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ICP Citizens Advisory Board Wrestles with DOE's Proposed HLW Interpretation, Focuses on Unanswered Questions about INL's High-Level Waste

Last November, the Department of Energy issued for public comment its proposal to allow the DOE to unilaterally reclassify its high-level waste (HLW) to non-HLW. [1]

The Idaho Cleanup Project (ICP) Citizens Advisory Board [2] subcommittee on DOE's Proposed High-Level Waste (HLW) Interpretation reviewed the comments describing the multitude of problems with DOE's proposal identified by the State of Idaho, [3] the Natural Resources Defense Council (NRDC),[4] and others and gave up trying to respond directly on the DOE's problematic proposal. The ICP CAB focused instead on the reclassification of sodium-bearing waste currently managed as HLW at the INL and the hope of sending it to the Waste Isolation Pilot Plant (WIPP) in New Mexico. Another subcommittee plans to review HLW calcine stored at the INL. (The status of HLW at the Idaho National Laboratory's Materials and Fuels Complex remains a mystery.)

The State of Idaho pointed out in its comments about the DOE's HLW proposal that the Department of Energy had actually a defied request for information that Congress had codified

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[1] 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, extended to January 9, 2019. 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." See the docket for the Department of Energy's Proposed Interpretation of High-Level Radioactive Waste ID: DOE_FRDOC_0001-3696, comments due January 9, 2019, on regulations.gov at https://www.regulations.gov/document?D=DOE_FRDOC_0001-3696

[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 June 21, 2018.

[3] John H. Tippets, Director, Idaho Department of Environmental Quality, Letter to Anne White, Assistant Secretary, Office of Environmental Management, U.S. Department of Energy, Subject: State of Idaho Comments on U.S. Department of Energy Interpretation of High Level Radioactive Waste (83 FR 50909), January 9, 2019. See it on our website at http://www.environmental-defense-institute.org/publications/IDEQHLW.pdf

[4] The Natural Resources Defense Council (NDRC), "NRDC et al. Comments on Energy Department's Request for Public Comment on the Interpretation of High-Level Radioactive Waste," January 9, 2019. https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/5c36635670a6add06a0aa079/1547068277020/NRDC+et+al.+Full+Comments+DOE+HLW+9+Jan+2019.pdf

into law last year. Specifically, DOE did not comply with Section 3139 of the National Defense Authorization Act for Fiscal Year 2018 (H.R. 2810) that required DOE to prepare and submit a report to Congress by February 1, 2018 on the classification of certain wastes.

Despite the complexity of the DOE's proposed HLW interpretation and the lack of information from the DOE about the ramifications of the HLW proposal on state agreements and current HLW commitments, no presentations were given to the CAB to attempt to explain DOE's proposal.

While a significant amount of time was recently spent studying the issues, the CAB appears to have many gaps in the understanding of the history of nuclear waste issues, the history of HLW at the INL and other DOE sites, the risks of HLW storage, the processes involved in opening a repository, and the implications on human health pertaining to HLW entering the drinking water, soil and air.

These information gaps don't appear to be adequately filled by private conversations with the local DOE-ID representatives to the subcommittees.

The CAB members are to be commended for their effort to try to understand the issues and to create recommendations— particularly for their resisting DOE's prodding to recommend ditching the Idaho Settlement Agreement. [5]

For many years now, the Department of Energy has been pretending that they were on track to meet the Idaho Settlement Agreement milestones for removing spent nuclear fuel and high-level waste from the state of Idaho. The CAB has for years been assured, behind the scenes, that a repository would be available when there was a change in the country's political leadership. But despite having a Republican president and Republican majorities in both the House and Senate for the previous two years, funding has not been passed for reopening Yucca Mountain licensing activities. The seriousness of the difficulties of finding a repository for the HLW and spent nuclear fuel at the Idaho National Laboratory seems to be beginning to dawn on the CAB.

Some of the difficulty in understanding the ramifications of DOE's HLW reclassification effort is by design — the DOE does not want citizens or the CAB to understand what its proposed HLW reclassification will actually mean.

There is also a complex history pertaining to high-level waste. It is important to understand that there is a process for accepting some small percentage of radioactive waste remaining in storage tanks when efforts have been made to empty and clean the tanks. In Idaho, this acceptance process is the Section 3116 process that requires state and U.S. Nuclear Regulatory Commission involvement. This issue gets complicated by just how much of the waste is left behind, because even a few percent of the waste being left behind can mean millions of gallons of waste left behind at the DOE site at Hanford, Washington, which has not allowed the Section 3116 process. See our EDI comments on DOE's HLW Reclassification for a discussion of the 3116 process. [6]

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

[6] High-level Waste Reclassification comment submittals at http://www.environmental-defense-institute.org/index.html (http://www.environmental-defense-institute.org/publications/CommentDOEHLW.pdf and http://www.environmental-defense-institute.org/publications/EDIComHLW6.pdf)

In contrast to accepting a small percentage of the waste left behind in tanks after emptying and washing the HLW tanks, the DOE wants to reclassify the bulk of certain HLW streams. When the entire amount of liquid sodium-bearing waste at the INL, now managed as HLW and classified as HLW — when that entire waste stream of 900,000 gallons of waste is reclassified from HLW, it becomes Low-level waste (LLW). If the sodium-bearing waste isn't currently HLW as DOE sometimes postures, then why is DOE having the ICP CAB study the issue of its reclassification from being HLW? Importantly, the DOE has tremendous latitude to dispose of LLW on its DOE sites.

A subset of LLW is of unlimited radioactivity and that is known as waste that is Greater-Than-Class C (GTCC) waste. Low-level waste that is GTCC can include transuranic waste of unlimited concentrations. Only when DOE's transuranic waste meets the criteria as being defense-related and acceptable for disposal at the Waste Isolation Pilot Plant (WIPP) in New Mexico can it be disposed of at WIPP. WIPP currently requires state and EPA permitting and has laws that govern what it will accept for disposal. HLW, for example, has been prohibited by law from disposal at WIPP. Reclassified sodium-bearing waste, having been HLW tank waste, is also currently prohibited at WIPP.

The DOE is trying to muddy the water by confusing the tank closure Section 3116 process that applies in Idaho **with the unlawful reclassification of the entire bulk amount of the HLW**, whether sodium-bearing waste or calcine.

The DOE is also refusing to acknowledge to the public and to the ICP CAB — to a degree I consider unethical — the serious cloud over the legality of its proposal to reclassify the bulk of its HLW. The court found that DOE's vague approach using its DOE Order and Manual 435.1 to allow unspecified "alternate requirements" would be unacceptable because it would allow DOE to reclassify waste on whim. For example, the DOE could allow cost savings to be the overriding waste classification criteria, not safety of human health and the environment. The court dismissed the case as unripe because the DOE had not yet reclassified its HLW.

See details of the legal challenges to DOE's HLW reclassification in the State of Idaho's HLW comment submittal, [7] the National Resources Defense Council (NRDC) comment submittal,[8] and also the book *Fuel Cycle to Nowhere*. [9]

[7] John H. Tippets, Director, Idaho Department of Environmental Quality, Letter to Anne White, Assistant Secretary, Office of Environmental Management, U.S. Department of Energy, Subject: State of Idaho Comments on U.S. Department of Energy Interpretation of High Level Radioactive Waste (83 FR 50909), January 9, 2019. See it on our website at http://www.environmental-defense-institute.org/publications/IDEQHLW.pdf

[8] The Natural Resources Defense Council (NDRC), "NRDC et al. Comments on Energy Department's Request for Public Comment on the Interpretation of High-Level Radioactive Waste," January 9, 2019. https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/5c36635670a6add06a0aa079/1547068277020/NRDC+et+al.+Full+Comments+DOE+HLW+9+Jan+2019.pdf

[9] Richard Burleson Stewart and Jane Bloom Stewart, *Fuel Cycle to Nowhere – U.S. Law and Policy on Nuclear Waste*, Vanderbilt University Press, 2011, ISBN 978-0-8265-1774-6.

DOE Explains to the ICP Citizen's Advisory Board That Cost and Uncertainty over Transportation Issues Drove Decision to Close the AMWTP This Year

The February 21 Idaho Cleanup Project Citizens Advisory Board meeting included an explanation of why the Department of Energy didn't find it economical to keep the Advanced Mixed Waste Treatment Facility (AMWTP) open. Keeping the facility in standby would be very expensive. And it was uncertain how the large containers at Hanford could be shipped with appropriate containers because there are no NRC-approved Type B containers that large.

Shipments to WIPP in New Mexico require Nuclear Regulatory Commission approved Type B packaging. But the requirements for shipments between DOE sites are not required by law or by DOE regulations to use Type B packaging. In the February presentation, the Department of Energy stated that the established protocols with the Western Governors Association require NRC approved Type B packaging for inter-site shipments of transuranic waste, and also that the Oregon Department of Energy formally stated it would strongly oppose using non-NRC approved packaging.

There was no mention of the National Environmental Policy Act (NEPA) Environmental Impact Statement commitments that the Department of Energy made regarding its commitment to use NRC-approved Type B containers for any continuing missions at the AMWTP. Apparently, the DOE doesn't regard its NEPA EIS commitments as important.

I commented to the CAB last year that there is a Department of Energy Environmental Impact Statement from ten years ago, 2008, (DOE/EIS-0200-SA03) for TRU waste treatment at INL's Advanced Mixed Waste Treatment Facility states that: [10] [11]

- NRC transportation requirements will be met and describes the packaging TRUPACT-II, TRUPACT-III packaging
- Idaho Settlement Agreement requirements will be met.
- [It expects no problem relying on process knowledge to know what is being shipped to INL]
- It says that there would be no new construction of facilities needed and no excavation needed at any DOE facility.

Anyway, despite the local DOE-ID folks emphasizing last year to the ICP CAB that transportation from Hanford to Idaho did not require NRC-approved containers for shipping the transuranic waste from Hanford to Idaho, and their hopeful hubris that something could be worked out about not having NRC-approved shipping containers for the Hanford waste they hoped to ship to the AMWTP, it turns out that the transportation issue, and the uncertainty in

[10] Department of Energy, "Supplement Analysis for the Treatment of Transuranic Waste at the Idaho National Laboratory," February 2008. https://www.energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/EIS-0200-SA-03-2008.pdf

[11] Environmental Defense Institute newsletter article for April 2018, "Idaho Cleanup Project Citizens Advisory Board Votes to Request More Information from the Department of Energy Work Regarding Details of Possible Continued Missions of the AMWTP."

whether adequate packaging could be developed by the DOE, was a big cost and project uncertainty issue.

The DOE did not consider exhuming the rest of the transuranic waste remaining at the Idaho National Laboratory's Radioactive Waste Management Complex to keep the AMWTP operating.

Integrated Waste Treatment Unit Struggles Continue, As DOE Announces Fluor Idaho Contract Up for Grabs

The Integrated Waste Treatment Unit (IWTU) struggles on in 2019, as it has since missing the 2012 Idaho Settlement Agreement milestone treatment date. The process gas filters were recently redesigned. Efforts have now also been made to assure that canisters can be surveyed and deconned if radioactively contaminated during filling.

The day before the CAB meeting, an electrical power outage occurred during substation maintenance conducted by the Idaho Cleanup Project. Power was lost seven minutes into the maintenance and the reasons were not yet known, explained Fluor Idaho's Fred Hughes. Power was lost to the IWTU facility and while the facility was not running radioactive material and is still in the testing phase, there was considerable effort in restart of HVAC and other plant equipment alignments which were somewhat unpredictable as to whether autostarting occurred when power was restored. There is no diesel-generator backup; and only the distributed control system has battery-backed power at the IWTU.

Late last year, the Department of Energy issued a Request for Information/Sources to solicit input of capability statements from interested parties for the upcoming competitive procurement for the Idaho Cleanup Project currently being performed by Fluor Idaho, LLC. Fluor's contract expires May 31, 2021. All remnants of enthusiasm have been deflated from Fluor Idaho, LLC, following last year's transuranic waste drum explosions and the continued lack of treatment of and lack of even an estimated schedule for the treatment of liquid HLW radioactive sodium-bearing waste by the IWTU.

ICP CAB Meeting Cites CPP-749 Degradation, But Provides No Information About the Degraded Underground Spent Nuclear Fuel Storage Facility

The ICP Citizens Advisory Board was told that there was CPP-749 Degradation and that Phase 1 mitigation activities have been initiated. But, while the CAB was told that spent nuclear fuel at the Idaho National Laboratory is stored safely, the CAB was not told what degradation had occurred or what the Phase 1 activities consisted of.

The CPP-749 facility is an outdoor underground spent nuclear fuel storage facility at the Idaho Nuclear Engineering and Technology Center (INTEC). The Department of Energy stores 78.4 metric tons heavy metal (MTHM) at CPP-749. The SNF is from Peach Bottom Unit 1 Core 1, Shippingport Light Water Reactor, and Fermi-1 blanket SNF. The facility consists of 218 underground vaults constructed between 1971 and 1985. Three types of vaults were constructed,

each consisting of carbon steel pipes with shield plugs and grouted bottoms, emplaced in mild steel casings, according to the U.S. Nuclear Waste Technical Review Board December 2017 report. [12] As according to the USNWTB report, corrosion of the spent nuclear fuel canisters has previously been detected.

Serious Flaws in the Radiological Monitoring in the Boise Area and the US Ecology Idaho Disposal and Transfer Facilities

Despite numerous efforts, no radiological monitoring data pertaining to the explosion at the US Ecology Idaho (USEI) disposal facility at Grand View, Idaho last November 16 has been provided by the Idaho Department of Environmental Quality or by USEI. USEI also has a Rail Transfer Facility east of Boise and north of Mountain Home.

The Environmental Protection Agency (EPA) which has two air monitoring locations in Idaho, one in the Boise area and one in Idaho Falls, curiously has a large gap in the radiological data for Boise following the Grand View explosion on November 16 and for the rest of the month. [13]

Environmental Defense Institute (EDI) was able to obtain several years of radiological monitoring records for the USEI Grand View site.

Concerning the Rail Transfer Facility, since 2013, apparently there is no USEI or Idaho DEQ monitoring data…. not even a single inspection report during a transfer.

Concerning the Grand View RCRA disposal facility that isn't an NRC licensed radioactive waste disposal facility but accepts extensive shipments of radioactive waste from around the country and from around the world, a brief look suggests that the radiological monitoring is a sham.

While USEI does monitor for plutonium in the air, water and soil, AND is finding increasing levels of plutonium, particularly in the air and soil around the USEI Grand View facility, the Idaho DEQ does not find any plutonium — because the Idaho DEQ **does not monitor for plutonium in the Boise area.** The detection of plutonium in the soil around USEI Grand View by USEI has been regularly above minimum detectable concentrations and was found in nearly every soil sample in 2016 and 2017.

The Environmental Protection Agency (EPA) has gaps in its annual air filter analysis. The EPA omitted from its typical annual air filter analysis, the analysis of plutonium in the Boise area the years 2004 through 2011 and 2014 through 2016. **EPA's RadNet filter analysis for 2017 detected plutonium-238 and plutonium-239/240 and this was the highest recorded EPA plutonium data since 1995.**

What is plutonium doing at the USEI facility? I had thought that just uranium-related wastes such as the Army Corp of Engineers' Formerly Utilized Site Remedial Action Program

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[12] U.S. Nuclear Waste Technical Review Board, "Management and Disposal of U.S. Department of Energy Spent Nuclear Fuel – Report to the United States Congress and the Secretary of Energy," December 2017. http://www.nwtrb.gov/our-work/reports/management-and-disposal-of-u.s.-department-of-energy-spent-nuclear-fuel-(december-2017)" See p. 84 for discussion of CPP-749.

[13] Environmental Protection Agency RadNet at https://www.epa.gov/radnet/near-real-time-and-laboratory-data-state and choose the state, https://www.epa.gov/radnet/radnet-air-data-boise-id or https://iaspub.epa.gov/enviro2/erams_query_v2.simple_query

(FUSRAP) waste from places like St. Louis, Missouri were disposed of at the US Ecology RCRA disposal sites: Site A at Bruneau is closed, but Site B at Grand View is open. Of course, FUSRAP disposal means radium-226, radon-222, polonium-218 and 214, other radionuclides, and stable and unstable nuclides of lead.

Well, somewhere along the way, "special nuclear material" such as plutonium became acceptable to send to the USEI Grand View facility, along with any and all transuranic radionuclides, fission products and activation products. (See NRC.GOV ADAMS for Hematite license changes in 2014 and others.)

When high levels of radioactivity are found in monitoring wells downgradient of the aquifer at the USEI Grand View Facility, within less than 3 miles from the Snake River, excuses are made like that that well is always hot, so don't worry about it. And then the "hot" well is not sampled for several years. The 2017 groundwater monitoring of gross alpha downgradient the US Ecology Idaho facility and very near the Snake River was 75.50 pCi/L gross alpha, and 49.90 pCi/L gross beta, according to USEI monitoring. [14] The federal drinking water standard for gross alpha is 15 pCi/L and this level really isn't healthy to drink.

When the airborne contamination one half mile away from the facility at the location called "Steiner house" is at or above that inside the fence of the facility, it is declared that the USEI facility is at or below "background."

Seriously, if you want to contaminate Idaho with cancer-causing, life shortening, and birth defect increasing radionuclides, these farcical radiological monitoring programs are just the ticket.

The whole exercise is perverted to avoid identifying a problem. Meanwhile, the public drinking water supplies are contaminated with uranium and who knows what else, because of the inadequate determination of contributors to gross alpha and the often non-existent monitoring of gross beta.

Boise area residents are told they have a radon problem. But for the last 20 years the gyrating levels of gross alpha and gross beta (when sampled) in Boise area drinking water, from Kuna to Boise, and Murphy to Marsing, are not from naturally occurring uranium and thorium in the soil. [15] The report "Isotopic and Geochemical Investigation into the Source of Elevated Uranium Concentrations in the Treasure Valley Aquifer, Idaho," in 2011 [16] does look at the issue — but does not identify the source of the elevated radioactivity. The report confirms the widespread occurrence of sometimes very high uranium concentrations, up to 100 micrograms/liter. The Federal maximum contaminant standard for uranium in drinking water is 30 micrograms/liter.

[14] US Ecology Grand View to Idaho DEQ, Letter May 22, 2018, "Re: US Ecology Idaho, Inc. (USEI) – IDD073114654 2017 Environmental Monitoring Summary Report – Radiological" Obtained from Idaho DEQ.

[15] Environmental Defense Institute newsletter article for October 2018, "Idaho DEQ Reports Concerning the Elevated Radioactivity in Drinking Water in the Boise Area Don't Identify the Source of the Radioactivity."

[16] Brian Hanson, Dr. Shawn Benner, Dr. Mark Schmitz, Dr. Spencer Wood, Department of Geosciences, Boise State University., "Isotopic and Geochemical Investigation into the Source of Elevated Uranium Concentrations in the Treasure Valley Aquifer, Idaho," Submitted to the Idaho Department of Environmental Quality, April 2011. http://www.deq.idaho.gov/media/563327-uranium_treasure_valley_0411.pdf listed at http://www.deq.idaho.gov/regional-offices-issues/boise/water-quality-plans-reports/

The report does conclude that the source is not from agricultural fertilizer. The report suggests that the source is a near-surface source of contamination.

The mystery is not solved by the report and the report does not conclude that the source of the elevated uranium is natural. The report simply concluded that more work was needed — and there is no evidence that any work has continued since 2011. See also our Environmental Defense Institute February newsletter article "What's Up With The Radionuclides in Drinking Water Around Boise, Idaho?" [17]

Uranium-238 has many decay products, including radon-222. Radon gas can be held up underground and released at uneven rates. But when the drinking water is loaded with elevated levels of gross alpha, some of it attributed to uranium, the radon may be coming from the drinking water. So, fixing the cracks in your basement floor isn't going to help.

While the federal maximum contaminant level for drinking water for gross alpha is 15 picocuries/liter, levels considered non-harming are far lower. [18] Naturally-occurring levels of gross alpha in the drinking water in the Boise area should not be exceeding 3 pCi/L. In the Boise area, levels gyrate to levels above 30 pCi/L. The City of Kuna in Ada County had a gross alpha level at 40.5 pCi/L in October of 2016.

When the sampling includes assessment of the contribution of uranium to gross alpha levels, it doesn't mean that the level of uranium is naturally occurring, and when the contribution of uranium leaves many picocuries/liters of gross alpha unaccounted for, there is probably plutonium or americium attributing for the remaining gross alpha. Drinking water sampling programs for public drinking water aren't required to determine what radionuclides, other than uranium, are contributing to elevated levels of gross alpha in the drinking water.

There are methods that have been used for decades to determine by gamma spectrometry which radionuclides are in the water. But that simply is not done, apparently because state laws don't specify how it could be done even if the drinking water district wanted to report these results.

What is shocking to me is not only how high the levels of radioactivity are in the public drinking water supplies in the Boise area, but how the Idaho DEQ is actively involved in covering up the sources of radionuclides. These long-lived radionuclides that are not naturally in the Boise area are starting to saturate the environment and the Idaho DEQ is actively pretending that nothing's going on.

US Ecology Idaho was granted permission to accept not only uranium processing wastes but any and all fission products, activation products and transuranic radionuclides, including "special nuclear material." Special nuclear material is defined in 10 CFR 70 as follows: "*Special nuclear material* means (1) plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section

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[17] Environmental Defense Institute February 2018 newsletter article by Tami Thatcher "What's Up With The Radionuclides in Drinking Water Around Boise, Idaho?" at http://environmental-defense-institute.org/publications/News.18.Feb.pdf

[18] For more information about federal drinking water standards and public health goals, see http://www.environmental-defense-institute.org/publications/decayfact.pdf and many articles in the EDI newsletter from February 2018 http://www.environmental-defense-institute.org/publications/News.18.Feb.pdf

51 of the act, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing but does not include source material." Despite this, the radiological monitoring by the Idaho DEQ does not include plutonium. [19] Nor does it include technetium-99 which it now accepts in the waste. [20]

In 2014, the U.S. Nuclear Regulatory Commission granted US Ecology Idaho permission to accept "special nuclear material" namely, enriched uranium and plutonium and also fission product technetium-99, the most difficult radionuclide to prevent from leaching into groundwater. Specifically, USEI "may dispose of solid materials… [provided the total inventory of Tc-99 based on the average concentration and total mass shipped remains below 1.3 Ci or 2.05 Ci based upon the 95th upper confidence limit as waste at the US Ecology Idaho facility in Grand View, ID. Pursuant to 10 CFR 30.11 and 10 CFR 70.17, this material is exempt from the requirements in 10 CFR 30.3 and 10 CFR 70.3. Any waste material which will be chemically treated at the US Ecology Idaho facility in Grand View Idaho will be shipped in a rail car and total U-235 content per rail car will be limited to 700 grams or less. In addition, Westinghouse will ensure that any chemical treatment which occurs at US Ecology Idaho is limited so that no treated batch contains more than the contents of one railcar." (NRC.gov ADAMS ML13280A388.pdf)

US Ecology's Site-Specific Dose Assessment Methodology Technical Bases that is publicly available — really isn't publicly available. The document is so heavily redacted that there's basically no information provided in it. [21] This is so that the public doesn't even know the "methodology" used to evaluate the radioactive waste migration from the disposal site.

Two Explosions at Idaho DEQ RCRA-Permitted Facilities in Idaho in 2018 Suggest Idaho DEQ Doing a Bang-Up Job of RCRA Permitting

The State of Idaho's Department of Environmental Quality grants RCRA permits for hazardous chemical RCRA facilities in the state. There are RCRA-permitted facilities at the Department of Energy's Idaho National Laboratory, and non-DOE facilities such as the US Ecology Idaho RCRA disposal site at Grand View, Idaho.

Last year, we learned that the explosion of four transuranic waste drums at the Department of Energy's Idaho Cleanup Project ARP V in April was due to extremely high methane gas buildup

[19] Idaho DEQ letter to US Ecology, "Re: US Ecology Idaho, Inc. (USEI) – EPA ID No. IDD07311454 DEQ Radiation Oversight Environmental Monitoring Report for 2013," January 27, 2014. https://www.nrc.gov/docs/ML1501/ML15014A092.pdf Note that more recent Idaho DEQ monitoring also omits plutonium monitoring.

[20] Hematite Decommission Project, Westinghouse Electric Company, Subject: Issuance of Hematite Amendment No. 63 Approving Westinghouse Hematite Request for Alternate Disposal of Specified Low-Activity Radioactive Material and Granting Exemptions to 10 CFR 30.3 and 10 CFR 70.3. ADAMS Accession No. ML13280A388.pdf at nrc.gov)

[21] US Ecology's Site-Specific Dose Assessment Methodology Technical Bases – Publicly Available Version, Document date: 02/28/2017. ADAMS Accession No. ML17230A361.pdf at nrc.gov)

after repackaging the drums, due to the beryllium carbide in the drums. [22] [23] **In violation of the RCRA permit, the required chemical compatibility analysis had not been performed.** And there has been no enforcement action by the Idaho DEQ against either of the permit signatories, Fluor Idaho's Fred Hughes or the Department of Energy's Rick Provencher.

I gave a statement at the RCRA permitting public meeting for the AMWTP permit discussing the lack of the required chemical compatibility analysis that was required in the RCRA permit and of the serious problems in the emergency response for the April four drum explosion event. Despite these problems, the DEQ maintained at the meeting that "DEQ has determined that legal requirements designed to protect human health and the environment have been met, and proposes to issue the 10-year permit renewal." [24]

My statement at the RCRA permitting meeting for the Advanced Mixed Waste Treatment facility about the explosion of four drums at the ARP V facility was relevant because the waste that exploded was from the AMWTP. And that waste was planned to return to the AMWTP.

Excerpts of my statement in the public meeting transcript are below:

Staff experts [of Fluor Idaho, LLC] had actually identified not only the presence of forbidden unreacted uranium but also the inconvenient fact that some of the so-called SD-176 waste was from Rocky Flat's building 444, which handled depleted uranium and beryllium among other things, but Fluor Idaho and DOE chose to ignore this information…

In fact, without knowing what was in the drums and having performed no chemical capability evaluation or evaluation of reactive and pyrophoric materials. […] Fluor mixed the waste from one drum into several others in order to spread the uranium among multiple drums thus lowering the amount of uranium in the original drum. Fluor Idaho mixed incompatible waste together …

The RCRA's permit submittal for the AMWTP assigned in June of 2018 by Fluor Idaho's Fred Hughes and by Department of Energy's Rick Provencher has numerous errors, omissions, and inconsistencies. In Section C, Waste Characterization, it incorrectly states that the uranium waste from Rocky Flats was incinerated prior to shipment to INL; although it admits that incineration may be incomplete. It does not acknowledge the

[22] Guest column by Tami Thatcher, printed in *The Idaho Falls Post Register*, "Following regs could have prevented barrel explosion," November 14, 2018.

[23] 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

[24] DEQ Public Hearing Held November 7, 2018, 6:00 p.m. to 7:00 p.m., 780 Lindsey Boulevard, Idaho Falls, ID, Revision 1, Transcript by T&T Reporting, LLC, Subject: Notice of Intent to Renew a Partial Permit for Hazardous Waste Management and Storage at the INL Advanced Mixed Waste Treatment Project. Copy obtained from the Idaho DEQ and posted on the Environmental Defense Institute website at http://environmental-defense-institute.org/publications/DEQpublichearingAMWTP.pdf

possibility and the finding of depleted uranium from Rocky Flats that had not been incinerated, which was the case in the drum fire of December 2017 at the AMWTP as well as drum ruptures of April at the ARP V. Workers and emergency responders were put at risk because of failure to conduct a chemical capability analysis or reactive and pyrophoric material analysis for the SD-176 waste stream even though the RCRA permit requires this. At the drum overpressurization event in April where four drums of recently repackaged waste blew their lids off expelling much of the radioactive and chemical waste throughout the ARP V enclosure.

I include here also excerpts of my statement pertaining to the many problems regarding emergency response to the drum explosion accident. There problems were due to inadequate documentation and planning that should have been identified during RCRA permitting prior to granted permit approval. The emergency responders were not at fault, but were put at risk due to the inadequate RCRA permit submittal that the Idaho DEQ had approved and stated at this meeting that it intended to approve without any changes following the ARP V explosions:

Firemen were not adequately informed of the material in the drums and had difficulty extinguishing the drums. In fact, some of the fire fighting actions may have been detrimental. Radiological control technician support was tardy 43 minutes after being requested at the emergency. And there was inadequate process knowledge of drum contents throughout the response to the emergency.

The RCRA permit states that permit changes can be required following failure of emergency responses. There were numerous failures in fire preplanning and lack of radiological training for firemen and radiological control technicians. Wrong breathing apparatus were used by a radiological control technician; anti-contamination clothing was doffed inside the contamination area; smoke was smelled in the vestibule, so how uncontaminated was the vestibule where no breathing apparatus was used?

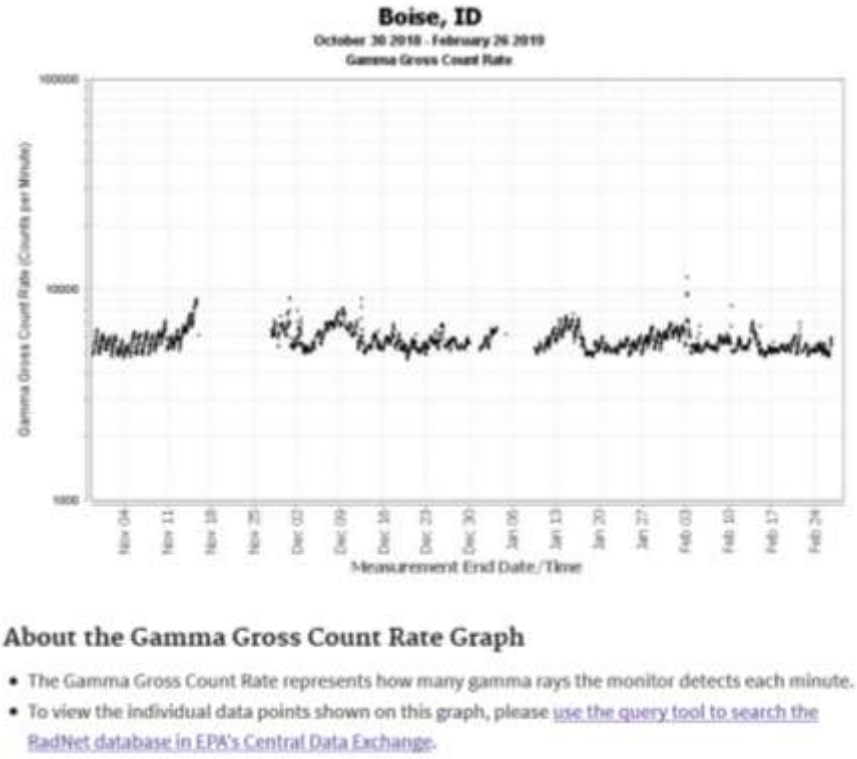
It is all the more outrageous that I can't even count the number of times during this permitting process that Idaho DEQ RCRA staff assured me that the AMWTP facility "was safe."

At the US Ecology Idaho RCRA facility in Grand View that accepts radioactive waste from around the country and from around the world, [25] despite not being an NRC licensed radioactive

[25] For some idea of the radioactive waste sources, see http://snakeriveralliance.org/tons-of-waste-shipped-to-idaho-from-kuwait/ and NRC.GOV ADAMS database for waste from NRC licensees in the U.S., and from the Army Corp of Engineers.

disposal facility, on the day of the explosion that killed a man, the state and USEI and Region 10 EPA were scrambling to monitor potential radiological releases. No data, other than radon levels, averaged from September 28, 2018 to January 15, 2019, [26] have been released showing what monitoring was conducted or the results.

Here is the U.S. Environmental Protection Agencies data for Boise, Idaho. Note the uptick in gamma gross counts around the November 16 explosion and then a gap in the data — the curious absence of data after the accident at Grand View — for the rest of the month of November. [27]



It should be noted that the prevailing downwind location monitored had higher radon levels. This is the location, Steiner house, located a half mile from the facility that is used as the "background" level for radiation monitoring and its contamination is used to say the US Ecology Idaho facility is at or below "background" levels.

As I have followed several RCRA permitting actions pertaining to the INL, I have witnessed the Idaho DEQ's refusal to question any aspect of the RCRA documentation submitted by the Department of Energy such as the above-ground, outdoor storage of radioactive waste that the

[26] Idaho DEQ radon monitoring report 107831-AL, 107830-RT. Data monitoring started 9/28/2018 and averaged through 1/15/2019. Copy obtained from the Idaho DEQ and posted on the Environmental Defense Institute website at http://environmental-defense-institute.org/publications/RADNOVARadon.pdf

[27] Environmental Protection Agency RadNet at https://www.epa.gov/radnet/near-real-time-and-laboratory-data-state and choose the state, https://www.epa.gov/radnet/radnet-air-data-boise-id or https://iaspub.epa.gov/enviro2/erams_query_v2.simple_query

Idaho DEQ allowed at the Materials and Fuels Complex, which will allow indefinite storage, something the State of New Mexico would not allow in their RCRA permit at WIPP. [28] [29]

The Idaho DEQ employees behave as though they have their marching orders to not question anything submitted by a large source of state revenue like the INL or perhaps campaign contributors like US Ecology Idaho.

It is now about 3 months since the explosion at the US Ecology Idaho Grand View explosion. So far, there is no explanation being provided for why the explosion occurred. Statements have been made by US Ecology Idaho that no radiological material was involved in the explosion — but we have not been told what radiological material inside the building that exploded prompted so much concern over emergency response radiological monitoring.

At one time, there appears to have been reluctance to allow radiological material in the processing building. It was deemed safer to just dispose of the material by burial. But this thinking was changed as soon as some of the radiological material required treatment.

Greenpeace France Issues Report: "The Global Crisis of Nuclear Waste"

Greenpeace France has commissioned a report titled "The Global Crisis of Nuclear Waste," that takes a look at the continued failures to find solutions to isolate radioactive waste and the unknown but escalating costs of attempting to find solutions to the waste problem in countries across the globe. [30]

The radioactive waste issues span the mining and milling of uranium, uranium enrichment and fuel fabrication, spent nuclear fuel, reprocessing of spent fuel — typically to obtain plutonium, the wastes from spent fuel reprocessing, and the atmospheric and other discharges to the environment.

The report discusses how the past six decades of generating electricity with nuclear power has created nuclear waste that requires the safe storage and management for "hundreds of thousands of years forever." The report concludes that despite escalating cost estimates, there are no solutions on the horizon.

This report looks at radioactive waste costs and progress, or lack thereof, in France, Belgium, Sweden, Finland, Japan, the United States, and the United Kingdom.

The United States proposed disposal of high-level waste and spent nuclear fuel at Yucca Mountain, the report points out:

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[28] See EDI's comment submittal to the Idaho Department of Environmental Quality September 29, 2017 for EPA Permit Number 4890008952 at http://www.environmental-defense-institute.org/publications/EDIRCRAcomments2017.pdf

[29] See EDI's October 2017 newsletter article "INL's Proposed Outdoor Radioactive Waste Storage at MFC Hazardous and RCRA permit Modification Should Be Denied" at http://www.environmental-defense-institute.org/publications/News.17.Oct.pdf

[30] *Greenpeace* France, "The Global Crisis of Nuclear Waste," A Report Commissioned by GP France, January 2019. http://m.greenpeace.org/belgium/Global/belgium/report/2019/REPORT_NUCLEAR_WASTE_CRISIS_ENG_BD.pdf

the Yucca Mountain site does not meet the basic geo-logical requirements for long term storage established by the International Atomic Energy Agency including a "stable geochemical or hydro chemical conditions at depth, mainly described by a reducing environment and a composition controlled by equilibrium between water and rock forming minerals; and long term (millions of years) geological stability, in terms of major earth movements and deformation, faulting, seismicity and heat flow"

The report also points out that in the U.S. despite not having a disposal solution, the U.S. lacks a coherent policy for addressing extended years of above ground storage:

the U.S. lacks a coherent policy for long-term surface storage of spent fuel and other high level wastes, which is the only viable option at present. In recognition of the major uncertainties, the DOE has stated that "extended storage, for periods of up to 300 years, is being considered within the U.S."

Another recent report by Stanford University and others [31] looks at radioactive waste in the U.S., also emphasizing commercial nuclear waste rather than military research and nuclear weapons related radioactive waste. It states: "Over the last half-century, implementers of national waste-management programs in more than a dozen countries have launched at least 24 efforts to site a deep-mined, geologic repository. In only five of these efforts was a site actually chosen. Nearly one-half of the initiatives ended prematurely because the projects failed to gain and sustain social acceptability. Those abandoned attempts typically adopted a strategy of "decide-announce-defend," in which the implementer, with little or no consultation, identified potential candidate locations, in-formed the recipient communities, and dismissed objections and criticism as they emerged."

It should be noted that radioactive waste disposal in a salt mine in Germany has been a disaster. The salt mine leaks water and won't isolate the radioactive contamination. [32] A decision has been made to remove the 126,000 barrels of radioactive waste but the risk of collapse of the mine shafts, with an estimated 13,000 liters of water flowing through daily, makes it a risky and expensive project that some people doubt can be completed.

Nuclear boosters repetitively try to promote spent nuclear fuel reprocessing and they ask "why doesn't this country reprocess spent nuclear fuel in order to solve our nuclear waste problems?" These folks usually have no idea how contaminated the West Valley commercial spent fuel reprocessing site is, and they somehow forget that the billions of dollars each year spent on "cleanup" of the hundreds of tanks of high-level waste at Hanford and HLW at other DOE sites came from reprocessing.

If commercial nuclear reactor spent nuclear fuel (SNF) is reprocessed, the uranium and/or plutonium could be extracted from SNF. When uranium fuel is used in a reactor, radioactive

[31] Stanford University Center for International Security and Cooperation, George Washington University Elliott School of International Affairs, Reset of America's Nuclear Waste Management Strategy and Policy, October 15, 2018. https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/reset_report_2018_final.pdf

[32] Jens Thurau, DW Germany, "Nuclear waste in disused German mine leaves a bitter legacy," February 8, 2019. https://www.dw.com/en/nuclear-waste-in-disused-german-mine-leaves-a-bitter-legacy/a-47420382

fission products like cesium-137 and strontium-90 build up from the fissioned uranium, and transuranic isotopes like plutonium-238 and plutonium-239 build up when a neutron is absorbed instead of fission taking place. There is uranium remaining in used nuclear fuel, which is considered "spent" when the fuel can no longer sustain needed power levels in a reactor. But to extract the uranium from spent fuel requires reprocessing. Reprocessing has been not only extremely expensive, it releases radioactive gases and creates a high volume of radioactive wastes. [33] Chemical extraction methods create toxic chemical combined with radioactive wastes.

Most of the Department of Energy's HLW came from reprocessing to extract plutonium for weapons production. However, most of the HLW as the Idaho National Laboratory came from the extraction of highly enriched uranium (HEU) from Naval submarine spent nuclear fuel at "chem plant" at INL's INTEC. The recovered HEU was sent to the Oak Ridge National Laboratory for fuel fabrication and the fuel was used in the plutonium production reactors at Savannah River Site. When these weapons material reactors shut down, there was no use for the recovered HEU from INTEC because the material contains impurities that make fabrication more difficult and the radionuclide impurities make it unsuitable for use in most reactors. Any stockpiles of the recovered HEU material are basically an unusable waste that the Department of Energy must store and ultimately dispose of. [34]

The cleanup of these Department of Energy reprocessing wastes has been ongoing since the 1940s and is costing several billion dollars per year, [35] despite little progress. The economic costs and chemical and radiological environmental polluting from weapons material reprocessing and from spent nuclear fuel reprocessing are enormous and largely misunderstood by nuclear boosters.

U.S. Nuclear Plants Operating Total 98 Amid Growing Financial Problems

In the U.S., nuclear power plant closures continue and only 98 commercial nuclear power plants continue operating. [36] Oyster Creek retired in 2018, leaving 98 operating reactors in the U.S. Of these 98 nuclear reactors, twelve are scheduled to shutdown within the next seven years.

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[33] Disposal Subcommittee Report to the Full Commission, Blue Ribbon Commission on America's Nuclear Future, June 1, 2011. https://www.nrc.gov/docs/ML1209/ML120970323.pdf and final report https://www.energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf

[34] Statement of Admiral Bruce DeMars, US navy Director, Naval Nuclear Propulsion before Nuclear Deterrence, Arms Control and Defense intelligence Subcommittee of the Senate Armed Services Committee on Nuclear spent Fuel Shipments, July 28, 1993. "During the cold war highly enriched uranium was a precious resource, recovered through chemical reprocessing at the Idaho National Laboratory for subsequent use as fuel for the weapons production reactors. . .. However, reprocessing involves chemical dissolution of the spent fuel, release of fission products, and a seven-fold increase in the amount of high-level waste at [INL]."

[35] Stanford University Center for International Security and Cooperation, George Washington University Elliott School of International Affairs, Reset of America's Nuclear Waste Management Strategy and Policy, October 15, 2018. https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/reset_report_2018_final.pdf See p. 14, 15.

[36] U.S. Energy Information Administration, Today in Energy page, "America's oldest operating nuclear power plant to retire on Monday," September 14, 2018. https://www.eia.gov/todayinenergy/detail.php?id=37055

The financial bailouts of nuclear energy companies continue in the U.S. as PG&E enters bankruptcy. [37] Cost estimates for the decommissioning of PG&E's Diablo Canyon nuclear plants are increasing by $1.6 billion, to be paid by ratepayers. [38] Diablo Canyon is California's only remaining nuclear power plant.

In France, there is the expectation that the state sponsored Electricite de France SA, known as EDF, "is likely to be taken into full state ownership…" The President of France, President Emmanuel Macron favors renewable energy and wants to boost wind and solar, while reducing the nuclear supply from 72 percent to 50 percent of France's electricity generation. [39]

Along with failure to find solutions for nuclear waste, all while aggressively promoting generating more waste, the U.S. Nuclear Regulatory Commission has now issued safety changes in response to the Fukushima Daiichi nuclear accident in Japan. The watered-down regulatory changes pertaining to the 2011 accident allows 2 years for the operators of U.S. nuclear power plants to comply with the new rules.

The NRC's action isn't just a decade late — it has omitted many of the proposed changes that are known to be needed. The NRC's final rule did not require licensees to prepare for re-evaluated flooding and earthquake hazards based on the most up-to-date seismological and hydrological knowledge.

The final version allows licensees to be prepared "only for the old, outdated hazards ... calculated decades ago when the science of seismology and hydrology was far less advanced than it is today." [40]

Versatile Test Reactor Preliminary Cost Estimate

The current cost estimate is $3 to $3.5 billion and the Department of Energy plans to make a decision in 2020 on whether to build the Versatile Test Reactor at the Idaho National Laboratory for fast-spectrum test reactor. [41]

The hopes of the Idaho National Laboratory have largely been pinned on fast neutron reactor research, the specialty of INL Director Mark Peters. But will the fabulously expensive sink hole for spending be funded?

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[37] Kaytlyn Leslie, The Tribune, "What does PG&E filing for bankruptcy mean for Diablo Canyon?" January 14, 2019. https://www.sanluisobispo.com/news/local/environment/article224498645.html

[38] Kaytlyn Leslie, The Tribune, "PG&E needs $1.6 billion more to decommission Diablo Canyon – and it'll come from your bill," December 13, 2018. https://www.sanluisobispo.com/news/local/environment/article223058625.html

[39] Francois DeBeaupuy, Geraldine Amiel, and Helene Fouquet, Bloomberg, "France Mulls EDF De-Listing Amid Nuclear Challenge," February 13, 2019. https://www.bloomberg.com/news/articles/2019-02-13/france-is-said-to-mull-edf-de-listing-amid-nuclear-challenges

[40] World Nuclear News, "NRC issues final rule on Fukushima lessons." January 28, 2019. http://www.world-nuclear-news.org/Articles/NRC-issues-final-rule-on-Fukushima-lessons

[41] Jacqueline Toth, Morning Consult, "DOE Nearing Decision Checkpoint on Versatile Test Reactor," February 11, 2019. https://morningconsult.com/2019/02/11/doe-nearing-decision-checkpoint-on-versatile-test-reactor/

Last year, Congress passed a bill creating a National Reactor Innovation Center. [42] The Department of Energy has announced that the Versatile Test Reactor project would be located at the Idaho National Laboratory. Secretary of Energy Rick Perry stated "This cutting edge Advanced Reactor will give American companies the ability they currently lack to conduct advanced technology and fuels tests without having to go to our competitors in Russia and China." [43]

Claims that the new test reactor could be built by 2016 should be met with skepticism. And then the subsequent research will be expensive but too late to address climate change. Promotors fail to grapple with the extent of environmental poisoning by radionuclides that the fast reactor research and electricity generation by nuclear energy will create. Reprocessing of spent fuel is essential to fast reactor operation, and may use pyroprocessing rather than chemical separations processes. However, the radioactive waste disposal issues are not solved by advanced fast reactor development.

Back in 2015, Bill Gates and TerraPower had reached an agreement with state-owned China National Nuclear Corp for building a demonstration reactor for an advanced (fourth generation) reactor, but Congress thwarted the plan with new U.S. restrictions on China. [44]

The Department of Energy announced the new national security measures last October 2018 involving China citing military diversion and proliferation concerns. "Notably, there will be a presumption of denial for new license applications or extensions to existing authorizations related to the China General Nuclear Power Group, which is currently under indictment for conspiring to steal U.S. nuclear technology." [45] Future U.S. nuclear technology exports to all China nuclear businesses, not just China General Nuclear are affected by the new measures.

Bill Gates is betting, I think wrongly, that building batteries to hold energy from solar and wind is more difficult than testing and building advanced nuclear reactors. Funding for energy storage research, such as batteries or thermal storage, has faced the chopping block for federal funding but appears much more economical and safe for the environment.

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[42] The Nuclear Energy Innovation Capabilities Act of 2017 (NEICA, S. 97, enacted into law September 2018. See https://www.energy.gov/articles/secretary-perry-launches-versatile-test-reactor-project-modernize-nuclear-research-and

[43] U.S. Department of Energy, "Secretary Perry Launches Versatile Test Reactor Project to Modernize Nuclear Research and Development Infrastructure," February 28, 2019. https://www.energy.gov/articles/secretary-perry-launches-versatile-test-reactor-project-modernize-nuclear-research-and

[44] *Reuters*, "Bill Gates' nuclear venture hits snag amid U.S. restrictions on China deals: WSJ," January 1, 2019. https://www.reuters.com/article/us-terrapower-china/bill-gates-nuclear-venture-hits-snag-amid-us-restrictions-on-china-deals-wsj-idUSKCN1OV1S5

[45] U.S. Department of Energy, "DOE Announces Measures to Prevent China's Illegal Diversion of U.S. Civil Nuclear Technology for Military or Other Unauthorized Purposes," October 11, 2018. https://www.energy.gov/articles/doe-announces-measures-prevent-china-s-illegal-diversion-us-civil-nuclear-technology and U.S. Policy Framework on Civil Nuclear Cooperation with China at https://www.energy.gov/sites/prod/files/2018/10/f56/US_Policy_Framework_on_Civil_Nuclear_Cooperation_with_China.pdf

Deep Bore Hole Radioactive Waste Disposal Not Dead?

The states of North and South Dakota fought off the Department of Energy's proposed deep bore hole research a couple years ago in 2016. [46] Deep bore holes are deep vertical holes drilled through granite into the earth for a depth of about three miles. Despite the research for deep bore hole research not being allowed by these states back in 2016, the Department of Energy didn't publicly admit the difficulty during its Consent-Based Siting meeting. Posters at the DOE's Consent-Based Siting meetings continued to claim the potential to dispose of radioactive waste like the calcine stored at the INL in deep bore holes that would be drilled in North or South Dakota.

See EDI's comment submittal on Consent-based siting on our website. [47]

Back in 2016, the Department of Energy was adamant that the *research* did not involve putting radioactive waste in place. But the point of the research was to dispose of radioactive waste in the deep bore holes. The Department of Energy hasn't given up on coercing these states to accept the research and accept disposal of radioactive waste, including High Level Waste in their states.

It appears that a few leaders in these low population states like North Dakota are poised to allow their states to become radioactive waste dumps. [48] The states are writing laws that will prevent counties from forbidding radioactive waste disposal and streamlines the approval of accepting radioactive waste disposal in deep bore holes.

EnergySolutions in Utah wants more Depleted Uranium, Lots More

Utah senators taking money from EnergySolutions support the bill to accept more depleted uranium at Utah's EnergySolutions facility; senators not taking donations from EnergySolutions do not agree with the proposal. [49]

The performance assessment launched in 2012 and still not completed for the nuclear waste disposal facility in Utah. The depleted uranium will grow more radioactive over time, not less.

Environmentalists are urging Utah Gov. Gary Herbert to veto legislation that could increase disposal of depleted uranium at the EnergySolutions facility, [50] but Herbert is not likely to veto the bill.

Tami Thatcher for March 2019.

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[46] Department of Energy, "Studying the Feasibility of Deep Boreholes," December 19, 2016, updated May 23, 2017. https://www.energy.gov/articles/studying-feasibility-deep-boreholes

[47] Environmental Defense Institute's comment submittal on the Consent-based Approach for Siting Storage for the nation's Nuclear Waste, July 31, 2016. http://www.environmental-defense-institute.org/publications/EDIXConsentFinal.pdf

[48] Jill Schramm, Minot Daily News, Bill amendments proposed, Alliance wants more local control in nuclear waste rules [in North Dakota]," February 25, 2019. http://www.minotdailynews.com/news/local-news/2019/01/bill-amendments-proposed/

[49] Tony Semerad, Salt Lake Tribune, "Utah Senate advanced bill to accept depleted uranium in Utah," February 20, 2019. https://www.sltrib.com/news/2019/02/20/utah-senate-advances-bill/

[50] AP, 2KUTV, "Advocates urge Gov. Herbert (Utah) to veto waste classification bill," February 25, 2019. https://kutv.com/news/local/advocates-urge-governor-to-veto-waste-classification-bill