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The ongoing failure of U.S. disposition plans for surplus plutonium

The estimates of the metric tons of surplus plutonium have varied through the years, as have the plans for disposition of the surplus plutonium. “Disposition” allows methods other than disposal and had once included using the surplus plutonium to make mixed oxide (MOX) fuel that could be burned in nuclear reactors.

In 1994, the Department of Energy declared that it had 52.5 metric tons of “excess plutonium.” An additional 9 metric tons was declared in 2007. ¹ There are various forms of the excess or surplus plutonium, and various declarations of what amount of material is surplus.

Until about 1989, the Department of Energy was still making weapons plutonium.

The 1986 Chernobyl accident in the Ukraine, however, had led to safety reviews of U.S. plutonium production reactors. This led to the shutdown of the Department of Energy’s remaining plutonium production reactors. Both the N Reactor at the Hanford site in Washington state and the K Reactor at Savannah River were shutdown by the late 1980s. Problems at the weapons production facility, the Rocky Flats Plant in Colorado, would also lead to its shutdown.

By early 1987, the Department of Energy had proposed the Special Isotope Separations Project, selecting the Idaho National Laboratory as the preferred location. The SIS Project was intended to provide more weapons plutonium by separating plutonium-239 from unprocessed DOE spent fuel. ²

A *Moscow-Pullman Daily News* article, “Troy man joins Boise protest of nuke project” by Tom Paulson, on Feb 27, 1987, quoted Chuck Broschious.

“We are not going to let DOE build this plant,” Broschious said in a prepared statement. “We are angry that the DOE wants to build yet another generation of bomb factories and add to the volume of toxic nuclear waste when we do not have the technology to safely dispose of and safeguard what we already have,” said Broschious.

¹ U.S. Department of Energy and NNSA, *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement Summary*, DOE/EIS-0283-S2, April 2015.

² U.S. Department of Energy, *Special Isotope Separation Project, Final Environmental Impact Statement*, DOE/EIS-0136, November 1988. The purpose of the SIS Project was to use the Atomic Vapor Laser Isotope Separation (AVLIS) process to process DOE fuel-grade plutonium into weapon-grade plutonium.

The Department of Energy also proposed building the New Production Reactor at the INL that would have produced more weapons plutonium and also it was to produce tritium for weapons that had been provided by the K Reactor.³

An article by *The Lewiston Tribune*, “Most oppose nuclear weapons plant at INEL,” on June 1, 1991, by John McCarthy, would quote Chuck Broschious:

It is a misguided priority to build more nuclear reactors when there is an environmental crisis from current nuclear waste contamination, said Charles M. Broschious, executive director of the Environmental Defense Institute in Moscow.

Even in the 1980s experts understood that there was already a surplus of weapons plutonium in the U.S., yet the Department of Energy had continued to propose projects, such as the SIS Project and the New Production Reactor to make more weapons plutonium.

According to the 2006 GAO-06-164T report,⁴ “When the United States stopped producing nuclear weapons in 1989, it had plutonium inventories located in numerous DOE facilities throughout the United States, including the Hanford Site in Washington, the Rocky Flat Environmental Technology Site in Colorado, the Los Alamos National Laboratory in New Mexico, the Lawrence Livermore National Laboratory in California and the Savannah River Site (SRS) in South Carolina.”

The DOE made initial plans to ship all of the surplus weapon’s plutonium to the Savannah River Site (SRS) for consolidation and much of it was sent to SRS. The plutonium was to be stored at SRS until it could be processed into a form for permanent disposal in the geological repository at Yucca Mountain, Nevada. While stored at SRS, the plutonium would be stored in 5-inch-wide, 10-inch-long DOE-approved storage containers, similar to the size of a paint can. SRS received nearly 1,900 containers from the Rocky Flats plant and many containers from other sites.

The Savannah River Site plans originally called for the construction of an Actinide Packaging and Storage Facility for the long-term storage, which the Department of Energy saw as being 50 years. Fifty years is a very short time for the plutonium-239 with its half-life of 24,000 years. The Actinide Packaging and Storage Facility was to provide for safe storage, including monitoring of the plutonium containers in a secure environment.

The plutonium was to be stored to minimize the risk of accidental release in the event a storage container is breached, to protect workers and the public. According to GAO-06-164T, “The containers were to be monitored for changes in the plutonium’s condition, particularly for any pressurization or corrosion of the containers. Such monitoring includes annually x-raying a sample of storage containers to evaluate potential pressurization. Storage containers may also be

³ U.S. Department of Energy, *Draft Environmental Impact Statement for the Siting, Construction, and Operations of New Production Reactor Capacity*, DOE/EIS-0144D, April 1991.

⁴ U.S. Government Accountability Office, *Securing U.S. Nuclear Materials – Poor Planning Has Complicated DOE’s Plutonium Consolidation Efforts*, GAO-06-164T, October 7, 2005.

cut open to evaluate the plutonium inside and the container itself for potential corrosion. An effective monitoring program is intended to detect damaged storage containers or inadequately stabilized plutonium...”

The proposed Actinide Packaging and Storage Facility was cancelled in 2001. The Department of Energy expected to store the plutonium for only a few years until processing the plutonium for permanent disposal at Yucca Mountain. DOE decided to use decades-old buildings at the Savannah River Site. Extensive upgrades had been planned to supplement existing capabilities. Storage capabilities at SRS were further reduced by facility closures.

Plutonium storage was to be inside DOE-approved plutonium containers, the size of a paint can, and called 3013 cans. The containers are problem prone, especially if the material is improperly or non-compliantly packaged. Even when compliantly packaged, there are unknowns about the condition of the various forms of plutonium that were packaged in the containers. What it takes to safely store the 3013 cans is relevant to ongoing storage of plutonium in Idaho as well as at the Savannah River Site.

For storage of the plutonium containers, DOE needed to be able to monitor the condition of the plutonium containers, to confine accidentally released plutonium through effective ventilation and appropriate filters, provide criticality control, be seismically safe, provide fire protection, provide security from theft, provide for removing the outer containers, and to be able to stabilize and repackage the plutonium if needed.

Surplus plutonium had been shipped to the Savannah River Site, with the Department of Energy claiming it would soon ship part of the material to Yucca Mountain for disposal. Funding for the never constructed Yucca Mountain repository ceased in 2010 and the Department of Energy has no program to develop a disposal repository. And although the DOE had claimed they would build a state-of-the-art storage and monitoring facility for the plutonium storage, the Actinide Packaging and Storage Facility at SRS, it was cancelled and DOE ended up using old buildings with significant safety deficiencies.

Another planned but cancelled facility at the Savannah River Site was the plutonium immobilization plant. The plutonium was to be mixed with ceramics, the mixture placed in large canisters, along with high-level radioactive waste, and then permanently transport to and dispose of the canisters at Yucca Mountain. In 2002, the plutonium immobilization plant was cancelled.

Surplus plutonium exists in various forms including nuclear weapon pits and also non-pit metal, non-pit oxide and certain nuclear reactor fuels.⁵ According to GAO-20-166, the National Nuclear Security Administration (NNSA) manages 33.3 metric tons (MT) of plutonium metal in the form of pits, DOE’s Office of Environmental Management manages 6.5 MT of metal and 6.4 MT of oxide, and at the INL, the DOE’s Office of Nuclear Energy (NE) manages 4 MT of plutonium metal in the form of reactor fuel, primarily Zero Power Physics Reactor (ZPPR) fuel.

⁵ U.S. Government Accountability Office, *Surplus Plutonium Disposition – NNSA’s Long-Term Plutonium Oxide Production Plans Are Uncertain*, GAO-20-166, October 2019.

There is also 0.7 MT of unirradiated Fast Flux Test Facility (FFTF) fuel from Hanford that was stated in the 2015 surplus plutonium EIS.⁶ The current location of the unused FFTF fuel is not stated in the 2020 GAO-20-166 report.

With regard to the ZPPR fuel at the INL, the GAO-20-166 report states that “DOE has not made any decisions on the 4 MT [metric tons] of surplus plutonium contained in metal reactor fuel and managed by NE [DOE Nuclear Energy]” but does not call out the ZPPR fuel by name.

While the roughly 4 metric tons of ZPPR plutonium metal may not sound like a lot, the nuclear weapon used by the U.S. on Nagasaki contained only about 6 kilograms of plutonium (or 0.006 metric tons of plutonium).

The bulk of the surplus plutonium metal from pits, 34 metric tons, was to be made into mixed oxide MOX fuel at the Department of Energy’s Savannah River Site. But after spending billions of dollars, the Department of Energy decided to cancel the MOX fuel project. No U.S. nuclear reactor had agreed to take the MOX fuel and the cost and schedule had spiraled out of control. The Department of Energy’s proposed MOX fuel fabrication facility was terminated in 2018 (see GAO-20-166).

A MOX fuel pellet needs to be formed from chemically pure materials and fabricated to very precise dimensions.⁷ Rather than fabricating MOX fuel, it was determined to be less costly by about half, to dispose of much of the surplus plutonium at the Waste Isolation Pilot Plant (WIPP) in New Mexico. There are still high costs and high risks associated with the blending and the transportation of the plutonium. And there is also the problem that WIPP is overcommitted and the Department of Energy has more waste than WIPP can hold.⁸ Two accidents in 2014 at WIPP occurred, one resulted from explosion of a waste drum at WIPP which shutdown WIPP for about three years and costs to resume shipments may exceed \$2 billion dollars.^{9 10}

⁶ U.S. Department of Energy and NNSA, *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement Summary*, DOE/EIS-0283-S2, April 2015.

⁷ Tom Clements, Edwin Lyman and Frank von Hippel, *Arms Control Today*, “The Future of Plutonium Disposition,” July/August 2013.

⁸ National Academies of Sciences, Engineering, and Medicine, *Review of the Department of Energy’s Plans for Disposal of Surplus Plutonium in the Waste Isolation Pilot Plant*, Washington, DC: The National Academies Press, 2020. <https://doi.org/10.17226/25593> Surplus plutonium, 48.2 MT, but not ZPPR fuel has been slated for disposal in WIPP. Only 4.8 MT of plutonium-239 to be emplaced in WIPP, the addition of 48.2 MT of surplus plutonium in WIPP greatly increases the plutonium inventory disposed of at WIPP.

⁹ Department of Energy Office of Environmental Management, Accident Investigation Report, “Phase 2 Radiological Releases Event at the Waste Isolation Pilot Plant February 14, 2014,” April 2015. http://wipp.energy.gov/Special/AIB_WIPP%20Rad_Event%20Report_Phase%20II.pdf See Sections 7.1 and 7.2. The release was found to have been from a single drum with stated inventory in plutonium-239 equivalent curies of 2.84 PE-Ci. But based on contamination on filters at Station A of 0.1 curies PE-ci far from the exploded drum in Panel 7, using conventional safety analysis assumptions the expected amount of material released to Panel 7 would not have exceeded 2.84E-4 PE-Ci — far less than what was measured downstream at Station A. The inventory in the drum appears to have been much higher than stated for WIPP drum and the release fractions may also be incorrect.

¹⁰ Dr. Jim Green, *The Ecologist*, “WIPP nuclear waste accident will cost US taxpayers \$2 billion,” September 20, 2016. <https://theecologist.org/2016/sep/20/wipp-nuclear-waste-accident-will-cost-us-taxpayers-2-billion>

A partial list of proposed but abandoned Department of Energy projects is provided in Table 1 below.

Revised proposed plans include sending much of the DOE's surplus plutonium (not including ZPPR fuel) to the Waste Isolation Pilot Plant (WIPP) in New Mexico, greatly increasing, 10-fold, the amount of plutonium to be disposed of at WIPP. This would exceed the radioactive material limits at WIPP that had been agreed to. It also puts containers of far higher grams of plutonium per container in WIPP. Environmental groups in New Mexico are adamantly opposed to expansion of disposal of waste at WIPP.

Table 1. A list of abandoned or never built Department of Energy projects pertaining to surplus plutonium.

Department of Energy Project	Status
Special Isotope Separations (SIS) Project, preferred site the Idaho National Laboratory (INL)	Proposed by 1987, never built
New Production Reactor (NPR), preferred site the INL	Draft EIS 1991, never built
ANL-W Plutonium Storage Facility Upgrade ¹¹ for potentially bringing plutonium from Rocky Flats to ANL-W, also potential upgrades to Zero Power Physics Reactor storage	Study published in 1996, upgrades cancelled
Actinide Packaging and Storage Facility, planned for the Savannah River Site (SRS)	Planned after 1989, but cancelled in 2001
Plutonium Immobilization Plant, planned for SRS	Cancelled in 2002
Yucca Mountain disposal facility for spent nuclear fuel, high-level waste, and surplus plutonium	Defunded in 2010, while there is a tunnel, the storage areas within the facility were never built
MOX Fuel Facility, was partially constructed at SRS	Project terminated in 2018 due to spiraling costs, delays, and other reasons

New plans include repurposing the partially constructed MOX fuel plant at the Department of Energy's Savannah River Site for the production of new plutonium pits. The pits are the fissile cores of nuclear warheads. Savannah River Site Watch and others issued a legal complaint in July 2022 for the failure of DOE and NNSA to prepare a new or supplemental preliminary EIS. Rather than the limited pit production at a single facility, the DOE and NNSA now plan the quadrupling of the production of plutonium pits and pit production at two facilities, which was not covered by previous EISs, according to the complaint. ¹² The radioactive waste disposal

¹¹ Fluor Daniel, Inc., Paid for by the U.S. Department of Energy, Office of Fissile Materials Disposition, Conceptual Design Report - ANL-W PSF [Plutonium Storage Facility], *Conceptual Design Report ANL-W Plutonium Storage Facility Upgrade*, Revision A, May 1996. [Inldigitallibrary.inl.gov, 88542.pdf](https://inldigitallibrary.inl.gov/88542.pdf)

¹² Savannah River Site Watch, Tom Clements, The Gullah/Geechee Sea Island Coalition, Nuclear Watch New Mexico, and Tri-Valley Communities Against a Radioactive Environment v. United States Department of Energy, Jennifer Granholm, in her official capacity as the Secretary, The National Nuclear Security Administration and

issues for the expanded plutonium pit production have not been addressed and the WIPP facility capacity is already overextended. **The expanded pit production will saddle already-burdened communities with significantly more nuclear waste and pollution and violates NEPA,** according to the complaint.

Expanded weapons pit production is to include 50 pits per year at the Savannah River Site and 30 pits per year at the Los Alamos National Laboratory.¹³

There is no disposition plan for the Zero Power Physics Reactor (ZPPR) plutonium fuel plates at the Idaho National Laboratory, nor are there comprehensive plans for safe interim storage

There is currently no disposition or disposal plan for the surplus plutonium in the Zero Power Physics Reactor (ZPPR) fuel stored at the Idaho National Laboratory.¹⁴

The five-year plan for the INL's Materials and Fuels Complex discusses the lack of proper facilities to repackage ZPPR plutonium fuel plates.¹⁵ Too bad Battelle Energy Alliance didn't figure this out before contaminating 16 workers and the ZPPR vault in 2011 trying to repackage damaged ZPPR plutonium plates in a malfunctioning and inadequate fume hood.^{16 17}

The features of a new glovebox facility appropriate for repackaging ZPPR plutonium fuel plates were not described in the most recent five-year plan. The repackaging would put the ZPPR fuel into a safer configuration in 3013 cans, the size of a paint can.¹⁸ But storage in 3013 cans still requires inspection and still carries risks to workers and the public.

For storage of the plutonium 3013 containers, containers can explode. The containers need to be monitored for pressure buildup and corrosion of the containers. In addition to monitoring the

Jill Hruby, Administrator, United States District Court for the District of South Carolina Aiken Division,, Amended Complaint for Declaratory and Injunctive Relief, No. 1:21-cv-01942-MGL. Filed July 11, 2022.

¹³ National Nuclear Security Administration, Department of Energy webpage, "Plutonium Pit Production," accessed October 31, 2022. <https://www.energy.gov/nnsa/plutonium-pit-production>

¹⁴ U.S. Department of Energy and NNSA, *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement Summary*, DOE/EIS-0283-S2, April 2015.

¹⁵ Battelle Energy Alliance for the Idaho National Laboratory, *Materials and Fuels Complex FY-22 – FY-26 Five-Year Investment Strategy*, INL/RPT-22-65922, May 2022. The ZPPR roof is aging and needs repair to address infiltration of precipitation. ZPPR vault cooling and criticality alarm system upgrades are complete. A new plutonium stabilization glovebox has been proposed to allow processing legacy and newly generated transuranic scrap materials into forms suitable for stable storage and ultimate disposal at the Waste Isolation Pilot Plant (WIPP). This glovebox would be used for excess Pu-bearing materials in the Fuel Manufacturing Facility (FMF) vault and also breached ZPPR plates. A project to implement "Uniform SNM [special nuclear material] Containers" has also been proposed to replace old designs.

¹⁶ U.S. Department of Energy Office of Health, Safety and Security Accident Investigation Report, *Plutonium Contamination in the Zero Power Physics Reactor Facility at the Idaho National Laboratory, November 8, 2011*, January 2012.

¹⁷ Department of Energy Occurrence Report, NE-ID—BEA-ZPPR-2011-0001, "ZPPR Workroom Pu Contamination Event in MFC-775," Update September 25, 2012.

¹⁸ Department of Energy, DOE Standard, Stabilization, Packaging, and Storage of Plutonium-Bearing Materials, DOE-STD-3013-2012, March 2012.

condition of the containers, there is the need to be able to confine accidentally released plutonium through effective ventilation and appropriate filters. Critically monitoring and control, seismic design adequacy of buildings and systems, fire protection and security is also needed. There needs to be a way to safely provide for removal of outer containers and to be able to stabilize and repackage the plutonium if needed.

The decades of past failure by the Department of Energy at the Idaho National Laboratory to ensure the safety of storage and handling of ZPPR fuel are cautionary. And current documents do not provide confidence that the DOE is providing for responsible management of ZPPR now or in the future.

In 1995, the Department of Energy created an implementation plan for the Defense Nuclear Facilities Safety Board issued Recommendation 94-1.¹⁹ In this plan, DOE agreed that material in close proximity to plastic would undergo periodic sampling, surveillance and monitoring and repackaging those forms or packaging configuration where problems are found on a priority basis. **The DOE states that “The term ‘in proximity to plastic’ means that direct communication between the plutonium and the plastic is possible (i.e., there is no airtight container separating them).”**

Despite the DOE’s implementation plan issued in 1995, some plutonium metal fuel remained wrapped in plastic and uninspected in the ZPPR facility until November 8, 2011 when, without adequate hazard analysis and without hazard mitigations used previously in the ZPPR facility, some material was finally to be placed in 3013 packaging without addressing the hydride buildup. Sixteen workers were exposed to airborne plutonium and americium in highly respirable form and without a functioning ventilation fume hood and without any procedures for responding to an abnormal event. Read more in last month’s October 2022 Environmental Defense Institute newsletter at <https://www.environmental-defense-institute.org>

Department of Energy fessed up to three episodes of waste shipping issues from the Idaho National Laboratory

An article in *The Idaho Falls Post Register*, “Idaho resumes radioactive waste shipments to New Mexico” by Keith Ridler on October 14, 2022 stated that the Waste Isolation Pilot Plant (WIPP) in New Mexico had again suspended shipments of transuranic radioactive waste from Idaho.

The latest New Mexico agency suspension was September 14 following problems with three Idaho shipments: one last April that caused a partial evacuation at the WIPP facility, one last July and one last August.

I have written about the problem shipment last April, which WIPP officials had required be returned to Idaho. On April 9, prohibited liquid was found in the TRUPACT-II container that

¹⁹ Department of Energy, *Defense Nuclear Facilities Safety Board Recommendation 94-1, Implementation Plan*, DNFSB/MISC-051, February 28, 1995.

held drums shipped from Idaho to the Waste Isolation Pilot Plant (WIPP).²⁰ The radioactive liquid is prohibited in the transuranic waste accepted by WIPP and it required an evacuation because chemicals like polychlorinated biphenyls (PCBs) as well as radionuclides can be harmful, yet difficult to detect.

The liquid found in the TRUPACT-II caused the evacuation of the WIPP CH-Bay and activation of the emergency center at WIPP. The problem transuranic waste came from the cleanup project at the Idaho National Laboratory and shipments from the INL were paused.

The TRUPACT-II holding the drums was shipped back to the Idaho National Laboratory where the drums and their contents were to be inspected in June.²¹

The return of a waste shipment from WIPP back to Idaho last June was an unprecedented event, yet the first time it happened, DOE did not disclose this to the Idaho Cleanup Project Citizens Advisory Board held in Fort Hall on April 26. The June 15 CAB meeting was abruptly cancelled.

There are strict limits on the amount of liquid allowed in drums and drums are required to be in good condition (see the WIPP Waste Acceptance Criteria and the New Mexico Environment Department hazardous waste requirements). The drums had been certified as not containing a noncompliant amount of liquid prior to being shipped to WIPP.

Pin hole leaks could allow liquid to leak out the bottom but that doesn't excuse the presence of excessive liquid. Liquid is a prohibited material in the drums of waste, typically 55-gallon drums, and any liquid is to have been absorbed by mixing in an adequate amount of absorbent.

²⁰ Maire O'Neill, *Los Alamos Reporter*, "Discovery of Radioactive Liquid in TRUPACT-II Container At WIPP Causes Evacuation of Contact-Handled Waste Bay," April 11, 2022. <https://losalamosreporter.com/2022/04/11/discovery-of-radioactive-liquid-in-trupact-ii-container-at-wipp-causes-evacuation-of-contact-handling-bay/>

²¹ Defense Nuclear Facilities Safety Board, Idaho National Laboratory (INL) Report for May, June, and July 2022 and Waste Isolation Pilot Plant (WIPP) Report for August 2022 at dnfsb.gov. INL May 2022: "On April 9, 2022, WIPP personnel reported that they identified a small amount of free-standing liquid at the bottom of TRUPACT-148, a recently shipped container with six waste drums inside. WIPP personnel shipped TRUPACT-148 back to INL on May 9, 2022; it arrived on May 11, 2022. TRUPACT-148 is currently staged at the Advanced Mixed Waste Treatment Project, where operators will re-open the container and investigate the anomaly after practicing on a clean mock-up and finalizing the work order." INL June 2022: "...operators [at AMWTP] opened it on June 6, 2022. After removing the drums inside, operators determined that one of the drums had pin-hole leaks in the bottom. A team of six staff members are reviewing the contents of the problematic drum and have begun to research specific waste streams from which the contents of the drum originated." INL July 2022: "Operators opened it on June 6, 2022 and collected samples of the liquid for laboratory testing. Although no laboratory results are available yet, the staff review team productively discussed potential origins of the liquid and pin hole leaks with DOE-ID and Idaho Environmental Coalition (IEC) personnel. The [DNFSB] staff review team encouraged IEC personnel to consider utilizing additional readily accessible technology, such [sic] real-time radiography, to diligently investigate the incident." WIPP August 2022: "On August 2nd, Nuclear Waste Partnership, LLC (NWP), reported elevated counts on a smear from a TRUPACT shipment (TP-180) sent by Idaho National Laboratory (INL). During subsequent investigations, on August 9th, it was determined that the contaminated surface area was greater than six square feet, which exceeds the requirements of the Hazardous Waste Facility Permit to allow decontamination at the WIPP Site. The [TRUPACT] TP-180 was sent back to INL. INL management has temporarily suspended shipments involving the waste stream in this shipment pending completion of an evaluation of the situation."

It should also be understood that the drums holding transuranic waste have vents to allow gases to escape and prevent overpressurizing the drum under normal, expected conditions.

The Department of Energy Idaho Field Office kept the lid on the problem waste shipments and their return to INL. The Idaho Department of Environmental Quality knew of the problem and from my discussions with them, they seemed oddly comfortable with the detection of prohibited liquid, the finding of pinhole leaks in the bottom of the drum(s) and the many unanswered questions about why these problems were occurring.

The April, July and August drum shipment problems to WIPP were not reported in the Idaho news until the October 14 article by Ridler.

Now in October, the Department of Energy is saying that additional steps are being taken to make sure the shipments don't leak or rupture. I was thinking this should have happened last April. In my view, the investigation of the causes of the liquid in the drums and of the leaky drums last April has not been adequate.

The problem drums were apparently packaged at the supercompactor at the AMWTP. The waste streams can be a complex mixture of various waste streams, and may include newly generated waste. The evacuation on April 9 at WIPP indicates that the waste may have included polychlorinated biphenyls (PBCs).

The Idaho Environmental Coalition that took over the Department of Energy cleanup contract from exiting Fluor Idaho in January 2022 had sent the waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

The article by Ridler quotes Ty Blackford, of the Idaho Environmental Coalition — the Department of Energy's cleanup contractor — as saying in October "The drum looked good when it left (Idaho)," he said during the Idaho Line Commission meeting. "But somewhere between here and there, bouncing down the road for 1,100 miles, something went wrong. So, we need to understand that in detail."

While it may not directly involve the problem waste shipments, it is relevant to know that the Region 10 Environmental Protection Agency cited violations at the Idaho Cleanup Project handling of transuranic waste last January at the Advanced Mixed Waste Treatment Project (AMWTP).

The AMWTP operated by the Idaho Environmental Coalition had problems that led to a Stand Down in March.^{22 23} There was no mention at the April 26 Citizens Advisory Board meeting of the Stand Down at the Advanced Mixed Waste Treatment Project (AMWTP) which had stopped all waste handling and processing work so that operations management could review whether current procedures were adequate. Maintenance activities were also discontinued on

²² Department of Energy Occurrence Report, "Less Than Adequate Conduct of Operations for Multiple Procedure Violations," Advanced Mixed Waste Treatment Facility, EM-ID—IEC-AMWTF-2022-0001. Notification date: February 24, 2022.

²³ Defense Nuclear Facilities Safety Board memo from Erin A. McCullough to Christopher J. Roscetti, Subject: Idaho National Laboratory (INL) Report for March 2022, April 1, 2022. See dnfsb.org.

March 7, 2022 due to misunderstandings of maintenance procedures among supervisory and craft personnel at AMWTP, according to the Defense Nuclear Facilities Safety Board memo.

The Department of Energy Occurrence Report for the Idaho Environmental Coalition's AMWTP facility stated that there were two waste handling events in January and February and the operators failed to execute steps correctly and the procedure steps were unclear and would not work as written. Drums or waste boxes were knocked over in the events.

During the timeframe of extensive conduct of operations problems at the transuranic waste facilities operated by the Idaho Environmental Coalition (IEC), they were handling RF-762 Pyrophoric Sludge, meaning high quantities of uranium metal. And IEC was not taking the safety measures required by the Resource Conservation and Recovery Act (RCRA) hazardous waste permit with the State of Idaho which required special fire protection configurations, a special "drop test" to check for pyrophoric reaction, and for thermal monitoring of the waste packaged in drums. **In January and February of this year, Idaho Environmental Coalition was not performing numerous required safety requirements for treating transuranic waste containing high levels of uranium metal that were specified in their RCRA permit.**

On March 30, 2022, the U.S. Environmental Protection Agency (EPA) Region 10 office issued a Notice of Deficiency to the Idaho Environmental Coalition Advanced Mixed Waste Treatment Facility and the Department of Energy Idaho Office. That notice states that "...The specific violations concern DOE-ID's failure to implement two engineering controls addressing the potential for post-packaging thermal reactions associated with wastes being managed at the AMWTP..."

With violations pertaining to the improper fire protection measures for the pyrophoric uranium metal, would the Department of Energy's nuclear safety analysis have also been violated?

It would not be unusual for Department of Energy nuclear safety basis requirements to use assumptions biased to reduce estimated radiological releases. There is always pressure to reduce the estimated radiological releases from a postulated accident so that extra costs or operational restrictions would not appear to be needed. According to the Defense Nuclear Facilities Safety Board report TECH-45, "*DOE does not ensure that all operations outside the approved safety basis are recognized and addressed.*"²⁴

The Department of Energy does require Occurrence Reporting of Technical Specification Requirement (TSR) violations. But there is inconsistency even in TSR reporting, see DNFSB/TECH-45, which states are due to "differing interpretations across the complex by DOE and contractor personnel on precisely what constitutes a violation of TSRs..." Furthermore, there

²⁴ Defense Nuclear Facilities Safety Board, Technical Report, *Violations of the Nuclear Safety Basis*, DNFSB/TECH-45, March 2020, at dnfsb.gov. See also DNFSB/TECH-43, "Deficiencies in DOE Standard 5506-2007, Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities, February 2018.

is no reporting of non-TSR safety basis requirements and differing interpretations on “what constitutes a violation of the nuclear safety basis.”

Importantly, for a TSR violation to occur, the potential release would be estimated to exceed a 25-rem dose to the public. For large distances to the public, for this to occur from a plutonium release, vast amounts of land would likely be extensively contaminated, virtually forever. So, the consequences could be horrendous and remediation of the contamination may not be feasible, yet by a variety of assumptions the estimated dose is slightly below 25 rem, such as the public was expected to be evacuated before receiving a 25-rem dose, the potential accident would not require a TSR control to mitigate it.

So, excuses that are offered to minimize a problem by saying “no TSRs were violated” would be no assurance that the problem wasn’t serious. Serious radiological exposures or releases may be possible despite no cited TSR violation. And violation of the safety basis, may not be clearly stated as such, but may also involve the potential for serious radiological exposures or releases. The violation of the Hazard Analysis Document (HAD) by IEC in 2022 would be a safety basis violation. Yet, this would not have typically been reported or disclosed.

Note that the waste type being handled without complying with the hazardous waste RCRA permit was uranium metal which was type of material that caused the four drums to heat up and overpressurize, ejecting their lids and expelling radioactive waste in a fabric enclosure in 2018. Workers had gone home for the day but could have been present when these drums expelled their contents causing a life-threatening inhalation of radioactive material and also beryllium. The blizzard of radioactive powdery waste also made conditions that limited visibility and so it would have been difficult to evacuate.

The causal analysis issued for the four transuranic waste drums that blew off their lids in April 2018 at the U.S. Department of Energy’s Radioactive Waste Management Complex states that “Management failed to fully understand, characterize, establish and implement adequate process controls for treating waste which lacked documented origin or process information.”²⁵ Belatedly, the previous cleanup contractor, Fluor Idaho, faced fines over the four drums that exploded in April 2018^{26 27} and mitigations were put in place to allow continuing to package pyrophoric waste that the facilities were never designed to handle.

²⁵ 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

²⁶ Exchange Monitor, “Fluor Idaho Has 30 Days to Contest \$580K Penalty for Drum Blast,” November 24, 2020. <https://www.exchangemonitor.com/fluor-idaho-30-days-contest-580k-penalty-drum-blast/?printmode=1>

²⁷ U.S. Department of Energy, Letter to Fred Hughes, Fluor Idaho, LLC, November 20, 2020. https://www.energy.gov/sites/prod/files/2020/11/f80/Preliminary%20Notice%20of%20Violation%20for%20Fluor%20Idaho_0.pdf

It is these mitigations for waste containing large quantities of pyrophoric uranium metal that the Idaho Environmental Coalition ignored and was not performing after taking over the cleanup contract.

As of May 31, the Idaho Environmental Coalition had not issued any press releases about the ‘stand down’ at AMWTP in March and April, the EPA violations or the shipment of prohibited liquid in discovered at WIPP on April 9. The June and October Citizens Advisory Board meetings were abruptly cancelled.

Much of the transuranic waste shipped to WIPP is not clothing or tools, much of it is chemically laden and radioactively contaminated sludges. Sludge wastes in transuranic waste can appear dry, but are also known to hold liquids, which can separate from the sludge material during freeze-thaw cycles. Liquid in waste drums that has separated from the sludge matrix is treated by adding a liquid absorbent before shipping the waste to WIPP. Newly generated transuranic waste can also be added to drums.

The non-conforming waste came from the AMWTP facility, but the waste stream of the problem waste drums sent to WIPP has not been disclosed. In fact, until recently, the Department of Energy and its cleanup contractor, the Idaho Environmental Coalition, have been completely silent about the April 9 liquid discovery in a TRUPACT-II from Idaho at WIPP.

The Idaho Department of Environmental Quality has communicated in a letter that pinhole leaks were found in one of the drums, and that the drums in the TRUPACT-II returned to Idaho had come from the AMWTP. The pin hole leak problem was a condition that has been observed with older drums at the Advanced Mixed Waste Treatment Project.²⁸

However, the presence of pin holes does not explain why liquid was present. Liquid, which is a prohibited material in the waste sent to WIPP, is to have been addressed by mixing in an absorbent material. The shipping of prohibited liquid to WIPP shows a failure to meet WIPP waste acceptance criteria which would not be limited to AMWTP but would also apply to the transuranic waste processes at the Radioactive Waste Management Complex (RWMC).

Despite the tendency of IEC to ignore its RCRA permit for handling transuranic waste, the Idaho Department of Environmental Quality appears to be satisfied by IEC excuses and it appears poised to rubberstamp the Department of Energy’s RWMC Accelerated Retrieval Project RCRA permit for IEC’s handling of transuranic waste.²⁹ The reviews by the Defense

²⁸ State of Idaho Department of Environmental Quality, Letter from Daryl Sawyer to Tami Thatcher, Subject: Request for Extension of Public Comment Period for Renewal of the Partial Permit for the Radioactive Waste Management Complex Accelerated Retrieval Project (RWMC ARP) at the Idaho National Laboratory, EPA ID# ID4890008952, June 23, 2022.

²⁹ Notice of Intent to Renew Partial Permit for Hazardous Waste Storage and Treatment at the Idaho National Laboratory. A public comment period begins May 6 and ends on June 20, 2022 for the Draft Hazardous Waste Management Act/Resource Conservation and Recovery Act Storage and Treatment Partial Permit Renewal for the Radioactive Waste Management Complex Accelerated Retrieval Project on the Idaho National Laboratory, EPA ID# ID4890008952. See the permit at <https://www.deq.idaho.gov/public-information/public-comment-opportunities> Current permits are also at the deq.idaho.gov website.

Nuclear Facilities Safety Board, throughout the summer, did not prevent the reoccurrence of problem waste shipments to WIPP. The degree that worker and public safety was compromised is difficult to access given the secrecy.

But the Idaho Environmental Coalition that is operating the Department of Energy's Idaho Cleanup Project continues to demonstrate its inability to comply with hazardous waste regulations and inability to adequately investigate and correct problems that occur. The Department of Energy has only demonstrated how effectively it can keep the lid on information about ongoing problems.

Tribute to Chuck Broschious

The time has come for Charles M. Broschious to return to mountain wilderness trails. He left us in October 2022.

Chuck was born in Pennsylvania in 1946 and later moved to Troy, Idaho where he made his home.

Chuck founded the Environmental Defense Institute that focused primarily on nuclear safety issues at the Idaho National Laboratory. He first learned of the problems at neighboring Hanford nuclear facility and from there, became deeply concerned about radiological issues affecting Idaho.

He was frequently quoted in news articles about Hanford and Idaho National Laboratory issues, especially between 1987 and 1992.

Chuck was a construction contractor by day who would put in countless hours learning and writing about the problems associated with nuclear weapons production and the nuclear industry.

While his first love was of nature and the environment, he had sincere compassion for people who had been harmed by radiation exposure and wrote of their stories.

He studied the issues and dug deeply for the truth, including making Freedom of Information Act requests from the Department of Energy. He held review board positions and published reports and a newsletter about nuclear issues. He was involved in legal challenges concerning the radiological releases, oversight of and safety of nuclear facilities.

From David McCoy: "Chuck and I worked together beginning in 1998. We found that two nuclear incinerators at Idaho National Laboratories never got permits for operation. It took 3 years of administrative battle to shut them down. An EPA complaint that we made resulted in the decision that the Idaho Department of Environmental Quality was not properly inspecting licensing of INL facilities. During that time Chuck provided technical expertise for Keep Yellowstone Nuclear Free to prevent a new plutonium incinerator from being built at INL. We

alerted the public to the ongoing dangers of Mackay Dam. Chuck was an intrepid defender of the environment with the organization that he founded the Environmental Defense Institute.”

From Tami Thatcher: “Chuck was always persistent, always working to seek the truth and to tell the truth. He understood the past harm, the ongoing harm and the harm posed to future generations from nuclear weapons production, various nuclear operations and nuclear waste. I might have never understood the extent of the onslaught of radiological releases from the Idaho National Laboratory, had he not documented inadequacies of studies that had aimed to minimize the releases. He tirelessly reminded people of the troublesome facts and he did this work out of his love of the natural environment and his compassion for human beings.”

From Robert Alvarez: “He was a force to be reckoned with. A gentle soul with an iron will, Chuck became an astute and respected critic of the Energy Department's maltreatment of the land, water and people living near the Idaho National Laboratory. Chuck always operated on a moral plane and will be missed.”

In his writing, Chuck has often quoted Helen Caldicott:

“If you love this planet, you are going to have to change the priorities of your life. People from all walks of life, many of whom identify themselves as non-political, have discovered that hopeful action is better than hopeless inaction.”

Chuck made hopeful action a priority in his life. He may have slowed down a bit but he never stopped passionately advocating for the truth, with the hope that if people understood the harm that the nuclear industry posed, that they would not accept its unfettered growth.

We are going to miss him. But he has deserved a rest and the return to the wilderness he so loved.

Articles by Tami Thatcher for November 2022. Minor editing, where to were, and an extra “be” removed after initial posting. Fast Flux misspelling corrected. References for the Waste Isolation Pilot Plant’s 2014 accident and costs to resume shipments added. Pit production goals for Savannah River Site and the Los Alamos National Laboratory added.