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Don't Abolish the Defense Nuclear Facility Safety Board

While there has been limited and inconsistent presence of the Defense Nuclear Facility Safety Board at the Idaho National Laboratory and no reports about INL since 2015, the oversight provided by the DNFSB around the Department of Energy weapons complex is occasionally a touchstone to reality that is sorely needed.

Yes, the DNFSB reviews may not be often enough or comprehensive enough. And DNFSB recommendations may not be heeded by the Department of Energy. Still, more DNFSB oversight is needed, not less.

The DNFSB is an independent organization within the executive branch of the United States Government, chartered with the responsibility of providing recommendations and advice to the President and the Secretary of Energy regarding public health and safety issues at Department of Energy defense nuclear facilities.¹ The “defense nuclear facilities” part limits the DNFSB to facilities involved with nuclear weapons production. For Idaho National Laboratory facilities that send waste to the DOE’s defense nuclear waste facility, the Waste Isolation Pilot Plant (WIPP) in New Mexico, these facilities and others qualify for DNFSB oversight.

That is why it is deeply troubling that the Department of Energy’s approach for solving the safety problems raised by the DNFSB is to make the DNFSB scale back or disappear. Events over the past year to undermine the existence of the DNFSB are described in articles by The Center for Public Integrity.²

While the Department of Energy has argued that it has solved the design problems at the Hanford treatment plant,³ a DNFSB report said the unfinished \$16.8 billion complex at Hanford to treat chemical and radioactive waste continues to suffer design problems that risk explosions

¹ Defense Nuclear Facility Safety Board website at <https://www.dnfsb.gov/> and see reports and Department of Energy responses at <https://www.dnfsb.gov/doe-sites>

² Patrick Malone, *The Center for Public Integrity*, “Energy undersecretary wants nuclear safety reports hidden from public,” November 9, 2017.

³ Letter from the Department of Energy to the Defense Nuclear Facility Safety Board, “Letter Documenting WTP Progress,” January 2017.
https://www.dnfsb.gov/sites/default/files/document/10631/DOE%20Letter%20Documenting%20WTP%20Progress_Jan-24-2017.pdf

and radioactive releases from unintended nuclear reactions.^{4 5} This report by the DNFSB about treating Hanford liquid waste should probably be read by safety analysts for INL operations involving liquid waste.

Epic Struggles To Decide Our Electric Grid Design and Clean Energy Choices Are Going On, Often With Too Little News Coverage

There are epic struggles going on, often out of public view. The competition over who will provide our electric energy, what power generation sources will be favored, and how much rate payers can be forced to pay for their electricity is going on now. And in Idaho, you can count on the State of Idaho to favor cronyism. While the public favors clean energy, the state website promotes nuclear energy with a rosy optimism that only nuclear cronies can love.⁶ Changes that may squash solar and wind development aren't being reported. News coverage seems awfully rare for a topic so important to everyone who pays an electric bill.

In Idaho, the conversation about energy that began with encouraging clean energy has devolved to how to let the electric utilities drive policy to maximize their profits. See the Idaho Governor's Idaho Office of Energy Resources and its Idaho Strategic Energy Alliance (ISEA)⁷ that is dominated by Idaho utilities and writes updates of the "Idaho Energy Plan." The Idaho Energy Plan is being updated in 2017 and can guide the Idaho Legislature's choices. In Idaho, energy policy is made out of public view and without advocates for the public electric rate payer.

Will the Idaho Public Utilities Commission be able to protect rate payers, even those home owners who installed solar? And as we watch what happens in Idaho during the next few months regarding fee increases for net metering solar generators, there is also the drama playing out in

⁴ Defense Nuclear Facility Safety Board DNFSB/TECH-42, "Flammable Gas and Criticality Hazards at the Waste Treatment and Immobilization Plant [to be built at Hanford]," June 2017. <https://www.dnfsb.gov/sites/default/files/document/13536/WTP%20Technical%20Issues%20Tech-42%2C%202017-100-067.pdf>

⁵ Editorial Board, *Union-Bulletin*, "Oversight of safety at Hanford site must remain – The Defense Nuclear Facilities Safety Board could be abolished, which would remove a watchdog for cleanup of radioactive nuclear waste," November 30, 2017. http://www.union-bulletin.com/opinion/editorials/oversight-of-safety-at-hanford-site-must-remain/article_890ae086-d5e6-11e7-bfbd-13c176da66ca.html

⁶ Idaho Governor's Office of Energy and Mineral Resources, Nuclear webpage at <https://oemr.idaho.gov/sources/nuclear/> The webpage states: "**The energy released from a pound of uranium through nuclear fission is much greater than the energy produced from burning a pound of coal (2.5 million times more), making it possible to generate vast amounts of energy from a very small amount of material.**" These nuclear promoters fail to mention the 10,000 abandoned uranium mining sites and people poisoned by uranium mining, read our article about uranium below. They fail to mention how much uranium ore had to be mined and how much electricity was used to enrich the nuclear fuel. It's the State of Idaho lobbying for nuclear energy while not doing enough to promote growth in solar and wind energy.

⁷ Idaho Governor's Office of Energy and Mineral Resources, Idaho Strategic Energy Alliance webpage at <https://oemr.idaho.gov/isea/>

Georgia over raising electric rate payer fees to continue funding the construction of two Westinghouse AP1000 nuclear units at the Vogtle site.

Idaho Power Company Wants to Charge Net Metering Solar Generating Customers More

Numerous interveners are against Idaho Power Company's request to the Idaho Public Utilities Commission (IPUC) to allow it to charge more for its roughly 1400 net metering customers who generate solar power. Solar power generators currently can send excess energy to the utility in return for energy supplied by the utility at a later time. About ten organizations have petitioned the IPUC to intervene in the fee increases.⁸

Idaho Power Company says it is unfair cost shifting to non-solar customers from net metering solar generators who don't always need power lines to receive energy. But Idaho Power Company does not propose charging larger fees to low usage non-net metering customers.

The issues, as I see it, are about whether Idaho Power Company can squash solar energy generation that it does not own, punish people who selected environmentally friendly solar energy generation, and impose expensive requirements such as state-of-the-art equipment on competitors.

The schedule calls for the Idaho Public Utilities Commission to conduct a full public hearing in March 2018 concerning Idaho Power Companies requested fee increases for its net metering solar customers.⁹ Documents about the petition and comments submitted to the IPUC can be viewed at the IPUC website.

Georgia Power Wants Ratepayers to Foot the Entire Bill for Cost Overruns on Vogtle AP1000 Nuclear Plant Construction

EnergyWire reported November 29 that the Georgia Public Service Commission staff are pushing back Georgia Power Company's push to make customers foot the entire bill.¹⁰

See the Georgia Public Service Commission website for the troubled Westinghouse AP1000 nuclear plants being constructed at the Vogtle site.¹¹ Many people concerned about the potential

⁸ Idaho Public Utilities Commission website, "Idaho Power – New Schedules for Customers with On-site Generation," Case Number: IPC-E-17-13, Date Filed: 07/27/2017 . See documents and comments at <http://www.puc.idaho.gov/fileroom/cases/summary/IPCE1713.html> and submit comments for IPC-E-17-13 at <http://www.puc.idaho.gov/forms/casacomment.aspx>

⁹ Snake River Alliance, "Net Metering News Update," [IPC-E-17-13], October 25, 2017. <http://snakeriveralliance.org/net-metering-news-update/>

¹⁰ *EnergyWire*, "Fresh questions arise about Vogtle's payment plan," November 29, 2017. <https://www.eenews.net/energywire/2017/11/29/stories/1060067501>

for excessive rate payer charges have submitted filings to the Georgia Public Service Commission, such as Georgia Interfaith Power and Light filing that states concerns that the public will be charged for excessive costs that are not reasonable and prudent.¹²

Nuclear Industry Continues to Downplay Adverse Health Effects of Uranium – Citizens and Radiation Workers Need to Beware

In a November news article by National Public Radio entitled “For Some Native Americans, Uranium Contamination Feels Like Discrimination,” the Blue Gap-Tachee Chapter in northeastern Arizona where uranium was mined with explosives, seven of Helen Nez’s children died of a disorder called “Navajo neuropathy” which is linked to uranium contamination. “Four of her children died as toddlers. Three died in early adulthood. Her three remaining children, now as adults, have health problems.”¹³ Nez recalled her dying childrens’ eyes turning a cloudy gray.

The water Helen Nez and her children were drinking contained uranium at least five times above federal drinking water standards according to a study published in the journal of *Environmental Science & Technology* in 2015.¹⁴ The samples contained elevated concentrations of uranium between 67 and 170 micrograms/liter while the EPA maximum contaminant level for uranium is 30 micrograms/liter. But not only was drinking water contaminated, the soil and air was contaminated and so homes were also contaminated.

The article reported that “More than 10,000 abandoned uranium mine waste sites are located throughout the western United States’ and “From 1944 to 1986, mining companies blasted 30 million tons of uranium out of Navajo land. When the U.S. Energy Department had stockpiled enough for the Cold War, the companies left, abandoning 521 mines.”

¹¹ Georgia Public Service Commission website, “Georgia Power Company’s Vogtle Units 3 and 4 Construction Monitoring,” Docket # 29849, <http://www.psc.state.ga.us/factsv2/Docket.aspx?docketNumber=29849>

¹² Georgia Interfaith Power and Light and Partnership for Southern Equity (“Petitioners”) Petition to the Georgia Public Service Commission. “Before the Georgia Public Service Commission, Verification of Expenditures Pursuant to Georgia Power Company’s Certificate of Public Convenience and Necessity for Plant Vogtle Units 3 and 4, Seventeenth Semi-annual Construction Monitoring Report; Proposed Forecast Cost and Schedule Revisions; and Determination of Continuation or Cancellation of the Project,” Docket # 29849, November 6, 2017. https://www.southernenvironment.org/uploads/words_docs/2017.11.06_Petition_for_Declaratory_Ruling_Brief_in_Support.pdf

¹³ Laurel Morales, *National Public Radio*, “For Some Native Americans, Uranium Contamination Feels Like Discrimination,” November 14, 2017. <https://www.npr.org/sections/health-shots/2017/11/14/562856213/some-native-americans-uranium-contamination-feels-like-discrimination>

¹⁴ Johanna M. Blake et al., *Environmental Science & Technology*, “Elevated Concentrations of U and Co-occurring Metals in Abandoned Mine Wastes in a Northeastern Arizona Native American Community,” 2015. <http://pubs.acs.org/doi/pdf/10.1021/acs.est.5b01408>

But the uranium problem is not limited to Indian reservations. Radiation workers who handle nuclear fuels that are relatively unirradiated, lightly irradiated, or contain reprocessed materials, such as at the Idaho National Laboratory's Materials and Fuels Complex may not understand the potential for gamma, beta and neutron dose from handling the fuel materials.

Radiation dose aspects for external dose from manually handling unused nuclear fuels are evaluated in a report in the journal of *Radiation Protection Dosimetry* in 2014 which indicated the reprocessed fuels and fuels containing plutonium and americium give higher radiation doses to people handling these fuels.¹⁵

The report describes how fuels containing plutonium and americium emit soft gamma rays that can be shielded using lead aprons. But fuels containing plutonium-238 emit gamma and neutron dose. Fuels with high curium content also emit more neutron dose. Gamma decay is also increased over time after reprocessing by the decay of Pu-236 into thallium-208. Shielding of unirradiated or lightly irradiated reprocessed fuels that can be moved manually could be provided by lead aprons as thin as 1-mm. For neutron shielding, polyethylene shielding up to 15 cm thick may be needed.

According to workers from the INL, the use of lead aprons was discontinued at a facility where various types of fuels are handled and the fuels are known to include plutonium, including Pu-238. Other safety precautions for fuel handling have been reduced, and the technical rationale for these changes remains unexplained. Radiation monitoring often requires workers to wear badges on the chest while lifting or handling work may disproportionately expose workers organs such as gonads. The actual dose and the harm from the dose may be greater than current INL practices indicate. In contrast to the reprocessed, unused or lightly used fuels, highly irradiated fuels cannot be manually handled and can be lethal in a few seconds of exposure at 100 meters.

Accidental or intentional releases resulting from melting nuclear fuel releases not only fission products but also the uranium, plutonium and other actinides such as neptunium from the fuel. Often the released uranium is not monitored because radiation surveys such as aerial surveys are gamma surveys that detect primarily cesium-137 for example but do not detect the alpha radiation from the uranium and other actinides.

Historical practices of radiation monitoring at the Idaho National Laboratory ignored or did not report many of the fission products such as cesium-137 and strontium-90 to the exclusion of those easier to measure, such as iodine-131 which has a relatively short half life of 12 days. The historical monitoring also completely ignored the uranium and other actinides which have extremely long half lives and long decay chains before a non-radioactive material remains.

¹⁵ G. Nicolaou, *Radiation Protection Dosimetry*, "Radiation Dose Aspects in the Handling of Emerging Nuclear Fuels," published February 2014.
<https://pdfs.semanticscholar.org/0d69/1b97ef44b82f421ba1569a2e16ddbb440cdb.pdf>

The 1961 SL-1 accident at the INL is an example of successful propaganda campaign to reduce public concern over the release but a horrible misrepresentation of the actual radiological release. The SL-1 accident monitoring reports only the iodine-131 released. The propaganda campaign was so successful that it was not until decades later that the remaining buildings and soils around the SL-1 area were acknowledged to be seriously contaminated, requiring remediation. What this means is that not only were first responders to the SL-1 accident affected, cleanup workers and then decades of workers who worked at the area where the accident happened were affected as well as the public who received the airborne plume of the accident especially at Atomic City and Rupert, Idaho.^{16 17 18 19 20 21}

Living Today in the USA: Warning - Don't Drink the Water

In the United States we have laws protecting our drinking water. And we have federal standards for various contaminant levels in our drinking water. And we have state programs that monitor contaminant levels in our drinking water. So what's the problem?

The problem is that not all contaminants have federal standards that are protective of health. And state drinking water monitoring programs have plenty of holes. First of all, they mainly address public water systems. But this means that non-community wells where people may attend school or work have much less monitoring. Private wells are not monitored by the state.

And even when the state monitors a public water system that supplies water to homes, the programs typically only started in the late 1980s long after the worst radioactive fallout for nuclear weapons testing conducted at the Nevada Testing Site. It means that levels found high may be ignored in hopes that the next sample or the annual average for contamination will be acceptable. It may mean intermittent monitoring or an incomplete set of contaminants. In Idaho, much of the earlier years of drinking water sample data is labeled as "Legacy – Do Not Use."

¹⁶ DOE-ID-12119, "Idaho National Engineering Laboratory Historical Dose Evaluation," August 1991. US Department of Energy Idaho Operations Office, Volumes 1 and 2 can be found at <https://www.iaea.org/inis/inis-collection/index.html> p. A-82 to A-85 describe the SL-1 accident.

¹⁷ Health Physics Society Meeting at Las Vegas, Nevada, "The Health Physics Aspects of the SL-1 Accident," June 16, 1961, USAEC Idaho Operations Office, John R. Horan and William P. Gammill.

¹⁸ IDO-12021, Health and Safety Division Annual Report, 1961. See p. 128, 133 for I-131 in jack rabbit thyroid and p. 129, 131 for I-131 in sage brush.

¹⁹ Risk Assessment Corporation, "Identification and Prioritization of Radionuclide Releases from the Idaho National Engineering and Environmental Laboratory," October 8, 2002, <https://www.cdc.gov/nceh/radiation/ineel/to5finalreport.pdf> See p. 117, 118 for SL-1.

²⁰ IDO-19311, "Final Report of the SL-1 Recovery Operation, Atomic Energy Commission report, Idaho Field Office, General Electric Co., June 27, 1962. partial center rod withdrawal of 20 inches, p. 146. See p. III-77 regarding fuel damage. <http://www.id.doe.gov/foia/archive.htm>

²¹ IDO-19313, "Additional Analysis of the SL-1 Excursion Final Report of Progress July through October 1962," Atomic Energy Commission report, Idaho Field Office, General Electric Co., November 21, 1962. <http://www.id.doe.gov/foia/archive.htm> See p. 27 Table I-VIII.

Which means, I guess, that they decided that they didn't know what they were doing when they did the monitoring. But perhaps what it means is, "ignore the high levels of radionuclides in the sample results because we don't want you to think it really happened." After all, if the state is arguing that the radionuclides in your drinking water are there from natural sources in the rock and soil, why the change in levels of radionuclide contaminants over time?

So how does a person find out about their drinking water supply? Well, if you are using a public water system, you will be mailed a report of the drinking water contaminants that were monitored. If you are on a private well, you would need to take water samples in to be tested.

In the State of Idaho, you can go to the Idaho Department of Environmental Quality website, and go to the "sample results" on the Drinking Water Switchboard.²²

Most states have a similar website for drinking water sample results. For example, Nevada has a similar "switchboard."²³ For an overview of primary contaminants, see the federal Environmental Protection Agencies National Primary Drinking Water Regulations table of contaminants on the EPA website.²⁴

A non-profit organization called Environmental Working Group²⁵ examined state drinking water records and created a database that you can use by state or by zip code. In my home town, the EWG database showed drinking water contamination by hexavalent chromium, radionuclides and Total Trihalomethanes (TTHMs), all of which are cancer causing.

In addition to state drinking water monitoring, monitoring conducted by the U.S. Geological Survey can be found online at the USGS mapper. The USGS well data may include water level only or may include a wide range of water quality data including contaminant sampling data.²⁶

A list of some drinking water contaminants that it is helpful to understand are shown in Table 1. The contaminants of interest spanning the categories of microorganisms, disinfectants, disinfection byproducts, inorganic chemicals, organic chemicals and radionuclides.

²² Idaho Department of Environmental Quality, <http://www.deq.idaho.gov/water-quality/drinking-water/pws-monitoring-reporting/> and <http://www.deq.idaho.gov/water-quality/drinking-water/pws-switchboard/> and find sample results for all counties at <http://dww.deq.idaho.gov/IDPDWW/> where you select your county or drinking water system, select the specific water system. For the specific water system, it may be helpful to select the link at the left called "Chem/Rad Sample/Result by Analyte." Then select the analyte of interest that the well has data for by clicking on its code. This brings up the applicable lab samples that included that contaminant. Note that non-community wells typically sample fewer contaminants.

²³ Nevada Division of Environmental Protection, <https://ndep.nv.gov/water/drinking-water> and general contaminants information at <https://ndep.nv.gov/water/drinking-water/information-for-public-water-systems/chemical-monitoring> . Find sample results for all Nevada counties at <https://ndwis.ndep.nv.gov/DWW/>

²⁴ United States Environmental Protection Agency, National Primary Drinking Water Table of Contaminants at <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>

²⁵ Environmental Working Group at www.ewg.org and see their tap water database at <https://www.ewg.org/tapwater/>

²⁶ US Geological Survey website link: <http://id.water.usgs.gov/projects/INL> and INL bibliography at http://id.water.usgs.gov/INL/Pubs/INL_Bibliography.pdf . Select individual wells at the USGS mapper at <http://maps.waterdata.usgs.gov/mapper/index.html> **US Geological Survey Mapper Data:** See well data at <http://maps.waterdata.usgs.gov/mapper/index.html>.

Table 1. Selected drinking water contaminants overview based on EPA data.

Contaminant	MCLG (mg/L)	MCL or TT (mg/L)	Potential Health Effects	Common Contaminant Sources
Total Coliforms (including fecal coliform and E. Coli)	zero	No more than 5.0% samples test positive	Used to indicate whether other potentially harmful bacteria may be present	Coliforms are naturally present in the environment; fecal coliforms and E. coli only come from human and animal fecal waste.
Turbidity	n/a	TT	Turbidity is a measure of cloudiness of water. Higher turbidity levels are often associated with higher levels of disease-causing microorganisms.	Soil run off
Total Tri-halomethanes (TTHMs)	n/a	0.080	Liver, kidney or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection
Chlorine dioxide (as ClO ₂)	MRDLG=0.8	MRDL=0.8	Anemia; infants and young children: nervous system effects	Water additive used to control microbes.
Chromium (total) (Hexavalent chromium)	0.1	0.1 (0.1 mg/L is equivalent to 100 ug/L)	The EPA site says “allergic dermatitis” but while the EPA continues to study it, hexavalent chromium causes tumor growth	Discharge from steel and pulp mills; erosion of natural deposits. (The infamous PG&E chemical which led to must tighter drinking water goals in California)

Contaminant	MCLG (mg/L)	MCL or TT (mg/L)	Potential Health Effects	Common Contaminant Sources
Lead	zero	TT; Action level = 0.015	Delays in physical or mental development; learning disabilities Adults: Kidney problems, high blood pressure	Corrosion of household plumbing systems, erosion of natural deposits
Nitrate	10	10	Infants below the age of six months could become seriously ill and if untreated may die.	Runoff from fertilizer use, leaking from septic tanks, sewage, erosion of natural deposits. (In Idaho, nitrate solutions from nuclear fuel reprocessing were injected into the Snake River Plain aquifer.)
Nitrite	1	1	Infants below the age of six months could become seriously ill and if untreated may die.	Runoff from fertilizer use, leaking from septic tanks, sewage, erosion of natural deposits. (In Idaho, nitrate solutions from nuclear fuel reprocessing were injected into the Snake River Plain aquifer.)
Carbon tetrachloride	zero	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities (Nuclear weapons processing waste buried at the Idaho National Laboratory which has entered the Snake River

Contaminant	MCLG (mg/L)	MCL or TT (mg/L)	Potential Health Effects	Common Contaminant Sources
				Plain aquifer)
2,4-D	0.07	0.07	Kidney, liver or adrenal gland problems	Runoff from herbicide use
Glyphosate (Round-up)	0.7	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use
Tetrachloroethylene (Also known as Perchloroethylene or PCE. Note that PCE may degrade to trichloroethylene or TCE)	zero	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry cleaners (Waste water injection at the Idaho National Laboratory)
Alpha particles	zero	15 pCi/L	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation. (Alpha decay can result from uranium. It can also result from plutonium which is not naturally occurring)
Beta particles and photon emitters	zero	4 millirems per year (exactly how many pCi/L yields 4 millirems per year depends on the particular radio-nuclide)	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation (Beta decay can result from uranium decay or can result from radioactive decay

Contaminant	MCLG (mg/L)	MCL or TT (mg/L)	Potential Health Effects	Common Contaminant Sources
				of fission products and radioactive material that is not naturally occurring)
Radium-226 and Radium-228 (combined)	zero	5 pCi/L	Increased risk of cancer	Erosion of natural deposits (Radium-226 results from uranium-238 decay, and radium-228 results from thorium-232 decay)
Uranium	zero	30 ug/L	Increased risk of cancer, kidney toxicity	Erosion of natural deposits (Uranium mining, uranium enrichments, weapons testing fallout, nuclear accidents)

Table notes: Maximum Contaminant Level Goal (MCLG), Maximum Contaminant Level (MCL), Treatment Technique (TT). Units are milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (PPM). For radionuclides, units are picocuries per liter (pCi/L). See EPA.gov <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations#four> The contaminants presented may be helpful for understanding some common contaminants in drinking water and several less common contaminants of interest. The table is based on the EPA table with particular exceptions in parentheses.

Articles by Tami Thatcher for December 2017.