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January 2020 INL News Roundup

In December, the Department of Energy named insider Danny Ray Brouillette the new Energy Secretary, replacing Rick Perry. [1] Brouillette was the Deputy Secretary and has extensive financial and business experience and apparently no experience understanding the health harm from nuclear projects he's pushing.

Santa did come to the Idaho National Laboratory. The National Defense Authorization Act passed in the House and Senate and included continued funding for the Naval Reactor Facilities Spent Fuel Handling Recapitalization Project and for continued INL site cleanup. And H.R. 1865 "Further Consolidated Appropriations Act, 2020" was passed into law (Public Law 116-94) giving $1.49 billion for the Department of Energy's Nuclear Energy projects.

The Idaho National Laboratory is hoping several new reactors will be built on the Idaho site:

- NuScale, the small modular reactor light-water design that can house up to 12 modules at a single facility. Each module would provide roughly 60 megawatts electricity. NuScale's design is being reviewed by the U.S. Nuclear Regulatory Commission and despite design issues, U.S. NRC licensing is expected to be completed in 2020. [2] Utah Associated Municipal Power Systems (UAMPS), with no expertise in nuclear reactor issues has been promoting this high-risk project. Idaho Falls electricity rate payers and other small cities may be stuck with paying for likely cost overruns for reactor module construction, repairs, and the management of spent nuclear fuel forever, despite the assurances to the contrary. And despite NuScale's seismic design problems that required abandoning the original location at the INL, the design is being touted as "resilient." The Department of Energy has agreed to purchase 70 MW from the plant. [3] Overhead crane, seismic design issues, and spent fuel pool safety issues are among new safety problems posed by the facility. None of the long-standing problems with light water reactors are solved by the facility, such as long-term spent fuel storage and spent fuel disposal.

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[1] Department of Energy, Dan Brouillette, Secretary of the U.S. Department of Energy, https://www.energy.gov/contributors/dan-brouillette

[2] U.S. Nuclear Regulatory Commission, Application Review Schedule for the NuScale Design, https://www.nrc.gov/reactors/new-reactors/design-cert/nuscale/review-schedule.html

[3] Department of Energy, https://www.energy.gov/ne/articles/doe-office-nuclear-energy-announces-agreement-supporting-power-generated-small-modular

- Versatile Test Reactor, a proposed new materials test reactor that the Department of Energy would approve and regulate, not the U.S. NRC. The Versatile Test Reactor is for testing conditions for fast neutron reactors. [4] INL is seeking private industry partners to develop the Versatile Test Reactor for "fast-neutron-spectrum" testing capability to test fuels and materials for fast neutron reactors. The DOE could build the reactor at the INL or Oak Ridge National Laboratory. While money is available for pursuing the design, the construction costs which are expected to exceed $3 billion dollars, but funding for building the VTR would require Congress to appropriate the funding, perhaps in 2021. [5]

- Oklo, a compact fast reactor of 1.5 MW. Aurora is preparing to submit a license application to the U.S. NRC. [6] The design incorporates solar panels and claims to be a great idea because the design will place the spent nuclear fuel underground. [7]

- The eVinci microreactor. The DOE has awarded Westinghouse a grant to prepare a demonstration of a microreactor design by 2022. Westinghouse is receiving the funds for its reactor in a cargo container called the eVinci microreactor concept. See American Institute of Physics, AIP, "Lawmakers Piecing Together Bipartisan Nuclear Energy Push," June 28, 2019. https://www.aip.org/fyi/2019/lawmakers-piecing-together-bipartisan-nuclear-energy-push Microreactors are envisioned to be factory-built reactors that fit on the back of a semi-truck, providing between 1 and 20 megawatts of thermal energy. [8]

Fluor Idaho finished 2019 without treating the radioactive liquid sodium bearing waste at the IWTU. The costs of construction and reengineering have reached about $1 billion as of last February. The IWTU was initially slated to cost $461 to complete the treatment of sodium-bearing liquid waste. The waste was to have been treated in 2012. [9]

According to The Idaho Falls Post Register, "As of Dec. 31, DOE has been assessed $7.33 million in penalties for failing to get rid of the liquid waste." [10] The penalties are not from the Idaho Settlement Agreement, but are from hazardous waste agreements to clean and close hazardous waste tanks.

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[4] Department of Energy, Fact Sheet: Versatile Test Reactor Capabilities, https://www.energy.gov/ne/downloads/fact-sheet-versatile-test-reactor-capabilities

[5] Nathan Brown, *The Idaho Falls Post Register*, "Battelle looking for partners on reactor project," November 19, 2019.

[6] *The Idaho Falls Post Register*, Shoptalk, "DOE grants site use permit for Oklo to build at INL," December 17, 2019.

[7] *World Nuclear News*, "Oklo unveils its vision of Aurora plant," December 3, 2019. http://world-nuclear-news.org/Articles/Oklo-unveils-its-vision-of-Aurora-plant

[8] https://www.energy.gov/ne/articles/swipe-right-nuclear-6-eligible-advanced-technologies

[9] See Nathan Brown, *The Idaho Falls Post Register*, "DOE starts process on new cleanup contract," December 18, 2019.

[10] *The Idaho Falls Post Register*, "The Decade 2010 – 2020 in Review," "The DOE and the Settlement Agreement," December 29, 2019.

Idaho has agreed to allow the DOE to transport research spent nuclear fuel to the INL in a one-time waiver for 25 commercial fuel rods from Byron Nuclear Generating Station in Illinois if DOE successfully produces one full canister of dry treated waste using the IWTU. The DOE would also have to agree that at least 55 percent of all future shipments to WIPP come from Idaho; and to treat at least 165 pounds of sodium-bonded EBR II driver fuel pins into material for high assay low enriched uranium fuel production (HALEU) each year until all pins have been treated, no later than the end of 2028. [11] Unfortunately, the IWTU and especially the HALEU production at the INL's Materials and Fuels Complex which will create high levels of airborne radionuclide releases to the Idaho skies. (See Table 1 of projected radiological releases for the Idaho National Laboratory that are expected to increase 170-fold later in this newsletter.)

DOE has started the process to name a new cleanup contractor. Fluor Idaho's cleanup contract with the Department of Energy expires May 31, 2021. The DOE has issued a notice asking for proposals for closing the Radioactive Waste Management Complex, processing sodium-bearing waste, "disposal of spent nuclear fuel" and other activities. [12]

Department of Energy manager Jack Zimmerman will be leaving the Idaho Operations office and heading to Cincinnati. No doubt his intelligence and finesse in glossing over Department of Energy problems will make him a great agent for representing the Department of Energy's interests in Ohio. [13] More about the radiological contamination issues near the Portsmouth Gaseous Diffusion Plant, the former uranium enrichment plant abandoned by private industry U.S. Enrichment Corporation later in this newsletter.

Department of Energy Decides Environmental Assessment to Allow INL Test Range Expansion to Poison Local Communities is Good Enough

The U.S. Department of Energy has decided that poisoning people in Mud Lake and Atomic City and other nearby communities as well as INL workers (and public) on the Idaho site is fine. After all, DOE's been doing it for decades. The DOE's proposed expansion of test range activities at the Idaho National Laboratory's National Security Test Range and Radiological Response Training Range will, for at least the next 15 years, will be releasing to the winds various long-lived and short-lived radionuclides to further the contaminate the INL and to blow to nearby communities. [14]

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[11] See Nathan Brown, *The Idaho Falls Post Register*, "Idaho, DOE announces new waste deal," November 8, 2019.

[12] See Nathan Brown, *The Idaho Falls Post Register*, "DOE starts process on new cleanup contract," December 18, 2019.

[13] See Nathan Brown, *The Idaho Falls Post Register*, "Idaho cleanup head moves to new job," November 19, 2019.

[14] U.S. Department of Energy Draft Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory (DOE/EA-2063) at

See Environmental Defense Institute comments on the radiological test range expansion on our website. [15]

For long-lived and short-lived radionuclides, returning to normal levels means blowing around until further dispersed or simply raising the "normal background level" to a new high. [16] [17]

"Normal background levels" are already elevated above what was naturally occurring and continue to rise. By selecting a contaminated area to determine "normal background," it appears to me that this is how some radiological facilities can claim to operate within "normal expected background" no matter what radiological release incident just occurred.

The draft EA implies meticulous radiation dose estimation, but is coupled with stating that **DOE may decide to release additional radionuclides that are not listed in the draft EA**. The draft EA states that the additional but as of yet unidentified radiological releases will be "based on ALARA." **But for the DOE, ALARA, which means "As Low as Reasonably Achievable" can mean anything DOE wants it to mean.**

If DOE is allowed to continue to assume, especially based on its loose environmental monitoring, that it can dose every man, woman and child up to its DOE limit of 100 mrem/yr from all sources (and that excludes exposures from transporting radiological waste), the rates of illness, premature death and unhealthy children will significantly increase. [18] The EPA standard is 10 mrem/yr for airborne exposure.

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https://www.energy.gov/sites/prod/files/2019/09/f66/draft-ea-2063-expanding-capabilities-nstr-rrtr-inl-2019-09.pdf Send comments by October 12, 2019 to nsrrea@id.doe.gov

[15] Public Comment Submittals on the U.S. Department of Energy Draft Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory (DOE/EA-2063), October 2019, by Tami Thatcher at https://www.environmental-defense-institute.org/publications/CommentDOETestRange.pdf and by Chuck Broscious at https://www.environmental-defense-institute.org/publications/EDINSTR.pdf

[16] T. M. Beasley et. al, Environmental Measurements Laboratory, *Heavy Element Radionuclides (Pu, Np, U) and Cs-137 in Soils Collected From the Idaho National Engineering and Environmental Laboratory and Other Sites in Idaho, Montana, and Wyoming*, EML-599, October 1998.

[17] See EML-599, page 37 and Figure 14 on page 46 describing the way SDA windblown radionuclides could be distinguished from global weapons testing fallout, Nevada Test Site fallout and stack releases from INTEC. See page 45 describing how elevated Americium-241 to 239+240 Plutonium ratios observed near the SDA differ from weapons testing.

[18] "Health Risks from Exposure to Low Levels of Ionizing Radiation BEIR VII – Phase 2, The National Academies Press, 2006, http://www.nap.edu/catalog.php?record_id=11340 The BEIR VII report reaffirmed the conclusion of the prior report that every exposure to radiation produces a corresponding increase in cancer risk. The BEIR VII report found increased sensitivity to radiation in children and women. Cancer risk incidence figures for solid tumors for women are about double those for men. And the same radiation in the first year of life for boys produces three to four times the cancer risk as exposure between the ages of 20 and 50. Female infants have almost double the risk as male infants.

Idaho National Laboratory on Track to Escalate Airborne Radiological Releases by a Factor of 170

The draft EA for the expansion of the Test Range at the Idaho National Laboratory includes a table that shows INL's airborne releases increasing by a factor of more than 170 from planned projects. The treatment of high assay low enriched uranium fuel production (HALEU) is a huge new source of radiological emissions, along with IWTU facility emissions.

An uninformed public, after all, won't have the benefit of adequate environmental monitoring or human health epidemiology and so the Department of Energy has no concern over the inevitable increases in birth defects, cancers and illness causes by the increased soup of radiological contaminants. I have provided data from the Department of Energy's draft EA in Table 1 below. The table isn't a complete listing of all likely future radiological releases.

The DOE's radiological monitoring of its waste disposal sites, nuclear facility emissions, nuclear fuel melt testing, accidents, and cleanup activities was and continues to be an ongoing coverup of radiological contamination that the DOE claims, no matter what, to be within limits protective of human health and the environment.

DOE has failed to disclose the full extent of past radiological releases and the DOE continues to coverup ongoing intentional and accidental releases. For example, extensive americium-241 contamination at the ATR Complex was known long ago but the DOE and the U.S. Geological Survey deliberately withheld the information about this and other Snake River Plain Aquifer contamination.

When asked by the governor in 1989 to provide an estimate of the radionuclides released from routine operations and accidents, the Department of Energy issued the "INEL Historical Dose Evaluation." [19] [20] It has been admitted to have underestimated serious releases by sometimes 10-fold. Furthermore, the past environmental monitoring used all along to claim no significant releases had occurred were not used in the INEL Historical Dose Evaluation. The environmental records that could have been used against the Department of Energy or its contractors were destroyed. See my article showing how the 1961 SL-1 accident radiological consequences have been grossly understated. [21]

The Idaho Department of Environmental Quality removes radiological monitoring data from its website after about 10 years, and actively works to avoid admitting when the INL is the source of elevated radiological contamination.

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[19] US Department of Energy Idaho Operations Office, "Idaho National Engineering Laboratory Historical Dose Evaluation," DOE-ID-12119, August 1991. Volumes 1 and 2 can be found at https://www.iaea.org/inis/inis-collection/index.html

[20] 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

[21] Environmental Defense Institute newsletter article "A Comparison to the 1979 Three Mile Island Unit 2 Fuel Release Fractions to the SL-1 Derived Release Fractions," September 2019. http://www.environmental-defense-institute.org/publications/News.19.Sept.pdf

Table 1. Estimated annual air pathway dose (mrem) from normal operations to the maximally exposed offsite individual from proposed projects, including the estimated dose from expanding capabilities at the Ranges based on DOE/EA-2063.

Current and Reasonably Foreseeable Future Action	Estimated Annual Air Pathway Dose (mrem)
National Security Test Range	0.04[e]
Radiological Response Training Range (North Test Range)	0.048[d]
Radiological Response Training Range (South Test Range)	0.00034[a]
HALEU Fuel Production (DOE-ID, 2019)	1.6[a]
Integrated Waste Treatment Unit (ICP/EXT-05-01116)	0.0746[h]
New DOE Remote-Handled LLW Disposal Facility (DOE/ID 2018)	0.0074[a]
Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling (DOE/EIS 2016)	0.0006[c]
TREAT (DOE/EA 2014)	0.0011[a]
DOE Idaho Spent Fuel Facility (NRC, 2004)	0.000063[a]
Plutonium-238 Production for Radioisotope Power Systems (DOE/EIS 2013)	0.00000026[b]
Total of Reasonably Foreseeable Future Actions on the INL Site	1.77[g]
Current (2018) Annual Estimated INL Emissions (DOE2019a)	0.0102[f]
Total of Current and Reasonably Foreseeable Future Actions on the INL Site [**DOE WOULD INCREASE INL'S AIRBORNE RELEASES BY OVER 170 TIMES**]	1.78[g]

Table notes:

a. Dose calculated at Frenchman's Cabin, typically INL's MEI for annual NESHAP evaluation.

b. Receptor location is not clear. Conservatively assumed at Frenchman's Cabin.

c. Dose calculated at INL boundary northwest of Naval Reactor Facility. Dose at Frenchman' Cabin likely much lower.

d. Dose calculated at INL boundary northeast of Specific Manufacturing Capability. Dose at Frenchman's Cabin likely much lower.

e. Sum of doses from New Explosive Test Area and Radiological Training Pad calculated at separate locations northeast of MFC near Mud Lake. **Dose at Frenchman's Cabin likely much lower.**

PLEASE NOTE THAT THE PUBLIC AT MUD LAKE IS CLOSER TO THE RELEASE THAN TO FRENCHMAN'S CABIN.

f. Dose at MEI location (Frenchman's Cabin) from 2018 INL emissions (DOE 2019a). The 10-year (2008 through 2017) average dose is 0.05 mrem/year.

PLEASE NOTE THAT MANY RADIOLOGICAL RELEASES ARE IGNORED AND NOT INCLUDED IN THE RELEASE ESTIMATES IN NESHAPS REPORTING.

g. This total represents air impact from current and reasonably foreseeable future actions at INL. It conservatively assumes the dose from each facility was calculated at the same location (Frenchman's Cabin), which they were not.

h. Receptor location unknown, according to the Department of Energy, the agency that is supposed to know the receptor location.

Idaho Department of Environmental Quality Fails to Acknowledge Serious Deficiencies in Fluor Idaho's Corrective Actions for Fluor Idaho's April 2018 Drum Event

The Idaho Department of Environmental Quality has again rubber-stamped a hazardous waste RCRA permit for the Idaho Cleanup Project. This time, actively ignoring serious deficiencies that led to the April 2018 rupture of four transuranic waste drums.

The Idaho Department of Environmental Quality response to public comments on the recent permit approval issued December 27, 2019 did not address all of the public comments nor did the DEQ's response provide anything other than a bureaucratic exercise in defending Fluor Idaho's unsafe actions and unsafe permit. See my public comment submittal on Fluor Idaho's permit modification request for the Radioactive Waste Management Complex September Permit Modification Request on our website. [22]

The Idaho DEQ argues that the new definition of pyrophoric material isn't needed because DEQ does not regulate radionuclides. Then the Idaho DEQ claims that the supporting document, RPT-ESH-014, just says the troublesome waste stream is "TBD" and that means that before the SD-176 waste is handled, Fluor Idaho will come up with something and that the DEQ and the public don't need to worry about what that "something" is.

The Idaho DEQ just isn't interested in even trying to prevent another accident like the April 2018 rupture of four drums that released uranium and beryllium, potentially exposing workers at the Radioactive Waste Management Complex.

There is no corrective action plan to address the causes of the ARP V drum event and the Idaho DEQ isn't requiring one. [23] **Clearly, the Idaho DEQ is unfit to administrate a hazardous waste program as the DEQ continues rubber stamp hazardous waste permits and fails to conduct any enforcement action against Fluor Idaho for its many lapses that caused the April 2018 drum event.**

Fluor has been making changes to the hazardous waste RCRA permits so that fabric enclosures used for exhuming waste can be used for treatment of above-ground stored "legacy" waste. [24] [25] [26] The changes include using ARP VII instead of ARP V for treating waste, including the uranium-laden SD-176 waste stream.

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[22] Public Comment Submittal on the Class 2 Permit Modification Request and Request for Temporary Authorization for the Idaho Nuclear Technology and Engineering Center and Radioactive Waste Management Complex (Hazardous Waste Management Act/Resource Conservation and Recovery Act Permit) Located on the Idaho National Laboratory, EPA ID No. ID4780008952, November 2019, by Tami Thatcher at https://www.environmental-defense-institute.org/publications/CommentARP7PMR.pdf

[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] Fluor Idaho, Notification of a Class 2 Permit Modification Request and Request for Temporary Authorization for the Idaho Nuclear Technology and Engineering Center and Radioactive Waste Management Complex located on

The four drums that exploded April 2018 at Accelerated Retrieval Project (ARP) V drum event due to rapid overpressurization leading to four drums popping their lids off and ejecting most of their waste into a room normally occupied by workers, would have had tragic health consequences for the workers, even if they managed to find their way to an exit with basically zero visibility as the powdery chemically and radiologically contaminated waste made a blizzard in the room. A large environmental release could easily have occurred as one ejected drum lid penetrated the inner fabric lining of the enclosure. In the response that followed, fire fighters responded to a fire alarm and there was no indication of a radiological contamination event. And when Fluor's staff for the waste facility were finally available, no staff had training on self-contained breathing apparatus, which forced the use of improper and inadequately protective breathing protection.

The ARP V, where the four drums exploded, was prohibited from treating pyrophoric material by its Idaho State approved hazardous waste permit. Yet that was exactly what the facility was doing. The RCRA permit required a chemical compatibility analysis but there was none for the SD-176 waste that was being treated. ARP V was treating waste that contained known large amounts of unreacted, unroasted pyrophoric uranium as well as zirconium. Now, Fluor Idaho intends to treat this waste in ARP VII while the Idaho DEQ is pretending that this form of uranium won't be treated in the facility as Fluor explains that it plans to do exactly that.

Finally, Idaho State University Comes Under U.S. NRC Scrutiny

Behind the scenes, Idaho State University has for years had a reputation for sloppy control and monitoring of radioactive materials. This first came to my attention when aquifer samples for tritium conducted by ISU about 15 years ago had several unusually high tritium levels. Naturally, the Idaho Department of Environmental Quality kept the problem under the radar and in a few years decided that the elevated tritium readings did not reflect the contamination levels in the water samples. It was surmised that the ISU tritium monitoring lab had been contaminated by the release of tritium from another ISU program licensed by the NRC. The slowness of the discovery demonstrated a lack of monitoring as well as loss of control of radioactive material.

The ISU tritium release stayed out of the news and ISU moved its tritium research facilities further off campus, away from its radiological sampling facilities and closer to facilities and homes that would not be likely to detect releases. ISU got away with the tritium release.

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the Idaho National Laboratory, EPA ID No. ID4890008952, September 23, 2019. At https://inldigitallibrary.inl.gov/PRR/169438.pdf

[25] Idaho Cleanup Project Core, Chemical Compatibility Evaluation of Wastes for Advanced Mixed Waste Treatment Project, RPT-ESH-014, Revision 10, September 2019. At https://inldigitallibrary.inl.gov/PRR/169440.pdf This document proports to have in it chemical compatibility evaluations, but largely it does not provide any chemical compatibility evaluation, instead providing N/A and TBD and in no way an adequate exercise to determine chemical compatibility.

[26] Evaluation of the Safety of the Situation for the Drum Event at ARP V (WMF-1617), ESS-137, Effective Date: TBD, At https://inldigitallibrary.inl.gov/PRR/169441.pdf

But the U.S. Nuclear Regulatory Commission's actively ignoring problems at ISU seems to have changed. The NRC has been paying more attention to ISU's way of doing things, especially after ISU admitted losing a one-gram plutonium source in 2017. The whereabouts of the Pu source, the NRC learned, hadn't been known for about 14 years, since about 2003. ISU submitted to the NRC a written report, dated November 13, 2017, [27] which presented the facts and circumstances surrounding the event, as well as supporting documentation about the lost source. Apparently, this plutonium source, identified as AP-237, was damaged, so ISU wrapped it in plastic and sought to have the Idaho National Engineering and Environmental Laboratory, now the Idaho National Laboratory, take ownership of it. But the INEEL refused and no records have been found regarding what happened to the Pu source that is about the size of a quarter. The loss of special nuclear material resulted in a civil monetary penalty by the NRC. [28] [29]

The lost one-gram source had been loaned to ISU by the Department of Energy, through the Idaho National Laboratory in 1991 as well as 13 other similar sources. The source contained primarily plutonium-239, as well as a mixture of other plutonium isotopes and decay progeny. **ISU has agreed to return all of its plutonium sources to the Department of Energy.**

ISU found itself facing more scrutiny from the NRC, when on May 2, 2019, NRC issued a Confirmatory Order to Idaho State University (ISU) confirming commitments reached as part of an alternative dispute resolution (ADR) mediation session. According to the NRC, the ADR mediation session was associated with an apparent violation involving the failure to secure two portable gauges containing radioactive sources to prevent unauthorized access or removal pursuant to Title 10 *Code of Federal Regulations* Section 30.34(i). According to the NRC's letter, the containers were not clearly labeled, were not inventoried every 6 months, didn't adequately limit access to contamination areas, didn't clearly document surveys of contamination, didn't conduct routine radiological surveys, didn't post required radiation signage regarding the radioactive material, didn't test fume hoods at least annually and didn't review their radiation protection program for adequate content and implementation at least annually. [30]

The NRC stated that ISU agreed to take a number of actions, in addition to steps already taken, including but not limited to: (1) complete a 100 percent source inventory; (2) **conduct an audit, using an independent third-party consultant(s), of NRC licensed activities across all**

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[27] See NRC's Agencywide Documents Access and Management System (ADAMS) Accession ML18011A069 or https://www.nrc.gov/docs/ML1801/ML18011A069.pdf

[28] U.S. Nuclear Regulatory Commission, Letter to Idaho State University, Subject: NRC Inspection Report 030-32322/2017-001, February 7, 2018. https://www.nrc.gov/docs/ML1801/ML18017A373.pdf

[29] Also see U.S. Nuclear Regulatory Commission, Letter to Idaho State University, Subject: NRC Inspection Report 030-32322/2018-001 and Notice of Violation, January 10, 2019. https://www.nrc.gov/docs/ML1901/ML19011A015.pdf This letter discusses, along with recent radiation program problems, the lost plutonium source reported in 2017 as well as lost and subsequently found sources reported in 2010.

[30] See Idaho State University (EA-18-153) at https://www.nrc.gov/about-nrc/regulatory/enforcement/current/materials-actions/2019.html and U.S. Nuclear Regulatory Commission, Letter to Idaho State University, Subject: Confirmatory Order, NRC Inspection Report 030-32322/2018-001, May 2, 2019. https://www.nrc.gov/docs/ML1912/ML19122A123.pdf

four NRC licenses (broad scope, production, research and test reactor, and special nuclear material); (3) complete a causal evaluation of the audit findings by the independent third-party consultant(s); and (4) submit a corrective action plan based on the third-party consultant(s) causal evaluation and recommended corrective actions.

Idaho State University has a license from the NRC authorizing possession and use of byproduct, source, and special nuclear materials in any form (License: 11-27380-01, Docket: 030-32322). In addition, ISU has three other NRC licenses including the isotope production or accelerator license (License: 11-27380-04, Docket: 030-38726), special nuclear materials license that authorizes uranium enriched in U-235 (License: SNM 1373, Docket: 070-01374), and a research test reactor license (License: R-110, Docket: 050-00284).

Beryllium contamination is widespread at uranium enrichment and nuclear weapons production facilities

Beryllium contamination and worker exposure is widespread at Department of Energy sites and its support facilities for nuclear research and production for nuclear weapons as well as support for the nuclear energy industry. The Department of Energy lists 381 facilities that are covered by the Energy Employees Occupational Illness Compensation Program (EEOICAP). [31] These facilities range from the Idaho National Laboratory to the Portsmouth gaseous diffusion plant in Ohio, to Amchitka Island in Alaska to Pinellas Plant in Florida.

Problems with worker health had been recognized before 1960 but it took over 40 years to pass laws to provide a compensation law. The EEOICP Act was passed in 2000 because it had become abundantly obvious that workers had been harmed and that the Department of Energy had known workers were being harmed by radiation and chemical exposures associated with DOE laboratories, weapons production plants, uranium enrichment plants, and other vendors. [32] An insightful overview of EEOICP coverage, agencies and areas of controversy is provided by Ken Silver in 2005. [33] The compensation law covers cancer caused by radiation and specifically covers beryllium illness. Note that only Department of Energy workers are covered. The radiation workers at commercial nuclear plants have no similar program.

The Energy Employee Occupational Illness Compensation Program enacted in 2000 includes compensation for the Part B program that covers those who have developed cancer as the result

[31] Office of Environmental, Health, Safety and Security (EHSS), Department of Energy, webpage at https://ehss.energy.gov/Search/Facility/ViewAllFacilities.aspx and https://ehss.energy.gov/Search/Facility/findfacility.aspx Note that the CDC's NIOSH website lists only 130 sites.

[32] 42 USC 7384, The Act--Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA), as Amended and see the website for the Center for Disease Control, National Institute of Occupational Safety and Health, Division of Compensation Analysis and Support at http://www.cdc.gov/niosh/ocas/ and U.S. Department of Labor, Office of Workers' Compensation Programs, EEIOCPA Program Statistics, http://www.dol.gov/owcp/energy/regs/compliance/weeklystats.htm

[33] Ken Silver, DSc, SM, AAOHN Journal, The Energy Employees Occupational Illness Compensation Program Act – New Legislation to Compensate Affected Employees, Vol. 53, No. 6, June 2005. https://journals.sagepub.com/doi/pdf/10.1177/216507990505300607

of exposure to radiation and **lung diseases resulting from exposure to beryllium** and silica. The Part E program compensates for illnesses, including cancer, that result from exposure to a wide range of toxic substances.

Many of the facilities associated with the Department of Energy or its contractors either produced beryllium metal, mixed beryllium with uranium, machined materials containing beryllium, conducted chemical separations of materials containing beryllium, or handled beryllium disposal. Chronic beryllium disease primarily affects the lungs and is caused by people inhaling beryllium dust or fumes.

A single exposure from one day of employment may be enough to cause chronic beryllium disease (CBD) in the lungs that develops 5 to 15 years later.

In 1977, Edward J. Baier stated: "**Probably no compounds known to man give so consistent a carcinogenic response in so many animal species as do the compounds of beryllium.** A least 20 different beryllium compounds, ranging from beryllium metal to beryllium-containing fluorescent phosphors, have been tested for the carcinogenic effects in animals. Almost without exception, these chemicals have induced metaphasis (pre-cancerous lesions) and/or cancer in the species tested, including rat, rabbit and monkey. In addition, numerous studies have repeatedly shown beryllium to be carcinogenic by several routes of administration, i.e., inhalation; intravenous, intraperitoneal and subcutaneous injection; intratracheal installation." [34]

Chronic beryllium disease (CBD) can cause granulomas in the lungs and other symptoms of illness including reduced lung capacity before cancer is present.

An ATSDR fact sheet states that 535 of the 1,613 National Priorities List have been found to have beryllium contamination. [35] The Department of Health and Human Services and the International Agency for Research on Cancer have determined that beryllium is a human carcinogen while the U.S. Environmental Protection Agency calls it a "probable carcinogen."

Beryllium is used in various industries but is widely used in nuclear weapons and nuclear reactors. Beryllium is a neutron reflector as well as a neutron moderator. In nuclear weapons, the beryllium may be blended with depleted uranium, as was found in the transuranic waste drums that exploded at the Idaho National Laboratory in April 2018. Beryllium may be used as a core internal component in a nuclear reactor such as the beryllium reflectors used in the Advanced Test Reactor which are then buried over the Snake River Plain Aquifer. Beryllium is mixed with uranium fuel for CANDU reactors and perhaps others. In a program to remove weapons material from Kazakhstan, the U.S. agreed to bring highly enriched uranium to the U.S. and most of it had been mixed with beryllium. The U.S. Enrichment Corp (USEC) at the Portsmouth, Ohio plant

[34] Statement of Edward J. Baier, Deputy Director, National Institute for Occupational Safety and Health, Center for Disease Control, to Department of Labor, Public Hearing on the Occupational Standard for Beryllium, August 19, 1977. https://www.cdc.gov/niosh/pdfs/77-bery.pdf

[35] Agency for Toxic Substances and Disease Registry (ATSDR), Beryllium CAS #7440-41-7, Division of Toxicology ToxFAQs, September 2002 at https://www.atsdr.cdc.gov/toxfaqs/tfacts4.pdf

had planned to dilute it and sell it as low-enriched uranium. [36] In any case, the Portsmouth gaseous enrichment plant now has discovered beryllium contamination and workers have been harmed from beryllium inhalation. **But you won't find the U.S. nuclear industry admitting worker health issues arising at uranium mining or uranium enrichment facilities.**

Beryllium had been found in perched water at the Idaho National Laboratory's ATR Complex, then called the Test Reactor Area (TRA), during early cleanup investigations in 1992. It was surprising to me because even though the Advanced Test Reactor uses beryllium reflectors, I had listened to the National Institute of Occupational Safety Health (NIOSH) speakers, on more than one occasion, deny that workers at TRA could have been exposed to beryllium. The uses of beryllium may also include nuclear fuel cladding according to a DOE training manual. [37] Beryllium in cladding for irradiation targets could explain the TRA contamination.

Many of the contaminants found in the 1992 remedial investigation [38] at the ATR Complex are common to nuclear weapons research not just operation of a nuclear research reactor. The contaminants found suggest separations processes for research, including nuclear weapons related research. The 1992 remedial investigation of contaminants in perched water at the Test Reactor Area, now, called the ATR Complex, found "contaminants of concern" to be arsenic, **beryllium**, cadmium, cobalt-60, lead, manganese, fluoride, chromium, cobalt-60, cesium-137, americium-241, strontium-90 and tritium. Volatile organic compounds detected in shallow wells near the cold waste pond included low concentrations of toluene, xylene, and various derivatives of benzene. Of semivolatile organic compounds analyzed, low concentrations of bis(2-ethylhexyl) phthalate was prevalent. These chemicals are frequently used for spent fuel or irradiation target chemical separations.

In a 1999 Center for Disease Control document, it is stated that "environmental monitoring has not indicated that a measurable amount of beryllium was released from facilities at the INEEL [now the INL]." [39]

Basically, the CDC report dismissed beryllium exposures at the Test Reactor Area. But on page iv of the 1999 CDC document, it is stated that beryllium may have been machined or hand filed in as many as six locations onsite at the INL.

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[36] Nuclear Threat Initiative, Ulba Metallurgical Plant, webpage updated September 25, 2017, https://www.nti.org/learn/facilities/753/

[37] Office of Enterprise Assessments, U.S. Department of Energy, *Chronic Beryllium Disease Prevention Program Assessment at the Los Alamos National Laboratory April 8-11 and 22-25, 2019*, August 2019. https://www.energy.gov/sites/prod/files/2019/08/f66/EA%20CBDPP%20Assessment%20at%20LANL%20-%20Aug%202019.pdf

[38] S. M. Lewis et al., Remedial Investigation (RI) Report for the Test Reactor Area (TRA) Perched Water System (Operable Unit 2-12), EGG-WM-10002, June 1, 1992. For the Idaho National Engineering Laboratory. https://ar.icp.doe.gov/owa/getimage_2?F_PAGE=1&F_DOC=EGG-WM-10002&F_REV=00

[39] Centers for Disease Control and Prevention, Department of Health and Human Services, Final Report – The Feasibility of Performing a Chemical Dose Reconstruction Study at the INEEL, RAC Report No. 4-CDC-Task Order 1-1999-Final, September 1999. https://www.cdc.gov/nceh/radiation/ineel/TaskOrder1Report.pdf See pages 59-64 and others for discussion of beryllium.

Beryllium was also detected above background concentrations at the ARA Chemical Waste pond at the INL near a hot cell facility. Materials analyzed at ARA sometimes came from the Test Reactor Area.

According to EGG-WM-10002, historic disposal points at the Test Reactor Area included the sewage ponds, retention basin, warm waste pond, chemical waste pond, cold waste pond, well USGS-53, and **the disposal well at the Test Reactor Area**. I have listened to Roy Bartholomay of the U.S. Geological Survey flatly deny at an Idaho Cleanup Project Citizens Advisory Board that there were any disposal wells at the Test Reactor Area. The USGS has a long history of covering up weapons-related contamination in its aquifer monitoring by not monitoring key constituents. The USGS had not reported americium-241 contamination for the Test Reactor Area which it knew of because of the practice of using gamma spectrometry to identify the radiological contaminants in a water sample. The USGS completely ignored all chemical contaminants prior to about 1987.

Under EEIOCPA, Part B compensation for beryllium disease is supposed to be pretty straight-forward. If you worked at a beryllium facility and you have beryllium disease, you will be compensated. But not every facility that handled beryllium was originally identified as such. And the extensive medical documentation is required to support a beryllium claim.

Contamination was also found at the Naval Reactors Facilities (NRF) similar to the Test Reactor Area contamination, including beryllium. [40] But NRF workers are categorically excluded for illness compensation under EEIOCPA, based on naval management excuses that radiation exposures didn't exceed radiation protection standards. NRF just ignores the chemical exposures, including beryllium exposure. So, even a documented case of beryllium disease would not allow illness compensation to an NRF worker. These civilian workers do not have any military or other program to help with medical expenses or any manner of illness compensation. There really should be a sign at the NRF gate at the Idaho facility that reads "Abandon all hope, all who enter here." I cringe whenever I read another obituary of an NRF fuel handling, dying young and of cancer.

A Government Accountability Office report in 2010 stated that "For example, although occupational exposure is the recognized cause of lung diseases such as chronic beryllium disease, some of the diagnostic tests for this condition have been found to be unreliable when performed on patients taking certain medications. Labor [the Department of Labor that administrates EEOICPA claims] has changed its approach to beryllium claims more than once, without the benefit of expert medical or scientific review. First, in 2007, Labor tightened its requirements for diagnostic evidence for Part B beryllium illness claims, requiring that living workers substantiate their claims with results from these tests or undergo more invasive testing. Then, in 2009, Labor once again relaxed its requirements and instructed claims examiners to

[40] See Prepared for the U.S. Department of Energy by Bechtel Bettis, Inc., Environmental Monitoring Report, "2005 Environmental Monitoring Report for the Naval Reactors Facility (NRF)," also called the "NRF 2005 Environmental Monitoring Report," NRFREC-EE-135, No issuance date.

consider a broader array of diagnostic evidence for living workers. As a result, the Department of Labor needed to review beryllium claims that were denied when the more restrictive 2007 policy was in effect." [41]

For workers exposed to beryllium and who died years ago, it is unlikely that sufficient medical records can be found to support the beryllium claim. Lung cancer if attributed to radiation rather than beryllium would require a sufficiently high estimated "probability of causation" in the radiation dose reconstruction that is performed based on documented evidence of the worker's radiation dose. But inadequate radiation monitoring or deliberate record destruction can mean that the worker's estimated radiation dose is considered too low to be recognized as having caused the cancer. Recently added Special Exposure Cohorts for the Idaho National Laboratory have added to approved compensation claims, but many facilities at the Idaho National Laboratory still have not been investigated for added Special Exposure Cohorts that don't require radiation dose reconstruction. [42]

The Department of Energy knew, since the 1950s, that beryllium was toxic, yet all too often its facilities were handling beryllium, sometimes without workers having any awareness of it. There are now programs for screening former workers for beryllium illness. A detailed training manual prepared in 2002 by the Department of Energy for communicating health risks and working safely with beryllium provided extensive information on beryllium health issues and history. [43]

So, are the bad old days of inadequate beryllium protection over? Not according to a 2018 Department of Energy Office of Inspector General report, DOE-OIG-18-20 [44] that found that Los Alamos had not implemented an effect prevention program and a 2019 program assessment at the Los Alamos National Laboratory that concluded that, due to a lack of resources, Los Alamos still hadn't implemented a program to protect workers from beryllium disease. [45] But the state of New Mexico played its part, in having rescinded its regulation standard for beryllium ambient air emissions in 1995. [46]

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[41] See U.S. Government Accountability Office (GAO), Energy Employee Compensation: Additional Independent Oversight and Transparency Would Improve Program's Credibility, GAO-10-302, March 2010. https://www.gao.gov/assets/310/302187.html

[42] See EDI's June 2017 newsletter article "Why so wrong for so long?" at http://www.environmental-defense-institute.org/publications/News.17.June.pdf

[43] Beryllium Health Risk Communication Task Force, U.S. Department of Energy, *Communicating Health Risks Working Safely with Beryllium – Facilitator Manual*, April 2002. https://www.energy.gov/sites/prod/files/2014/09/f18/communicating_0.pdf

[44] Department of Energy Office of Inspector General, *Los Alamos National Laboratory Chronic Beryllium Disease Prevention Program*, DOE-OIG-18-20, February 20, 2018. https://www.energy.gov/ig/downloads/inspection-report-doe-oig-18-20

[45] Office of Enterprise Assessments, U.S. Department of Energy, *Chronic Beryllium Disease Prevention Program Assessment at the Los Alamos National Laboratory April 8-11 and 22-25, 2019*, August 2019. https://www.energy.gov/sites/prod/files/2019/08/f66/EA%20CBDPP%20Assessment%20at%20LANL%20-%20Aug%202019.pdf

[46] Concerned Citizens for Nuclear Safety (CCNS), Beryllium Fact Sheet, undated at http://www.nuclearactive.org/docs/be.html#9

Contamination from the 'Cleanup' of the Portsmouth Gaseous Enrichment Plant is Getting Attention

A new class-action lawsuit has been filed because of radioactivity that came from the Portsmouth Gaseous Diffusion Plant that enriched uranium from 1954 to 2001 for the Department of Energy nuclear research and weapons production and for commercial nuclear reactors. According to the *Cincinnati Enquirer*, "A local residents group identified 247 cancer cases within a six-mile radius of the plant, according to the lawsuit." [47] The *Cincinnati Enquirer* article also identified a worker with breathing problems believed to be related to beryllium at the Portsmouth plant.

The Department of Energy has admitted underreporting of contamination near the Portsmouth plant, in several reports, including the 2001 to 2017 reports for annual National Emission Standards for Hazardous Air Pollutants Reports and for the Annual Site Environmental Reports. [48]

Radiation hazards at the Ohio plant were not just uranium and uranium decay progeny. Other contaminant radionuclides introduced from using reprocessed uranium (RU) from the Hanford and Savannah River Department of Energy uranium reprocessing. The RU included transuranic radionuclides neptunium-237, plutonium-238, plutonium-239, plutonium-240 and americium-241 and fission product contaminants including technetium-99. [49] [50] [51]

The chemical exposures at Portsmouth are extensive but official NIOSH documents don't seem to discuss beryllium contamination at Portsmouth. In fact, the beryllium contamination had not been identified at the Portsmouth plant until 2004, as reported in a Worker Health Protection Program Healthwatch newsletter. [52] Elevated levels of beryllium were announced in January 2004 while the Portsmouth Gaseous Diffusion Plant contractor was conducting beryllium surveys as part of its responsibilities under the DOE Chronic Beryllium Disease Prevention

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[47] Sarah Brookbank, *Cincinnati Enquirer*, "Lawsuit: Residents near Portsmouth Gaseous Diffusion Plant have been 'sacrificial lambs,'" June 30, 2019. https://www.cincinnati.com/story/news/2019/06/30/lawsuit-residents-near-portsmouth-plant-have-been-sacrificial-lambs/1611619001/

[48] Max Londberg, Cincinnati Enquirer, " 'Minor miscalculation': DOE says Pike County contamination was underreported for years," June 11, 2019. https://www.cincinnati.com/story/news/2019/06/11/ohio-uranium-plant-contamination-underreported-but-safe-doe-says/1427045001/

[49] ORAU Team Dose Reconstruction Project for NIOSH, ORAUT-TKBS-0015-2, October 4, 2006. https://www.cdc.gov/niosh/ocas/pdfs/tbd/portsm2r1.pdf

[50] S. Cohen & Associates, SC&A, Review of the NIOSH Site Profile for the Portsmouth Gaseous Diffusion Plant, SC&A-TR-TASK1-0020, February 7, 2008. https://www.cdc.gov/niosh/ocas/pdfs/abrwh/scarpts/sca-portssp-r0.pdf This document indicates there may have been "beryllium workers" but little else.

[51] ORAU Team Dose Reconstruction Project for NIOSH, ORAUT-OTIB-0078, Rev. 03, July 22, 2016. https://www.cdc.gov/niosh/ocas/pdfs/arch/frnld5-r1.pdf This document is for the Feed Materials Production Center, in Ohio, not the Portsmouth gaseous diffusion plant, but it contains a useful explanation of recycled uranium constituents from Hanford and Savannah River.

[52] *Health Watch – A newsletter of the PACE/Queens College Worker Health Protection Program*, Worker Health Protection Program, Volume 2, Issue 7, Summer 2004. http://www.worker-health.org/QueensCollegeNewsletter7.pdf

Program Final Rule (10CFR Part 850). **The Health Watch newsletter stated that the beryllium contamination came as a surprise at the Portsmouth uranium enrichment facility.** Beryllium contamination was known to exist at many other Department of Energy facilities including the Oak Ridge K-25 plant, where many workers were known to work with or near beryllium.

Nuclear proponents often emphasize that nuclear energy is safe — but it just isn't true

Even people without technical backgrounds understand that if disaster strikes a wind farm or array of solar panels, it's no big deal. That besides the economic loss of that equipment, it's nothing compared to a nuclear accident with the release of radionuclides to air, soil and water. So, why do nuclear proponents pretend that nuclear energy is safe?

Would you rather have a few wind turbines fall over from a natural disaster? — Or have a nuclear accident blowing a plume of radionuclides over the region you live in? Would you rather replace some wind turbines and solar panels — Or replace a multibillion-dollar nuclear reactor facility?

With the Fukushima accident, nuclear proponents in Idaho stressed that we can't have a Tsunami here. But nuclear reactors, along with being vulnerable to flooding, seismic events and other natural disasters, are also inherently vulnerable to accidents due to a myriad of causes involving design error, human error, equipment malfunctions and structural failures.

Even the release from a single spent nuclear fuel canister or so-called microreactor could force the permanent evacuation of the public, require disposal of agricultural products from milk to beef cattle, require taking agricultural land out of use, cause the contamination of hospitals from treating radiologically contaminated people, and require disposal of everyday objects, from houses to cars, now contaminated with radionuclides. The nuclear industry doesn't like to talk about these things. Instead, they want to focus on the number of acute radiation deaths, while denying the increases in deaths and illnesses that will happen because of the accident.

When a nuclear reactor accident happens, environmental monitoring of the released radionuclides won't be the responsibility of the nuclear plant owner. **State and federal radiological monitoring is designed to be inadequate.** Inadequate monitoring allows the nuclear industry to deny the extent of the release. Despite the lies told about the Three Mile Island Unit 2 accident in 1979, lives were shortened by the accident. [53] It's a clue that when people were vomiting and having their hair fall out, that the radiation exposure was more serious than officialdom was admitting.

[53] Steve Wing, David Richardson, Donna Armstrong, and Douglas Crawford-Brown, A Reevaluation of Cancer Incidence Near the Three Mile Island Nuclear Plant: The Collision of Evidence and Assumptions, Volume 105, Number 1, January 1997, Environmental Health Perspective

Nuclear proponents don't want you to have any concern about elevated levels of man-made radiation, as they work to prevent meaningful epidemiology near nuclear facilities

Most Americans are such conformists that it doesn't take much for a nuclear promoter to get the crowd to fall in line, nodding with approval, that sure, we don't worry about a little radiation exposure. The nuclear promotor puts up comparisons of voluntary radiation exposures for medical treatments and allowable exposures for radiation workers — and implies that these are safe, benign radiation exposures, which is not true. But nobody questions it. They don't want to feel stupid. And even more strongly, they don't want to be seen as not conforming to the local federal laboratory that brings in jobs and supports the economy.

The nuclear industry in the U.S. is not about to accept the inconvenience of lowering radiation worker dose limits, nor is it going to tighten the contamination standards to air and water to protect the public.

The nuclear industry continues to pretend that the radiation worker radiation dose limit of 5000 milli-rem/year (mrem/yr) is a benign radiation dose when epidemiology is showing that annual ***doses as low as 400 mrem/yr, for just a few years of exposure, increases cancer risk to adults.*** [54] This doesn't address that the reproductive health effects are larger than workers realize, in terms of sterility and in terms of increased risk of birth defects.

Here in Idaho, the public does not know that the Department of Energy's radiation protection limits for radioactive contamination allow much higher doses to the public via air and soil contamination than would be benign. The Department of Energy has its own contrived contamination limits that are usually about 100 times higher than federal limits for radiological contamination.

If you actually understand that the Department of Energy's dose limits don't protect an adult male for a few years of exposure, you might begin to understand that the DOE's dose limits certainly don't protect the unborn. Woman are more vulnerable to radiation, and female children are seven times more vulnerable than an adult male.

That is why it is so difficult for me to watch the Department of Energy go forward with expansion of the Idaho National Laboratory's Test Range to allow unfettered release of radionuclides to the open air and other pork projects that will increase radiological emissions. The DOE knows that few Idaho citizens will bother to look at the draft Environmental

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

Assessment (EA). [55] See Environmental Defense Institute comments on the radiological test range expansion on our website. [56]

The DOE has already concluded that homes in Mud Lake will be adversely affected, but hey, who cares? No one in Mud Lake is going to read the Environmental Assessment for it. And even if they did, they aren't going to make waves. You know, sacrifices have to be made for the nuclear industry, and hey, why not your baby?

Do you really want to support an industry that cares so little for human life that it refused to conduct any credible human epidemiology study in the U.S.? The U.S. Nuclear Regulatory Commission knows that the results from studies in other countries mean that any serious study of health effects from living near nuclear power plants in the U.S. would spell bad news for the nuclear industry.

It is important to know that the public and radiation workers will be receiving life shortening radiation doses ***even when below allowable radiation protection standards***. The nuclear promotors in the U.S. refuse to acknowledge compelling and diverse studies of human epidemiology that show more harm than accepted radiation protection standards predict.

One university professor from SE Idaho, who I won't name, offered to me his explanation: "somebody higher up has decided the harm [to human life] isn't worth the cost [of having to reduce radiation doses]." He couldn't explain or defend from a technical basis that the evidence of harm was wrong; he could only defer to someone else having decided that the main thing was not to harm the nuclear industry. He expected his explanation to be sufficient to any good conformist, and he expected others, like me and of course, his students, to all be very good conformists like he was. This is the usual behavior that goes along with the nuclear industry. University professors do not get defense industry dollars by raising radiation health concerns. And the performances I see all too often, by many of these nuclear promoters shows that they have convinced themselves that they are telling lies for a good cause, even if it's just their paycheck.

This is really the state of affairs, even when, a few years ago, I inquired and the response from INL Director Mark Peters was that he didn't have a technical reason for ignoring the epidemiology showing greater than expected health harm to radiation workers and he didn't have any plan to discuss the matter with radiation workers at the INL. I see time and time again the refusal to acknowledge the evidence of harm to human health and the environment.

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[55] U.S. Department of Energy Draft Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory (DOE/EA-2063) at https://www.energy.gov/sites/prod/files/2019/09/f66/draft-ea-2063-expanding-capabilities-nstr-rrtr-inl-2019-09.pdf Send comments by October 12, 2019 to nsrrea@id.doe.gov

[56] Public Comment Submittals on the U.S. Department of Energy Draft Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory (DOE/EA-2063), October 2019, by Tami Thatcher at https://www.environmental-defense-institute.org/publications/CommentDOETestRange.pdf and by Chuck Broscious at https://www.environmental-defense-institute.org/publications/EDINSTR.pdf

Science requires the review of new evidence. But the U.S. NRC has not only ignored valid evidence from epidemiology in other countries and in multi-country studies, the NRC has refused to conduct epidemiology near U.S. nuclear facilities that would reveal increased childhood cancer and leukemia. The NRC ignores extensive and diverse evidence that there is more harm from radiation exposure to people than the U.S. nuclear industry has assumed.

The US Nuclear Regulatory Commission decided to refuse to fund epidemiology studies near US nuclear power plants. The framework for the study was reported in "Analysis of Cancer Risks in Populations Near Nuclear Facilities; Phase I (2012). [57] After 5 years in planning for the study, the NRC decided it would take too long and cost too much. The NRC knows that a credible study would be the end of licensing new nuclear plants.

Epidemiology conducted in Europe includes the study known by its German acronym KiKK (Kinderkrebs in der Umgebung von Kernkraftwerken). The KiKK study on Childhood Cancer in the Vicinity of Nuclear Power Plants, completed in 2007 is scientifically rigorous and statistically sound and its peer reviewed results show significantly elevated cancer risk for children under five years of age living within 5 km of a nuclear power plant. The study looked at childhood leukemia and cancer near nuclear plants from 1980 to 2003.

The NRC issued a statement [58] explaining their decision which included this excuse: "For example, the German study initially found an association of increased childhood leukemia risk within 5 kilometers of the facilities. However, upon examination of the offsite exposures, the authors concluded the increased risk could not be explained by the releases from the facilities." In other words, it couldn't happen, so it didn't.

In Illinois, near the Braidwood and Dresden nuclear power plants, one family learned that many children in the area had cancer, brain cancer, and leukemia, after their daughter Sarah was diagnosed with brain cancer when she was seven. [59] Cindy and Joe Sauer lived in the area of these reactors from 1998-2004. Joe Sauer, a medical doctor, conducted his own epidemiology study which showed clear increases in childhood cancers near the plants. Read his findings of elevated brain and other cancers near these plants and other studies. [60] [61]

[57] See cancer risk study at nap.edu.

[58] NRC Policy Issue Information SECY-15-0104, August 21, 2015 "Analysis of Cancer Risks in populations Near Nuclear Facilities Study," http://pbadupws.nrc.gov/docs/ml1514/ML15141A404.pdf

[59] Read about Cindy and Joe Sauer and what they learned about childhood cancer near nuclear power plants: http://ieer.org/resource/commentary/on-life-near-two-nuclear-power-plants-in-illinois/ and read Joe Sauer, MD, presentation on elevated cancer rates near the Dresden and Braidwood nuclear plants at http://ieer.org/wp/wp-content/uploads/2013/06/Health-Concerns-and-Data-Around-Illinois-Nuclear-Plants-slides-for-SDA-2013.pdf

[60] Dr. Paul Dorman, "Why UK nuclear power plants may cause childhood cancer and leukaemia," May 16, 2011, https://www.escosubs.co.uk/theecologist/promotion.asp?code=RF2011ROW

[61] Steve Wing, David B. Richardson, Wolfgang Hoffman, "Cancer Risks Near Nuclear Facilities," Environ Health Perspect. 2011;119(4):417-421.

Let's examine the Argonne National Laboratory's explanations in an ANL webpage titled '10 myths about nuclear energy'

The arguments presented in an Argonne National Laboratory (ANL) webpage titled, "10 myths about nuclear energy" [62] are technically flawed, deceptive and incomplete. In fact, some of ANL's explanations are so misleading that they are fraudulent.

ANL states *"Myth #1: Americans get most of their yearly radiation dose from nuclear power plants."* The ANL states: *"We are surrounded by naturally occurring radiation. Only 0.005% of the average American's yearly radiation dose comes from nuclear power; 100 times less than we get from coal, 200 times less than a cross-country flight, and about the same as eating 1 banana per year."* In the ANL's explanation, they use a 1987 report by the National Council on Radiation Protection (NCRP) [63] to estimate the dose to people from the nuclear fuel cycle and then divided by the entire United States population to obtain an average dose for a member of the U.S. population. It's like giving the odds of dying in a sky diving accident that includes all Americans, even those who have never participated in sky diving.

The NCRP 92, 93 and 95 studies, issued over 30 years ago, are based on estimates of releases and do not utilize actual health data. **Equating the natural human act of eating a banana to the ingestion or inhalation of man-made radionuclides or to the elevated external radiation is good propaganda, but ignores the reality of adverse health effects from elevated radiation exposure, particularly from inhalation and ingestion of man-made radionuclides.**

The U.S. Nuclear Regulatory Commission knows that a scientifically valid study of health effects near a nuclear plant would yield bad news for the nuclear industry and so the NRC choose to not conduct any meaningful epidemiology near U.S. nuclear plants (see the previous article).

ANL states *"Myth #2: A nuclear reactor can explode like a bomb."* They state: *"It is impossible for a reactor to explode like a nuclear weapon; these weapons contain very special materials in very particular configurations, neither of which are present in a nuclear reactor."* The fact is that while a nuclear plant explosion has a reduced capability to demolish structures and instantly kill thousands of people, accidents at nuclear reactor facilities can force the evacuation of several hundred thousand people, ruin millions of dollars' worth of agricultural products, ruin the economy of the country that the accident happens in, and increases illness and death. A nuclear reactor accident can release more fission products than a nuclear weapon. Explosions can occur in many ways at a nuclear power plant. Nuclear power excursions from the uncontrolled increase in the rate of fissioning can cause steam explosions, nuclear jets of

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[62] Argonne National Laboratory, "10 myths about nuclear energy," September 9, 2013, originally an American Nuclear Society article. https://www.anl.gov/article/10-myths-about-nuclear-energy The deceptions in this "feature story" are typical of the nuclear industry.

[63] National Council on Radiation Protection and Measurements, Report No. 093 – Ionizing Radiation Exposure of the Population of the United States (1987). ISBN 0-913392-91-X. https://ncrponline.org/shop/reports/report-no-093-ionizing-radiation-exposure-of-the-population-of-united-states-1987/ See also Reports No. 092 and 095.

fissioning fuel, and/or hydrogen generation when fuel cladding melts. Experts still are trying to understand what types of explosion took place at the Chernobyl accident that occurred in 1986. See our December 2019 Environmental Defense Institute newsletter.

ANL states *"Myth #3: Nuclear energy is bad for the environment."* ANL states that nuclear reactors emit no greenhouse gasses during operation, similar to wind and solar. Then they state that nuclear energy requires less land use than most other forms of energy. But when you factor in the land rendered radiologically contaminated from uranium mining, uranium enrichment, fuel fabrication, radioactive waste disposal, and spent fuel management and disposal, you would find the land use and contamination of entire water sheds affects far more land and water than the footprint of the nuclear power plant.

ANL states *"Myth #4: Nuclear energy is not safe."* Then ANL states: *"Nuclear energy is as safe or safer than any other form of energy available. No member of the public has ever been injured or killed in the entire 50-year history of commercial nuclear power in the U.S. In fact, recent studies have shown that it is safer to work in a nuclear power plant than an office."* The relatively small number of acute radiation deaths is something the nuclear promotors are willing to talk about. But the nuclear industry continues to deny the reality of increased illnesses and deaths resulting from chronic inhalation and ingestion of radionuclides. They continue to deny the genetic effects and increased infant mortality. Children exposed to radiation show decreased intelligence as well as far higher cancer rates.

What the ANL has left out is the shortened lives from increases rates of cancer, leukemia and other illnesses that is caused by the nuclear industry. The ANL has left out the epidemiology from the 1979 Three Mile Island accident in the U.S. The ANL has left out, *because it does not exist for U.S. plants*, the epidemiology of people living near U.S. nuclear plants. The ANL has left out the health problems of those people living near waste disposal sites, and Idaho is already affected by the nuclear industry's nuclear waste at US Ecology Grandview and other disposal of radiological waste in our state. And the ANL, a Department of Energy laboratory, left out the billions of dollars paid out for illness compensation to the former employees of DOE contractors under the Energy Employee Occupational Illness Compensation Program, which is a program that commercial nuclear reactor employees are not eligible for.

The escalation of radionuclides in Idaho is alarming and a study of the issue by Boise State University has not provided any answers. [64] It states that "The Treasure Valley Aquifer System (TVAS) in western Idaho contains documented uranium and arsenic concentrations, up to 110 microgram/liter and 120 micrograms/liter, respectively…" And "The contaminants historically show elevated concentrations with high spatial variability throughout the region."

[64] Gus Womeldorph and Shawn Benner, Boise State University, "A Study of Uranium and Arsenic in the Treasure Valley Aquifer System, Southwestern Idaho, Year 1, 2017-2018," 2018 at https://www.idwr.idaho.gov/files/publications/201807-GWQ-GW-Study-of-Uranium-in-TV-Aquifer-System.pdf

See also our Environmental Defense Institute February newsletter article "What's Up With The Radionuclides in Drinking Water Around Boise, Idaho?" [65]

The DOE has failed to be truthful about past aquifer contamination migration to the south of the Idaho National Laboratory, as I describe in *Tritium at 800 pCi/L in the Snake River Plain Aquifer in the Magic Valley at Kimama: Why This Matters*. [66]

The ANL propaganda fails to address the widespread and growing radionuclide contamination in the U.S., let alone the health effects.

ANL states *"Myth #5: There is no solution for huge amounts of nuclear waste being generated."* Then ANL states: *"All of the used nuclear fuel generated in every nuclear plant in the past 50 years would fill a football field to a depth of less than 10 yards, and 96 % of this "waste" can be recycled. Used fuel is currently being safely stored. The U.S. National Academy of Sciences and the equivalent scientific advisory panels in every major country support geological disposal of such wastes as the preferred safe method for their ultimate disposal."*

First of all, in the U.S. there is still no way to isolate the radiotoxic materials in spent nuclear fuel from the biosphere for the millennia that the materials are toxic. The industry aspires to slow trickle out of radionuclides over time, while the reality is that the trickle out will be sped up by flooding, seismic events and other phenomena. What trickles out will be poisoning people, animals and plants. The legal terminology for fuel used in a reactor is "spent nuclear fuel" not "used nuclear fuel" as the nuclear industry tries to avoid using terminology with legal meaning.

The focus on the volume of spent fuel misrepresents that fact that the spent nuclear fuel cannot be stored in such a close packed arrangement. Analyses conducted of the proposed Yucca Mountain spent fuel repository acknowledge that not only will the heating caused by the fuel will be significant, it is the millions of gallons of water that will be contaminated and the number of years of contamination trickle out that ANL has conveniently left out.

Yes, the U.S. National Academy of Sciences and others have agreed that geological disposal of such wastes is the preferred safe method. Yet, the ANL doesn't mention the failure of the any country to provide such disposal. And the Department of Energy with last years reclassification of high-level (and spent fuel) waste scandal where DOE notifies the public, in carefully ambiguous statements, that it fully intends to reclassify its high-level and spent fuel waste as simply low-level waste that it will leave on DOE sites. It will use contrived "performance assessments" to claim that the trickle out of radionuclides into our water won't be much of a problem.

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[65] 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

[66] Thatcher, T.A., Environmental Defense Special Report, *Tritium at 800 pCi/L in the Snake River Plain Aquifer in the Magic Valley at Kimama: Why This Matters*, 2017. www.environmental-defense-institute.org/publications/kimamareport.pdf

The ANL assertion that 96 percent of spent fuel can be recycled is a misleading fiction. The ANL is referring to the high amount of uranium remaining in spent nuclear fuel, which depends on the fuel enrichment and burnup in the reactor. Reprocessing to extract the fissile uranium-235 and plutonium-239 still leaves the majority of the waste behind and reprocessing is highly environmentally polluting, not to mention expensive. There are already huge stockpiles of depleted uranium and so the vast majority of this so called 96% of the waste that can be recycled has no use what-so-ever except to be disposed of.

Creating the enriched uranium currently used in nuclear reactors already creates enormous quantities of depleted uranium that requires disposal. According to the Institute for Energy and Environmental Research (IEER), "The 56,000 metric tons of spent fuel that have been created so far correspond to more than 300,000 metric tons of [depleted uranium] DU. There will be hundreds of metric tons of additional DU due to future fuel production for the existing reactor fleet." [67]

Performance Assessments over radioactive waste disposal are making highly speculative assumptions and using unvalidated modeling of waste migration over millennia. This means that groundwater and citizens health is not protected by such contrived Performance Assessments for spent nuclear fuel and other high-level waste. See High Level Waste comment submittals regarding the Department of Energy's HLW Reclassification efforts by Tami Thatcher and by Chuck Broscious on the Environmental Defense Institute website. [68] [69]

ANL states *"Myth #6: Most Americans don't support nuclear power."* Well, with the only thing the nuclear industry does well being disinformation, ANL could be right that Americans support nuclear power. But don't ask the Americans who have had to pay higher than average electrical rates to try to build and then abandon the plant, such as the AP1000 Westinghouse plants partially constructed and then abandoned in South Carolina or live near a nuclear power plant, because, like the people living near the San Onofre power plant, they aren't happy about vast amounts of spent fuel stored next to the ocean and with no other place for spent nuclear fuel to go. [70]

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[67] Arjun Makhijani, Institute for Energy and Environmental Research (IEER), "Comments of the Institute for Energy and Environmental Research on the U.S. Nuclear Regulatory Commission's Proposed Waste Confidence Rule Update and Proposed Rule Regarding Environmental Impacts of Temporary Spent Fuel Storage," February 6, 2009. https://ieer.org/wp/wp-content/uploads/2012/06/WasteConfidenceComments2009.pdf See page 41 to 43.

[68] Environmental Defense Institute newsletter articles: If You Care About Human Health and the Environment, You Will Oppose Allowing DOE's HLW Reclassification, http://www.environmental-defense-institute.org/publications/News.19.Jan.pdf and Idaho Leaders and the Department of Energy Not Being Transparent About High-Level Waste Reclassification, Idaho Department of Environmental Quality Concerns About DOE's Proposed HLW Reclassification, and State of Washington Opposes DOE's Proposed HLW Reclassification, http://environmental-defense-institute.org/publications/News.19.Feb.pdf

[69] 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)

[70] See Donna Gilmore's research at SanOnofreSafety.org

ANL states *"Myth #7: An American "Chernobyl" would kill thousands of people."* Then ANL states: *"A Chernobyl-type accident could not have happened outside of the Soviet Union because this type of reactor was never built or operated here. The known fatalities during the Chernobyl accident were mostly emergency first responders. Of the people known to have received a high radiation does, the increase in cancer incidence is too small to measure due to other causes of cancer such as air pollution and tobacco use."*

First of all, saying this type of reactor was never built or operated here omits the graphite-cooled reactors operated in the U.S. for plutonium production as well as all of the Department of Energy reactors lacking a containment. After the Chernobyl accident, subsequent reviews of the Department of Energy's reactors led to permanent shutdown of several delipidated plutonium production reactors at Hanford and Savannah River. While the RBMK reactor design of Chernobyl may have been stunningly unsafe, there is plenty of unsafe reactor design issues in the U.S. from flooding, tsunami, seismic, terrorism and other plant vulnerabilities. The continued focus by the ANL and the U.S. nuclear industry to try to limit the consequences of the Chernobyl accident to a few dozen emergency first responders is an active disinformation campaign to deny the actual radiological and economic consequences of the Chernobyl disaster. Before the Chernobyl accident, most children in the Ukraine were healthy; after the accident, even now, most children in the Ukraine are unhealthy, see *Chernobyl Consequences of the Catastrophe for People and the Environment*. [71]

ANL states *"Myth #8: Nuclear waste cannot be safely transported."* Then ANL states: *"Used fuel is being safely shipped by truck, rail, and cargo ship today. To date, thousands of shipments have been transported with no leaks or cracks of the specially-designed casks."*

In the U.S. an increasing number of severe train accidents have occurred. And crumbling road and bridge infrastructure is real. The number of past spent nuclear fuel shipments in the U.S. for commercial spent nuclear fuel from 1964 to 1989 is 2623 casks shipments. [72] [73] Of these, 223 shipments were between 3.1 and 3.3 MTU with the remaining 2400 shipments less than 2 MTU per cask, usually far less.

There have been 850 naval spent fuel shipments, 236 U.S. research fuel shipments and 250 foreign research fuel shipments, totaling 1336 shipments.

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[71] Alexey V. Yablokov et all, Chernobyl Consequences of the Catastrophe for People and the Environment, Annals of the New York Academy of Sciences, Volume 1181, 2009. https://web.archive.org/web/20110419144513/http://www.strahlentelex.de/Yablokov%20Chernobyl%20book.pdf

[72] Science Applications International Corporation, Oak Ridge, Tennessee, "Historical Overview of Domestic Spent Fuel Shipments Update," ORNL/Sub—88-997962/1, July 1991. https://www.osti.gov/servlets/purl/5430848

[73] NEI webpage Factsheet at https://www.nei.org/resources/fact-sheets/safe-secure-transportation-used-nuclear-fuel says that the NRC says there have been 1300 safe SNF shipments in the U.S. based on NRC document NUREG/BR-0292, Rev. 2 at https://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0292/ It is unclear how the 1300 safe SNF shipments number was determined from the NUREG/BR-0292 document over the past 35 years.

Future spent nuclear fuel shipments of 10 MTU per cask involve much more fuel per cask and much more weight of the fuel and cask combination. In fact, should spent fuel shipping to a repository commence as planned, with 35,000 to 100,000 shipments over 25 years, there would be more spent nuclear fuel shipped in a single year than has been shipped in the U.S. since the first nuclear plants began operating. [74] And in that time, road, bridge, and rail infrastructure has been crumbling and rail accidents from human error and other causes increasing and have continued increasing since the NRC study reexamined accident frequencies in 2000. [75] The severity of accidents also has increased due to increased transportation of oil that sustains long burning high temperature fires.

High burnup fuel (i.e., fuel with burnups generally exceeding 45 GWd/MTU) may have cladding walls that have become relatively thin from in-reactor formation of oxides or zirconium hydride. The maximum temperature is lower for high burnup fuel, 570 C. See NRC Interim Staff Guidance ISG-11, Rev. 3. [76] This may mean that transportation testing for lower burnup fuels may not be adequate for high burnup fuels. It also means that there may be pressure to accept higher radiological release likelihood and consequence from transporting higher burnup fuels because while arguing that the regulatory requirements are met, but the NRC is happy with regulatory requirements for transportation that don't provide safety in real world accident conditions. Various real-world accident conditions that have exceeded regulatory requirements are discussed in a 2016 presentation. [77]

On the NRC website, Office of Public Affairs, "Safety of Spent Fuel Transportation" February 2017 [78] they state that on the basis of studies that consider real world accidents (which the brochure does not identify) the brochure states that the NRC believes spent fuel can continue to be shipped safely. But the NRC has not studied accidents involving high burnup fuels above 45 GWd/MTU. And they want the public to believe transportation of spent nuclear fuel is safe — **despite the lack of regulations that would require transportation containers to be shown to actually meet real world accident conditions and despite the lack of testing to verify that modeling is adequate to show container performance.**

In addition to the unaddressed fuel cladding issues involving high burnup fuel, transportation safety issues **due to aging effects from years of dry storage beyond two decades** pose an unanalyzed problem for both low and high burnup spent nuclear fuel. The U.S. Nuclear Waste

[74] State of Nevada, Nuclear Waste Project Office, "Transportation of Spent Nuclear Fuel and High-Level Radioactive Waste to a Repository," Factsheet, 1999. http://www.state.nv.us/nucwaste/trans/trfact03.htm

[75] U.S. Nuclear Regulatory Commission, "Reexamination of Spent Fuel Shipment Risk Estimates," NUREG/CR-6672, 2000.

[76] U.S. Nuclear Regulatory Commission, Interim Staff Guidance-11, Rev. 3, "Cladding Considerations for the Transportation and Storage of Spent Fuel," 2003. https://www.nrc.gov/reading-rm/doc-collections/isg/isg-11R3.pdf

[77] Douglas J. Ammerman and Carlos Lopez, Technical Workshop for the 2016 NTSF Meeting held June 7-8, 2016, "Testing and Certification for SNF Transportation Containers," Sandia National Laboratories, SAND2016-5285PE, https://www.osti.gov/servlets/purl/1368738

[78] NRC website, Office of Public Affairs, "Safety of Spent Fuel Transportation" February 2017 at https://www.nrc.gov/docs/ML1703/ML17038A460.pdf#page=6&zoom=auto,-265,619

Technical Review Board stated in 2010: "The technical information currently available, together with the experience gained to date in the dry storage of used fuel, demonstrates that used fuel can be safely stored in short term and then transported for additional storage, processing or repository disposal, at least for low burnup fuel. **However, additional information is required in order to demonstrate, with similarly high confidence, that high burnup fuel can be safely transported and any type of used fuel can be stored in dry storage facilities for extended periods without the fuel degrading to the extent that it may not perform satisfactorily during continued storage and subsequent transportation**." [79]

ANL states *"Myth #9: Used nuclear fuel is deadly for 10,000 years."* Then ANL states: *"Used nuclear fuel can be recycled to make new fuel and byproducts. Most of the waste from this process will require a storage time of less than 300 years. Finally, less than 1% is radioactive for 10,000 years. This portion is not much more radioactive than some things found in nature, and can be easily shielded to protect humans and wildlife."*

The ANL statements are egregiously misleading and contains errors. Yes, the rapid decay of some fission products in spent nuclear fuel, such as cesium-137 and strontium-90, do reduce the shielding requirements significantly over a few hundred years. But shielding isn't the main issue; containing the material over millennia is the unsolved and perhaps unsolvable problem.

The statement that "less than 1 percent is radioactive for 10,000 years" is wrong. The uranium in the waste, according to ANL, is 96 percent of the waste and it grows increasingly radioactive. So, while the ***activity*** (the number of radioactive decays) is markedly reduced over time, and the penetrating gamma energy of certain decays is reduced, what is more important is the mobility and the toxicity of the waste, not the total activity in curies. Alpha and beta emitters are easily shielded but create health harm even in very low curie amounts when inhaled or ingested. And these radionuclides persist for millennia. Certain radionuclides such as iodine-129, technetium-99, americium-241 (and its decay progeny) are extremely long-lived and dominate disposal hazards.

Pretending that the issue of disposal of spent nuclear fuel is only about shielding a person standing nearby from penetrating radiation is either lame brained or simply propaganda. The problem has always been that containers are breached or corrode, and radionuclides are carried into nearby watersheds, polluting water that could be used for drinking or for agriculture.

The nuclear industry's dry storage spent nuclear fuel storage plans for consolidated storage facilities are a disaster in the making and don't solve any of the problems with containing the spent fuel. The only problem solved is moving the waste from high population and high value real estate to low population and low value real estate. The U.S. Nuclear Regulatory Commission has noted important problems in the proposal by Holtec to place consolidated storage in New

[79] United States Nuclear Waste Technical Review Board, "Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel," December 2010. https://sanonofresafety.files.wordpress.com/2013/06/usnwtrb-evaloftechbasisforextendeddrystorageandtransportofusednuclearfuel2010-dec-eds_rpt.pdf

Mexico. [80] Holtec's design can't withstand flooding and so Holtec argued that the facility wouldn't have more than 7.5 inches of flooding when actually the predicted probable maximum precipitation flood is predicted to exceed 40 inches. The NRC also pointed out that Holtec also didn't properly consider soil settling, seismic issues or the hazards from mining and transportation in the vicinity of the proposed spent fuel storage facility.

ANL states *"Myth #10: Nuclear energy can't reduce our dependence on foreign oil."* Then ANL proceeds with a stunningly convoluted explanation that fails to distinguish the fact that any source of electricity can be used for expanded mass-transit and plug-in cars, not just nuclear-generated energy. But to make the jumbled logic appear to rely on nuclear energy, ANL goes on to state that the use of nuclear propelled ships can be expanded beyond the U.S. nuclear navy. Really hilarious. How many people can buy a nuclear-powered ship? And what were they smoking when they wrote this?

The pro-nuclear propaganda presented by the ANL with the American Nuclear Society is so stunningly twisted and so deliberately incomplete, it would be laughable if it were not so mutating and murderous to life on this planet.

Articles by Tami Thatcher for January 2020. Issued January 4 and revised January 6, 2020 to add that beryllium contamination has historically been found at the Naval Reactors Facilities at the Idaho National Laboratory, despite NRF civilian workers being categorically denied any illness compensation under the EEOICP. Also added that the historical release from the 1961 SL-1 accident has been grossly understated and that $7.33 million dollars has been collected in fines for Fluor's failure to treat the liquid sodium bearing waste as promised in 2012 and made a few editorial corrections.

[80] U.S. Nuclear Regulatory Commission, Subject: NRC Letter to Holtec International – Request for Additional Information for Holtec HI-STORE CISF License Application, November 14, 2019. ADAMS Accession Number ML19322C260 or https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19322C260