued for the June 5 injury at the Advanced Mixed Waste Treatment Project. A worker cleaning out a Supercompactor Glovebox got a puncture wound involving transuranic radionuclides.¹³

At the October 25 Citizens Advisory Board meeting in Sun Valley, I asked Fred Hughes if chelation was required for the June 5, 2018 puncture wound event he had briefly discussed. And he said yes.¹⁴

¹¹ Idaho Department of Environmental Quality, draft Partial Permit for the AMWTP at <http://www.deq.idaho.gov/news-archives/waste-idaho-national-laboratory-permit-renewal-comment-092818/> and see Attachment 2 at <http://www.deq.idaho.gov/media/60182097/inl-amwtp-permit-attachment-2-0918.pdf> revision as of June 2018 which would not include report findings about the April 2018 transuranic waste drum explosions and why the Idaho DEQ permit for that operation did not include adequate precautions.

¹² See my second Public Comment submittal on October 30 to the Idaho DEQ concerning renewal of the Advanced Mixed Waste Treatment Project RCRA permit renewal at www.environmental-defense-institute.org

¹³ Department of Energy Occurrence Report EM-ID—FID-AMWTF-2018-0004, "Operator Receives Puncture Wound Resulting in Internal Dose." Final report September 18, 2018.

¹⁴ Idaho Cleanup Project Citizens Advisory Board (formerly the Idaho National Laboratory Citizens Advisory Board) meeting schedules and presentations at <https://energy.gov/em/icpcab/idaho-cleanup-project-citizens-advisory-board-icp-cab> Meeting held October 25, 2018.

As I was aware of the Oak Ridge REACTS website that emphasized that **chelation of wounds involving transuranic radionuclides needs to be administered within 2 hours in order to limit bone uptake**, and that after 2 hours, the effectiveness of chelation is much less, I asked if chelation was administered within 2 hours of the injury. Fred Hughes said no. He did not address the reasons why. And the corrective actions for the occurrence report didn't address the issue of the tardy medical response.

Because the Department of Energy Occurrence Reporting threshold for the puncture event was 500 mrem Committed Effective Dose, which to me is very high, this indicates a serious event. And this is contrary to the impression Fred Hughes gave when he said that the wound was excised and he indicated that it was a very low dose.

According to the Oak Ridge Associated Universities website, chelation with diethylene triamine pentaacetic acid (DTPA) accelerates renal elimination of radioactive materials from the body from plutonium, americium or curium. **The use of DTPA is indicated when individuals have been internally contaminated with a significant amount of radioactive plutonium, americium, and/or curium.** It should be noted that these radionuclides are also neutron emitters.¹⁵ DTPA treatment may actually increase the deposition of uranium and neptunium into bone and thus is not recommended treatment for contamination with these radionuclides.¹⁶ There are calcium or zinc forms of DTPA: Ca-DTPA and Zn-DTPA. Ca-DTPA is considered more effective in the first 24 hours but carries a higher risk of mineral depletion from the body. Zn-DTPA is considered as effective as Ca-DTPA 24 hours after exposure but carries less risk of mineral depletion if given over a long duration.

Chelation following plutonium intake is recommended to commence within one hour of the intake or wound entry. Actinides such as plutonium are rapidly taken up by bone within two hours.¹⁷

¹⁵ Environmental Defense Institute, July 2018 newsletter article "Neutron Exposure During Glovebox Work and Other Handling of Fissile Material at the Idaho National Laboratory and Idaho Cleanup Project. Note that Pu-239, which is fissile, is bred from U-238 by single neutron capture. Other transuranic radionuclides, which may or may not be fissile, result from repeated neutron absorption, usually in a nuclear reactor. Uranium and transuranic radionuclides such as plutonium, americium and curium may undergo spontaneous fission and emit neutrons. Some transuranic materials are created in spent nuclear fuel, while some transuranic radionuclides are created from target material exposed to high neutron flux in a nuclear reactor. Radiation workers who work around uranium and transuranic radionuclides such as plutonium are exposed to neutron radiation which is not stopped by metal shielding or lead aprons and which causes densely ionizing damage to the human body. The neutron dose from an intake is usually ignored; however, the radiation workers most likely to have a plutonium, americium or curium intake may be chronically exposed to neutron radiation in their jobs. I suspect that the detrimental health effects of chronic neutron exposure such as infertility may be underappreciated in these radiation workers.

¹⁶ Medical Countermeasures for Radiation Exposure and Contamination webpages at <https://www.ornl.gov/rsb/countermeasuretraining/#DTPA>

¹⁷ Nicholas Dainiak, MD, FACP et al., Radiation Emergency Assistance Center/Training Site, Oak Ridge Associated Universities, "REAC/TS Approach to Rapid Dose Estimation and Decontamination of Plutonium Following a Puncture Wound," Presentation May 10, 2017. https://radiation-medicine.de/fileadmin/user_upload/Praesentationen/Dainiak-ConRad2017.pdf Actinides (plutonium, americium

While Fluor Idaho has now put in place many corrective actions to prevent a similar accident at a glovebox, I had previously read of glove box puncture wounds at LANL and I find it astonishing that in Idaho, no one seemed to have recognized this hazard previously. But just because skin intakes don't happen often is no excuse for the INL to not understand how to properly and to rapidly respond to such an event, which could also happen in work not involving glove boxes.

Epidemiology for radiation workers for **external dose** is showing elevated cancer risk for radiation doses far less than the allowed 5 rem annual dose limit in the U.S.¹⁸ The health harm from **radionuclide intakes** or internal dose is greater than official radiation protection models predict. For more about the inadequacy of radiation health harm estimates as currently estimated in the U.S., see our Environmental Defense Institute newsletter article from September, "Just Two Problems with U.S. Radiation Protection: Radiation Dose Underestimated and the Harm Underestimated."¹⁹ Also, the health harm from the **neutron exposure** is likely being underestimated in the assumed conversion to whole body dose because the biological damage may be greater than assumed. See our Environmental Defense Institute July newsletter.²⁰

Also, at the October ICP Citizens Advisory Board meeting, I asked how many non-routine lung counts have been given this year for Fluor Idaho operations. Fred Hughes, responded that he would have to find out. Later at the meeting, he answered that there had been three non-routine lung counts. **Conspicuously, he declined to say when or why these lung counts were given, even though this meeting's focus included the newly released causal analysis of the drum event.**

That Fred Hughes would avoid admitting that the lung counts were given to fire fighters responding to the drum event is somewhat perplexing because the Executive Summary for the causal report for the drum event states that there were three precautionary lung counts given to

and others) are absorbed through wounds rapidly, within 2 hours. The actinides are taken up strongly by bone and liver. "Early decorporation therapy (1-2 hours) with DTPA is required to reduce rapid translocation of actinides to tissues." In 2018, at a DOE site where a worker had a puncture wound involving 300 disintegrations/minute on an alpha meter, the wound was flushed and treatment with Ca-DTPA was initiated within 1 hour.

¹⁸ Richardson, David B., et al., "Risk of cancer from occupational exposure to ionizing radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS), *BMJ*, v. 351 (October 15, 2015), at <http://www.bmj.com/content/351/bmj.h5359> Richardson et al 2015 . This epidemiology study that included a cohort of over 300,000 nuclear industry workers has found clear evidence of solid cancer risk increases despite the average exposure to workers being about 2 rem and the median exposure was just 410 millirem. Also see December 2015 EDI newsletter.

¹⁹ Environmental Defense Institute September 2018 newsletter article by Tami Thatcher "Just Two Problems with U.S. Radiation Protection: Radiation Dose Underestimated and the Harm Underestimated" at <http://environmental-defense-institute.org/publications/News.18.September.pdf>

²⁰ Environmental Defense Institute July 2018 newsletter article by Tami Thatcher "Neutron Exposure During Glovebox Work and Other Handling of Fissile Material at the Idaho National Laboratory and Idaho Cleanup Project" at <http://environmental-defense-institute.org/publications/News.18.July.pdf>

fire fighters who responded to the drum rupture event.²¹ At none of the briefings this year or in October on the drum rupture event was the CAB told about the lung counts given to fire fighters.

The beryllium, by the way, would not be detected by a lung count, but causes a lung disease called Berylliosis or chronic beryllium disease. Lung counts often base the result on the known composition of the airborne radionuclides inhaled on the more easily detected americium-241 gamma ray at 59.5 keV. Uranium isotopes can be detected but with lower detector efficiency. Interpretation of the lung count results would also require understanding the particle sizes and solubilities of the material inhaled. But since the harm of uranium inhalation is based on natural forms of uranium inhaled in mining, the actual harm from the material inhaled during the event may be greater than official estimates would indicate. The causal report does not provide any information about worker exposures and it appears to me that Fluor Idaho and the Department of Energy were trying to avoid discussion of the lung counts given to the fire fighters responding to the April 11 drum event.

Still No Schedule for Treatment of Sodium Bearing Waste at the Integrated Waste Treatment Unit

Progress was reported at the October Idaho Cleanup Project Citizens Advisory Board meeting, but so were new problems.²² The treatment of about 900,000 gallons of liquid radioactive waste that the Department of Energy tries to say is not high-level waste was supposed to have been completed in 2012 to meet an Idaho Settlement Agreement milestone.²³

Progress was made resolving past process instabilities and equipment problems on the Denitration Mineralization Reformer (DMR), but a new problem at the IWTU was the buildup of material on the Process Gas Filter elements, according to the October presentation. The CAB was told that now the reality may be that when processing the radioactive material, many shutdowns to clean off this buildup, which will be radioactive, may be required.

The liquid waste, when treated by the IWTU, will be similar to the dry calcine high-level waste already stored at the Idaho National Laboratory. The calcine resulted from the reprocessing of spent nuclear fuel at the Idaho National Laboratory, of mostly naval and research reactor fuel.

There are many questions remaining about where the treated sodium bear waste and the calcine high-level waste will ultimately be disposed of.

²¹ Idaho Cleanup Project Core, "Formal Cause Analysis for the ARP V (WFM-1617) Drum Event at the RWMC," October 2018. See the Executive summary for the only mention of lung counts provided to three fire fighters. https://fluor-idaho.com/Portals/0/Documents/04_%20Community/8283498_RPT-1659.pdf

²² Idaho Cleanup Project Citizens Advisory Board (formerly the Idaho National Laboratory Citizens Advisory Board) meeting schedules and presentations at <https://energy.gov/em/icpcab/idaho-cleanup-project-citizens-advisory-board-icp-cab> Integrated Waste Treatment Unit presentation October 25, 2018 by Kevin O'Neill.

²³ See more about Idaho's Settlement Agreement at <https://www.deq.idaho.gov/inl-oversight/oversight-agreements/1995-settlement-agreement.aspx>

The State of Idaho has now assessed the DOE \$4.77 million in penalties for its failure to finish treating sodium-bearing waste at the Idaho National Laboratory — treatment which has never started.²⁴ The penalties are not from failure to meet the 1995 Idaho Settlement Agreement, but are from the failure to clean out the tanks on the schedule agreed to under state laws for managing hazardous waste.

Citizens Advisory Board Re-Vote on AMWTP Shows CAB Recommendations Do Not Represent Idaho Citizens

Observers of the Idaho Cleanup Project Citizens Advisory Board²⁵ meetings over the years had commented to me that the CAB leadership appeared to be “good ole boys and girls.” And what they meant was that the meetings appeared to be more of an opportunity to cheer on the Department of Energy rather than to seriously scrutinize issues on the cleanup of radioactive waste.

There is value in the presentations by the Department of Energy, its contractors like Fluor Idaho and by others such as the U.S. Geological Survey and the U.S. Nuclear Waste Technical Review Board. And CAB members are to be thanked for their efforts to learn about Department of Energy operations at the Idaho National Laboratory. But the brief power point presentations often gloss over things — important things.

The first vote to endorse finding new missions for the Advanced Mixed Waste Treatment Project last spring failed to support a strong enough endorsement for the CAB’s chairman. So, he led an effort to have an unannounced re-vote on the issue after the 6-year terms for some dissenting CAB members had expired. He had stated publicly at the LINE Commission meeting held May 24th in Arco, Idaho that the reasons that a stronger endorsement had not resulted in the first vote “were political.”²⁶

The new CAB voted on an endorsement that had not yet been written. The new CAB’s majority had no qualms about trusting DOE to handle the issues of transportation not using NRC-approved packaging or about not being able to meet the Idaho Settlement Agreement for limiting how long waste brought to Idaho for treatment will stay in Idaho (the 6 month in and 6 month out requirement). The DOE had said at the February CAB meeting that the Idaho Settlement Agreement requirement would needed to be removed.

²⁴ Exchange Monitor, “Idaho Waste-Treatment Penalties Against DOE Reach \$4.77 Million,” November 1, 2018.

²⁵ Idaho Cleanup Project Citizens Advisory Board (formerly the Idaho National Laboratory Citizens Advisory Board) meeting schedules and presentations at <https://energy.gov/em/icpcab/idaho-cleanup-project-citizens-advisory-board-icp-cab>

²⁶ Idaho Leadership in Nuclear Energy Commission 3.0, <https://line.idaho.gov/minutes/> as of November 2, there are no meeting materials or meeting minutes for the May 24, 2018 meeting held in Arco, Idaho. Materials but not meeting minutes for the October 10 meeting have been posted. Brad Little in the LINE Commission Chair.

The CAB letter to the Department of Energy cited as endorsement of the continuing missions at the AMWTP stated that “we are extremely proud of the highly trained team and the comprehensive resources available in AMWTP for processing and repackaging of waste. The manner in which they have operated over the past 15 years has been exemplary and is indicative of the efficiency with which they can complete such a complex task in a safe manner.” This letter was written before the first report on the cause of the drum ruptures was issued that states that the DOE cleanup contractor, Fluor Idaho, had not performed the required analyses for the waste stream that had been stored at the AMWTP prior to sending to the Accelerated Retrieval Project V where drums exploded. The drums were to have returned to the AMWTP and be shipped to WIPP. The waste acceptance criteria for WIPP was not being used when the waste was repackaged into new drums. This illustrates that the CAB was not well-informed when the letter of unconditional support for the AMWTP was written.

At that the June 21 CAB meeting, a time-out was taken to confirm that the vote did not need to be previously announced in the agenda. The answer came back that the CAB did not need to meet any of the normal rules for conducting public meetings and that any vote could be taken and did not have to be previously announced.

The meaningfulness of any vote by the CAB is greatly diminished by the lack of technical expertise on the CAB, by the selection of CAB members by the Department of Energy and by the practice of taking a re-vote if CAB leadership doesn’t like the results of the prior vote. That doesn’t mean that there aren’t CAB members who really care about the issues or that there are not CAB members who understand the issues. But votes on items that are not on the publicly posted agenda prevent CAB members from studying the issue prior to the vote and also exclude the public from participating in public comment prior to a vote on the issue. **The Department of Energy is putting increasing emphasis on the CAB to show acceptance of DOE’s proposals, including waste reclassification changes.**

For these reasons, a CAB recommendation on an issue should not be regarded as meaningful representation of citizen views in the community on important issues regarding the Department of Energy’s Idaho site.

DOE Focusing on Obtaining ICP Citizens Advisory Board Approval of Reclassifying Radioactive Waste

The Department of Energy is starting to feed the Idaho Cleanup Project Citizens Advisory Board propaganda about the reasons for DOE’s decades of failure to cleanup its radioactive waste around the U.S. The DOE gave the CAB a document by the Energy Community Alliance²⁷ that contains no references but contains many unsubstantiated excuses for the DOE’s failure.

²⁷ Energy Communities Alliance, “Waste Disposition: A New Approach to DOE’s Waste Management Must Be Pursued,” September 2017.

The ECA document asserts that the reasons for DOE's failure thus far is due to "artificial" standards and due to overly conservative cleanup goals.

I gave public comment on this issue at the October CAB meeting. The ECA document says that the DOE would like to reclassify the sodium bearing waste, once treated at the Integrated Waste Treatment Unit, and the stored calcine waste at the Idaho National Laboratory as transuranic waste and get the Waste Isolation Pilot Plant (WIPP) to change its current restrictions so that the waste could be disposed of at WIPP.

The ECA document states that the calcine is "orphan" waste that cannot be accepted at Yucca Mountain. However, the DOE has not told the CAB this. In fact, the DOE issued a NEPA study saying they had decided to use Hot Isostatic Pressing to treat the waste and then would dispose of the waste at Yucca Mountain. This planning was required by the 1995 Idaho Settlement Agreement. The DOE issued a press release in 2010 stating that the DOE has signed the Record of Decision for the treatment of high-level waste calcine at the INL, meeting a legal commitment to the State of Idaho for a decision no later than the end of 2009.²⁸ It says the treatment must be accomplished by the end of 2035.

Why is the DOE telling other energy communities information about the calcine that is different than what the DOE is telling the citizens of Idaho?

And given the way that the DOE violates its own DOE Orders and regulations, why would informed citizens want DOE to have more authority to reclassify its radioactive wastes?

The open disposal facilities are WIPP in New Mexico, various commercial low-level waste facilities like the one in Clive, Utah, RCRA landfills that currently allow loop-hole radioactive waste, and Department of Energy disposal at DOE's Nevada site. The Yucca Mountain spent fuel and high-level waste repository may never open, but many of the DOE's NEPA decisions depend on it opening.

The Department of Energy will be trying to find any solution they can, regardless of the impact to human health and the environment. If WIPP refuses to accept the sodium bearing waste and the calcine, the DOE could conduct its own Performance Assessment to say that the waste is low level, and that storing it in Idaho, for millennia, will be acceptable. This would be an environmental devastation over time because the unscientific assumptions in these Performance Assessments by the DOE assume perfect soil cap performance over millennia, unrealistic and non-conservative radionuclide migration and aquifer dilution, grout or no grout. On top of that, the radiation health models to predict cancer rates underestimate the health harm by limiting the harm to cancer while ignoring heart disease, birth defects and other diseases resulting from ingestion and inhalation of radionuclides.

<https://static1.squarespace.com/static/55c4c892e4b0d1ec35bc5efb/t/59ce7384cd39c3b12b97f988/1506702214356/ECA+Waste+Disposition+Report.pdf>

²⁸ U.S. Department of Energy, DOE-ID Press Releases, "DOE signs Record of Decision selecting Hot Isostatic Pressing Technology for Treatment of High Level Waste Calcine," January 4, 2010.
<https://www.id.energy.gov/NEWS/PressReleases/PR100104.htm>

DOE Likes To Grout Radioactive Waste, But Grouting Does Not Immobilize Iodine-129 and Other Radiotoxic Nuclides

Iodine-129 has radioactive half life of 16 million years. And even though it has a low specific activity of 0.00018 curies per gram, it is extremely radiotoxic and can give a very high thyroid dose. It also is highly mobile in the environment, meaning that it does not “sorb” to soil but travels with water that contacts the waste.

A recent report discusses the results showing that grout does not slow down the migration of iodine-129.²⁹ The Department of Energy has used grout to cover liquid and sludgy radioactive waste that remains in high level waste tanks. It’s not a tiny amount of waste that the DOE leaves inside the tanks — it can be thousands of gallons of waste. At the Idaho National Laboratory, 326,300 gallons was left in the **cleaned** tanks at INTEC. And the tank heels can contain a disproportionately high amount of long-lived radioactivity such as plutonium.

The DOE has grouted tanks in Idaho and Savannah River, because a 2005 law change where DOE snuck language into Section 3116 of the National Defense Authorization Act (NDAA). But wiser lawmakers in the state of Washington, where the DOE’s Hanford site is located, did not allow the law permitting the DOE to use grout in tanks to be used in Washington.³⁰ **Despite this, the DOE is proposing leaving an average of 4 percent of the waste in the tanks, which amounts to 64,000 gallons to be left in place at the C Tank farm — and Hanford has 17 other tank farms.**³¹ What DOE is doing is calling the thousands of gallons of high-level waste — “low-level waste.” This means that high-level waste that would by law require a deep geologic repository no longer requires a deep geologic repository.

The DOE is now proposing to reclassify and abandon thousands of gallons of tank heels at Hanford.^{32 33} They may apply a little grout over the waste and call it good. Washington Senator

²⁹ Open Access Government, Special Reports, “How do we dispose Iodine-129 long-term? – Professor Peter Santschi discusses Iodine-129 and how the issues around the disposal,” November 1, 2018. <https://www.openaccessgovernment.org/iodine-129-disposal/53932/>

³⁰ Christine A. Langton, Savannah River National Laboratory, WM2008 Conference, February 24-28, 2008, Phoenix, AZ, “Recent Progress in DOE Waste Tank Closure – 8396.” <http://www.wmsym.org/archives/2008/pdfs/8396.pdf>

³¹ Annette Cary, Tri-City Herald, “Controversial Hanford cleanup plan needs more hearings, say U.S. senators,” September 6, 2018. <https://www.tri-cityherald.com/news/local/hanford/article217934270.html>

³² Department of Energy, “Draft Waste Incidental to Reprocessing Evaluation for Closure of Waste Management Area C at the Hanford Site,” DOE/ORP-2018-01, Draft D, March 2018. <https://www.hanford.gov/files.cfm/DOE-ORP-2018Draft.WIR.Evaluation.pdf> and see <https://www.hanford.gov/page.cfm/WasteManagementAreaC> for related documents.

³³ Annette Cary, Tri-City Herald, “Hanford watchdog warns against closing underground tanks,” June 11, 2018. <https://www.tri-cityherald.com/news/local/hanford/article212957659.html>

Maria Cantwell's 2004 statement on the proposed reclassification of nuclear waste is still relevant.³⁴ DOE is planning to call thousands of gallons of HLW low level waste and leave it.³⁵

Radionuclides contributing the most to dose from the Hanford C Farm tanks include iodine-129 and technetium-99. There are also doses from carbon-14 and an array of natural and unnatural uranium nuclides. Doses to adults are bad enough. But doses to the unborn and to children can devastate health and intelligence.

The DOE's Performance Assessment for grouting and capping the tanks would be laughable if their tortured models were not so deadly for future generations.

DOE Request for Public Comment on the U.S. Department of Energy Interpretation of High-Level Radioactive Waste

The Department of Energy announced their request for public comment on their interpretation of high-level radioactive waste in the Federal Register on October 10.³⁶

While on the surface, the DOE makes their proposal that they be allowed to reclassify high-level radioactive waste sound reasonable, this proposal will allow the DOE to rename vast quantities of high-level waste (HLW) as non-HLW which will allow the DOE to reclassify as low-level radioactive waste. This will allow the DOE to use shallow burial of the waste rather than comply with the current law for a deep geologic repository. The DOE addresses its low-level waste with a Performance Assessment, that by historical example, usually contains many unrealistic assumptions in order to yield low migration of radionuclides into water sheds. The Performance Assessments, performed to DOE's satisfaction, usually with many unrealistic assumptions, are a form of tobacco science and the consequences of these unrealistically low radiation doses from these analyses will be the poisoning of future generations.

³⁴ Senator Maria Cantwell, Senator for Washington, Press Release – Sen. Cantwell's Floor Statement on Proposed Reclassification of Nuclear Waste," May 20, 2004. <https://www.cantwell.senate.gov/news/press-releases/sen-cantwells-floor-statement-on-proposed-reclassification-of-nuclear-waste>

³⁵ Exchange Monitor, "Watchdog Opposes Hanford C Farm Waste Reclassification," June 12, 2108. <https://www.exchangemonitor.com/watchdog-opposes-hanford-c-farm-waste-reclassification/> Hanford Challenge opposes DOE's plan to call the waste remaining in tanks Waste Incidental to Reprocessing (WIR) and use DOE Order 435.1 to leave it in place. The Hanford C Tank Farm has about 64,000 gallons remaining in the tanks.

³⁶ Federal Register, Request for Public Comment on the U.S. Department of Energy Interpretation of High-Level Radioactive Waste, A Notice by the Energy Department on October 10, 2018. Public comment ends December 10. <https://www.federalregister.gov/documents/2018/10/10/2018-22002/request-for-public-comment-on-the-us-department-of-energy-interpretation-of-high-level-radioactive> Summary: "U.S. Department of Energy (DOE or the Department) provides this Notice and request for public comment on its interpretation of the definition of the statutory term "high-level radioactive waste" (HLW) as set forth in the Atomic Energy Act of 1954 and the Nuclear Waste Policy Act of 1982. This statutory term indicates that not all wastes from the reprocessing of spent nuclear fuel ("reprocessing wastes") are HLW, and DOE interprets the statutory term such that some reprocessing wastes may be classified as not HLW (non-HLW) and may be disposed of in accordance with their radiological characteristics."

The DOE like soil caps and assumes that they will perform perfectly for hundreds of thousands of years, even though it is well known that these caps require maintenance practically annually and we cannot count on no flooding and geologic stability over these long time-frames.

The DOE has already used sneak attack to insert laws to undercut radioactive waste protections of the public. In general, watch out for any new law that effectively removes previous law by the use of the magic word — “notwithstanding”. Section 3116 of the National Defense Authorization Act for 2005 is one example.³⁷ This law allowed thousands of gallons of HLW to be left in tanks at South Carolina’s Savannah River Site and over the Snake River Plain Aquifer at the Idaho National Laboratory’s INTEC tank farm.^{38 39}

And at the same time that the pathological law-breaking and DOE Order violating Department of Energy wants more authority to do whatever it wants with its vast radioactive mess that it has failed to clean up over seven decades, the Defense Nuclear Facilities Safety Board is under attack to lessen its already limited capability to review operations at DOE sites.⁴⁰

³⁷ Public Law 108-375, 108th Congress [H.R. 4200], Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005. SEC. 3116. DEFENSE SITE ACCELERATION COMPLETION.

(a) IN GENERAL.—Notwithstanding the provisions of the Nuclear Waste Policy Act of 1982, the requirements of section 202 of the Energy Reorganization Act of 1974, and other laws that define classes of radioactive waste, with respect to material stored at a Department of Energy site at which activities are regulated by a covered State pursuant to approved closure plans or permits issued by the State, the term “high-level radioactive waste” does not include radioactive waste resulting from the reprocessing of spent nuclear fuel that the Secretary of Energy (in this section referred to as the “Secretary”), in consultation with the Nuclear Regulatory Commission (in this section referred to as the “Commission”), determines—

(1) does not require permanent isolation in a deep geologic repository for spent fuel or high-level radioactive waste;

(2) has had highly radioactive radionuclides removed to the maximum extent practical; and

(3)(A) does not exceed concentration limits for Class C low-level waste as set out in section 61.55 of title 10, Code of Federal Regulations, and will be disposed of—

(i) in compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations; and

(ii) pursuant to a State-approved closure plan or State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this section;

or (B) exceeds concentration limits for Class C low-level waste as set out in section 61.55 of title 10, Code of Federal Regulations, but will be disposed of—

(i) in compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations;

(ii) pursuant to a State-approved closure plan or State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this section; and

(iii) pursuant to plans developed by the Secretary in consultation with the Commission.

³⁸ U.S. Government Accountability Office (GAO), Comptroller General, Decision in Matter of Savannah River Technology & Remediation, LLC; Fluor Westinghouse Liquid Waste Services, LLC, February 8, 2018, states that there are 36 million gallons of liquid radioactive waste at Savannah River Site. Also notes the Department of Energy failure to assess the viability of the awardee’s technical approach as required by the terms of the contract solicitation for tank waste treatment. <https://www.gao.gov/assets/700/690289.pdf>

³⁹ Christine A. Langton, Savannah River National Laboratory, WM2008 Conference, February 24-28, 2008, Phoenix, AZ, “Recent Progress in DOE Waste Tank Closure – 8396.” (Includes discussion of Idaho National Laboratory) <http://www.wmsym.org/archives/2008/pdfs/8396.pdf>

⁴⁰ Defense Nuclear Facilities Safety Board at <https://www.dnfsb.gov/about> and <https://www.dnfsb.gov/documents/letters/letter-anne-m-white-re-thank-you-accepting-invitation-nov-28-public-hearing>

⁴¹ A new DOE Order 140.1 would reduce the DNFSB's access to DOE nuclear sites and allow the DOE to withhold more information from the DNFSB. Hearings on DOE Order 140.1 are to be held, including one on November 28 that DOE's EM-1 Anne White has planned to attend. ⁴²

MOX Plant Cancelled at Savannah River

The partially built overbudget and behind schedule Mixed Oxide Fuel Fabrication Facility has finally been cancelled. Now the Senate Appropriations Committee wants the Waste Isolation Pilot Plant (WIPP) in New Mexico to dispose of 34 metric tons of plutonium now stored in South Carolina. ⁴³

The Department of Energy plans to convert the unfinished facility into a nuclear-warhead core production plant and dispose of the surplus plutonium at WIPP.

According to Wayne Barber in an *Exchange Monitor* article, "Currently, WIPP is limited to disposing of 175,565 cubic meters of transuranic waste, under the 1992 WIPP Land Withdrawal Act. Congressional action would be needed to amend the act to allow for the extra space to accommodate the plutonium, New Mexico Environment Secretary Butch Tongate said recently."

There are about 90,000 cubic meters already disposed of underground at WIPP. ⁴⁴ The DOE wants to shrink the volume by about one third, to 60,000 cubic meters, by not counting the empty space between drums.

There is an ample backlog of TRU waste destined for WIPP already, and in addition to the surplus plutonium at Savannah River, the DOE continues to identify WIPP as the potential disposal site for the nation's Greater-Than-Class-C Low-Level waste, DOE's 10,000 metric tons of mercury, high-level waste from Hanford and West Valley, ⁴⁵ and high-level waste from the Idaho National Laboratory's calcine and treated sodium-bearing waste. ⁴⁶ Even if the new

⁴¹ Los Alamos Study Group, Massive Staff Cut, Reorganization Proposed at Defense Nuclear Facilities Safety Board, August 17, 2018. http://www.lasg.org/press/2018/press_release_17Aug2018.html

⁴² Defense Nuclear Facilities Safety Board letter to the Department of Energy regarding DOE Order 140.1 at <https://www.dnfsb.gov/sites/default/files/document/16011/Regarding%20DOE%20Order%20140.1%20%5B2018-100-064%5D.pdf> and <https://www.dnfsb.gov/documents/letters/letter-anne-m-white-re-thank-you-accepting-invitation-nov-28-public-hearing>. See other documents pertaining to the DNFSB's concern about DOE Order 140.1 at https://www.dnfsb.gov/search?search_api_views_fulltext=DOE+Order+140.1

⁴³ Wayne Barber, *Exchange Monitor*, "Senate Panel Tells WIPP to Start Planning for Cancellation of MOX Project," June 1, 2018.

⁴⁴ Nuclear Waste Partnership LLC, An AECOM-led partnership with BWXT and AREVA, "WIPP Strategic Plan Operations Through 2050," 15-GM-14, Rev. 0, July 27, 2016. This "Obsolete" version posted on the Southwest Research and Information Center website at http://www.sric.org/nuclear/docs/2016-06-27_FY-2016-Plan.pdf

⁴⁵ Southwest Research Information Center, "Current DOE Proposals to Expand WIPP," 2017, http://www.sric.org/nuclear/docs/2017_09_15_WIPP-expansion-proposals.pdf

⁴⁶ Energy Communities Alliance, "Waste Disposition: A New Approach to DOE's Waste Management Must Be Pursued," September 2017. The Department of Energy gave this document to the Idaho Cleanup Project Citizens Advisory Board in June 2018. <https://static1.squarespace.com/static/55c4c892e4b0d1ec35bc5efb/t/59ce7384cd39c3b12b97f988/150670221435/6/ECA+Waste+Disposition+Report.pdf>

counting method is approved, the amount of TRU waste already destined for WIPP from Energy Department generator sites would fill its limited space.

DOE Proposes Making High-Assay Low-Enriched Uranium (HALEU) Fuel at the Idaho National Laboratory

The Department of Energy has released a draft Environmental Assessment for making fuel for advanced reactors at the Idaho National Laboratories Materials and Fuels Complex or the Idaho Nuclear Technology and Engineering Center.^{47 48}

The Post Register article stated: “The proposal is to process high-assay low-enriched uranium into fuel that can be used for research and development for **companies experimenting with small mobile reactors.**” Yikes! — More mobile Chernobyls. There is no discussion of small mobile reactors in the Environmental Assessment. But apparently somebody thinks that we need fabulously expensive power sources that emit radionuclides during normal operation, are vulnerable to meltdowns, and have no place to dispose of their spent nuclear fuel and can be in your remote neck of the woods anytime.

The enrichment would be between 5 and 20 percent enrichment. Typical commercial reactors use fuel between about 3 and 5 percent enrichment. A total of about 10 metric tons of uranium will be utilized, using up to 2.5 metric tons annually.

High-enriched uranium is defined as being greater than 20 percent enriched with uranium-235, up to 93 percent enrichment. Weapons grade material is 90 percent enrichment up to 93 percent enrichment. Low-enriched uranium is defined as below 20 percent enrichment with uranium-235. Various radioisotopes, basically are impurities in the feedstock, and make manufacturing of fuel more difficult and require more shielding.

The feedstock at the Materials and Fuels Complex contains various impurities including plutonium-239, americium-241, cesium-137, uranium-236 (a neutron poison), technetium-99, and neptunium-237.⁴⁹

The Materials and Fuels Complex, formerly ANL-W, had the liquid sodium cooled fast reactor, the EBR-II. Pyroprocessing, also called electro-refining, is conducted in a hot cell to

⁴⁷ Nathan Brown, *The Idaho Falls Post Register*, “DOE studying making fuel at INL for advanced reactors,” November 1, 2018.

⁴⁸ Department of Energy, Office of Nuclear Energy, “DOE invites public comment on Draft Environmental Assessment for the use of DOE-owned High Assay Low-Enriched Uranium Stored at INL,” November 1, 2018. <https://www.energy.gov/ne/articles/doe-invites-public-comment-draft-environmental-assessment-use-doe-owned-high-assay-low> The draft environmental assessment prepared in accordance with the National Environmental Policy Act is posted for public review at: <https://www.id.energy.gov/insideNEID/PDF/Draft%20HALEU%20EA.pdf> Public comments are due November 30.

⁴⁹ See Table 1 radionuclide inventory in 2,500 kg of the HALEU feedstock in the draft environmental assessment at <https://www.id.energy.gov/insideNEID/PDF/Draft%20HALEU%20EA.pdf>

reprocess spent fuel in very small batches. Treatment of wastes at the facility has not been confirmed to provide an acceptable waste form for Yucca Mountain disposal. And the treatment of wastes at the facility, in the hopes that the waste form will be accepted for disposal has proceeded at a very slow pace.⁵⁰

Spent Fuel and GTCC Waste Proposed for Andrews County, Texas

The proposed Consolidated Interim Storage (CIS) for Andrews County, Texas is similar to the Holtec facility proposed for New Mexico. The Waste Control Specialists facility has low-level radioactive waste disposal now, and proposes not only interim spent fuel storage but also a limited amount of Greater-Than-Class-C waste. Public comment has been extended to November 19 for the proposal by “Interim Storage Partners, LLC” for WCS CISF.⁵¹

The partners are Waste Control Specialists and Orano CIS LLC with parent Orano USA which was a portion of Areva (from France).

No plan for aging management of degrading canisters. No facility for SNF canister repackaging or replacement, i.e., no spent fuel pool or dry hot cell facilities when canisters fail.

Located just across the boundary of New Mexico and close to WIPP, and would be very close to the proposed Holtec dry storage facility and close to the Waste Isolation Pilot Plant (WIPP), although WIPP currently prohibits disposal of spent nuclear fuel.

New Mexico will effectively be stuck with the SNF whether at the N.M. Holtec facility and/or at the proposed Andrews County, Texas facility. Once canisters start leaking/exploding, likely within just a few years, New Mexico will be forced to accept the SNF for salt mine burial, despite government promises that WIPP would not accept SNF.

In another proposal, the Department of Energy would greatly increase the GTCC waste by disposing of the waste at the Waste Control Specialists facility at Andrews County, Texas, to include all of the nation’s GTCC waste. See recently released DOE Environmental Assessment for sending the nation’s GTCC waste to Texas.⁵²

Articles by Tami Thatcher for November 2018.

⁵⁰ “Under requirements of an Environmental Impact Statement performed in 2000, DOE uses an electrorefiner at MFC to refine and down-blend spent fuel that contains highly-enriched uranium material generated decades ago in the Experimental Breeder Reactor-II (EBR-II).” *DOE-owned High Assay Low-Enriched Uranium Stored at INL (DOE/EA-2087)* HULU Notice]

⁵¹ Consolidated Interim Storage of Spent Nuclear Fuel at Andrews County, Texas, Docket NRC-2016-0231-0220 <https://www.regulations.gov/document?D=NRC-2016-0231-0220>. The documents associated with this are at <https://www.nrc.gov/docs/ML1822/ML18221A408.html>

⁵² Department of Energy, Office of NEPA Policy and Compliance, “EA-2082: Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste at Waste Control Specialists, Andrews County, Texas,” <https://www.energy.gov/nepa/ea-2082-disposal-greater-class-c-gtcc-low-level-radioactive-waste-and-gtcc-waste-waste-control>