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Rate of cancer in Idaho continues to increase, according to Cancer Data Registry of Idaho

The forty-first annual report of the Cancer Data Registry of Idaho (CDRI) was issued in December 2019 for the year 2017. [1] While the rate of some cancers decreased, the bad news for the State of Idaho is that the overall rate of cancer incidence continues to increase.

And, very importantly, childhood cancers in Idaho continue to increase. Pediatric (age 1 to 19) cancer increased at a rate of about 0.6 percent per year in Idaho from 1975 to 2017, see https://www.idcancer.org/pediatriccancer.

In Idaho, specific cancer incidence rates that continue to increase include:

- Non-malignant brain and other central nervous system tumor incidence increased at a rate of about 7.7 percent per year in Idaho from 1975 to 2003 and at the rate of about 2 percent after 2003.
- Female breast cancer incident increased at a rate of about 1.5 percent per year in Idaho from 1975 to 2001, and 1 percent per year since 2004. The rate decrease from 2001 to 2004 is thought to possibly be due to a decrease in the use of hormone replacement therapy.
- Corpus uteri cancer incidence rates have increased by 1.4 percent since 2003.
- Kidney and renal pelvis cancer incidence rates have increased by about 2.5 percent per year in Idaho from 1975 to 2017.
- Leukemia incidence has increased at a rate of about 0.7 percent per year from 1975 to 2017. Leukemia incidence is higher than expected in Health Districts 4, 5 and 6 for 2017.
- Liver cancer incidence increased at a rate of about 4.9 percent per year in Idaho from 1975 to 2017.
- Skin melanoma increased at a rate of about 2.9 percent per year in Idaho from 1975 to 2017.
- Myeloma increased at a rate of about 1 percent per year in Idaho from 1975 to 2017.
- Prostate cancer rates continue to increase at a rate of about 2 percent per year.

[1] C. J. Johnson, B. M. Morawski, R. K., Rycroft, Cancer Data Registry of Idaho (CDRI), Boise Idaho, Annual Report of the Cancer Data Registry of Idaho, *Cancer in Idaho – 2017*, December 2019. https://www.idcancer.org/ContentFiles/AnnualReports/Cancer%20in%20Idaho%202017.pdf

- Testis cancer incidence increased at a rate of about 1.1 percent per year in Idaho from 1975 to 2017.

In this article, I have focused on cancer incidence trends for brevity; however, the cancer registry data also includes mortality rates. Some cancers are more treatable than others, but cost of treatment, cost of being too sick to work, loss of quality of life before diagnosis, and so forth should also be considered before dismissing the importance of cancers that are treated successfully and don't result in death.

In Idaho, the highest thyroid cancer incidence rate, by far, occurred in Bonneville County. Thyroid cancer incidence for all ages in Bonneville County compared to the rest of the state is shown in Table 1. The overall rate for Bonneville County is double compared to the remainder of the state and the rate for males is more than double. This is remarkable considering how many areas of Idaho are affected by weapons fallout and high levels of radiological contaminants. It clearly points to the iodine-131, iodine-129, as well as other radiological releases historically from the INL.

Table 1. Bonneville County thyroid cancer incidence rate compared to the rest of Idaho, 2017.

Cancer type	Sex	Rate in Bonneville County	Adjusted Rate in Bonneville County	Rate for remainder of Idaho
Thyroid	Total	28.2	30.7	14.2
	Male	16.0	17.8	7.4
	Female	40.3	43.5	21.0

Table notes: Rates are expressed as the number of cases per 100,000 persons per year (person-years). See Table 2 notes.

Bonneville County is in Health District 7, which has roughly twice the rate of thyroid cancer, at 23.6 per 100,000 person-years, compared to the other six Health Districts in Idaho. Health District 7 includes Bonneville, Clark, Custer, Fremont, Jefferson, Lemhi, Madison and Teton. Health District 7 is highly affected by the Idaho National Laboratory.

The other two health districts with elevated thyroid cancer rates are HD4 and HD6 and these districts also have high levels of environmental radiation from non-naturally occurring sources.

Health District 4 includes Ada, Boise, Elmore and Valley Counties and does not have any nuclear reactors, just radioactive fallout from somewhere, perhaps either weapons testing or Hanford, before 1980 and decades of accepting shipments of radioactive waste for the profit of a few individuals at the US Ecology Site A (Bruneau, now closed) and Site B (Grandview) landfills.

Health District 6 includes Bannock, Bingham, Butte and Power Counties which are all highly affected by the Idaho National Laboratory and Bear Lake, Caribou, Franklin and Oneida.

With most of Idaho having a decrease in overall cancer rates, Health Districts 1, 4 and 7 had increasing cancer incidence rates.

Thyroid cancer incidence was stable in Idaho from 1975 to 1995. From 1995 to 2008, thyroid cancer incidence increased at a rate of about 9.5 percent per year, and has been stable since 2008. The report acknowledges that occupational and environmental exposures to ionizing radiation have been associated with higher rates of thyroid cancer. Further stated in the report: "Radiation exposure to the head and neck in childhood is a well-known risk factor. Some clinicians believe that use of imaging technologies such as ultrasound, CT, and MRI scanning is fueling an epidemic in diagnosis of thyroid cancers that are unlikely to progress to cause symptoms or death, while other argue that the trend is in part real and involves both small and large tumors."

I know of several adults in Bonneville County that were diagnosed with thyroid cancer. These cancers required surgery and were serious cancers. Not all were radiation workers, but all lived in the area for many years.

Overall cancer incidence rates were not higher in Bonneville County compared to the rest of the state. But the incidence rates of several types of cancer were higher in Bonneville County. [2] There is higher incidence of brain and other central nervous system (CNS) non-malignant conditions, higher breast cancer incidence for males, higher testis cancer incidence, higher ovary cancer incidence, higher melanoma incidence and higher myeloma incidence, see Table 2. Both leukemia and non-Hodgkin lymphoma incidence adjusted rates are higher that the remainder of the state. Adjusted rates are based on age and sex-specific rates for the county, using the remainder of the state as the standard. For example, when people in a county are getting cancer at a younger age, the adjusted rate for the county goes up.

Table 2. Selected Bonneville County cancer incidence rates compared to the rest of Idaho, 2017.

Cancer type	Sex	Rate in Bonneville County	Adjusted Rate in Bonneville County	Rate for remainder of Idaho
Brain and other CNS non-malignant	Total	12.7	14.1	12.9
	Male	**9.5**	10.5	8.5
	Female	15.8	17.7	17.4
Breast	Total	63.2	72.3	73.0
	Male	2.9	3.4	1.0
	Female	122.8	140.3	145.4
Leukemia	Total	16.3	**18.2**	18.0

[2] Factsheet for the Cancer Data Registry of Idaho, Idaho Hospital Association. Bonneville County Cancer Profile. Cancer Incidence 2013-2017. https://www.idcancer.org/ContentFiles/special/CountyProfiles/BONNEVILLE.pdf

Cancer type	Sex	Rate in Bonneville County	Adjusted Rate in Bonneville County	Rate for remainder of Idaho
	Male	20.0	**22.6**	21.3
	Female	12.6	13.9	14.8
Melanoma	Total	33.7	38.1	30.2
	Male	38.2	43.9	35.1
	Female	29.2	32.4	25.3
Myeloma	Total	7.4	8.6	7.3
	Male	8.4	9.9	8.6
	Female	6.5	7.4	6.0
Non-Hodgkin Lymphoma	Total	19.0	**21.8**	21.5
	Male	20.4	23.6	24.5
	Female	17.6	**20.0**	18.6
Ovary	Female	14.4	16.3	12.4
Testis	Male	7.3	7.5	6.4

Table notes: Rates are expressed as the number of cases per 100,000 persons per year (person-years). Adjusted rates are age and sex-adjusted incidence rates for the county using the remainder of the state as standard. Data from Factsheet for the Cancer Data Registry of Idaho, Idaho Hospital Association. Bonneville County Cancer Profile. Cancer Incidence 2013-2017. https://www.idcancer.org/ContentFiles/special/CountyProfiles/BONNEVILLE.pdf

The rate of childhood cancer incidence in Bonneville County exceeded the remainder of the state for boys, based on the adjusted rate of cancer incidence. For girls the rate was high, but not above the remainder of the state, see Table 3.

Table 3. Bonneville County childhood cancer incidence rate compared to the rest of Idaho, 2017.

Cancer type	Sex	Rate in Bonneville County	Adjusted Rate in Bonneville County	Rate for remainder of Idaho
Pediatric Age 0 to 19	Total	17.8	17.9	18.2
	Male	19.0	**19.3**	19.1
	Female	16.5	16.5	17.2

Table notes: Rates are expressed as the number of cases per 100,000 persons per year (person-years). See Table 2 notes.

In this article, I focused on Bonneville County, where I live. In the next article, I focus on Butte County. But there is much more to study about the cancer incidence and mortality rates in other counties in Idaho.

Cancer Incidence in Butte County – Deadly high and due to the Idaho National Laboratory

I have family roots in Butte County, Idaho. I am always hearing how it seems like everyone has cancer. Well, now I understand why. Based on the state cancer registry, the cancer incidence rate for all cancer types is higher in Butte County, much higher. [3]

In Butte County, Idaho, the rate of over cancer incidence is 719.4 per 100,000 people and the rate for the remainder of the state is 493.8.

In Butte County, most types of cancer incidence are higher than the remainder of the state and not just by a little. For brevity, I'll just highlight a few of the highest cancer incidence rates for Butte County.

Thyroid cancer incidence for Butte County is **three times** the remainder of the State of Idaho, see Table 4.

Table 4. Butte County thyroid cancer incidence rate compared to the rest of Idaho, 2017.

Cancer type	Sex	Rate in Butte County	Adjusted Rate in Butte County	Rate for remainder of Idaho
Thyroid	Total	45.9	42.8	15.1
	Male	15.0	12.7	8.0
	Female	78.2	75.6	22.2

Table notes: Rates are expressed as the number of cases per 100,000 persons per year (person-years). See Table 5 notes.

Several selected cancer incidence rates for Butte County are provided in Table 5. **Nothing says radiation-induced like high rates of leukemia, and the rates in Butte County are over three times higher than the remainder of the state.**

The incidence of myeloma in Butte County is five times the remainder of the state. My great grandmother died of myeloma after just over a decade of exposure from living near the Idaho National Laboratory in the 1950s and 60s. INL monitoring of my great grandmother's and also my grandmother's yards isn't available, despite INL monitoring via radiation detection film badges on the picket fence.

[3] Factsheet for the Cancer Data Registry of Idaho, Idaho Hospital Association. Butte County Cancer Profile. Cancer Incidence 2013-2017. https://www.idcancer.org/ContentFiles/special/CountyProfiles/BUTTE.pdf

Table 5. Selected Butte County cancer incidence rates compared to the rest of Idaho, 2017.

Cancer type	Sex	Rate in Butte County	Adjusted Rate in Butte County	Rate for remainder of Idaho
Brain and other CNS non-malignant	Total	15.3	12.2	12.9
	Male	30.0	23.2	8.5
	Female	-	-	17.4
Breast	Total	68.9	52.8	72.3
	Male	**15.0**	**9.5**	1.1
	Female	125.1	99.7	143.9
Leukemia	Total	61.2	45.3	17.8
	Male	59.9	42.3	21.1
	Female	62.6	48.2	14.5
Melanoma	Total	38.3	29.7	30.4
	Male	-	-	35.4
	Female	78.2	66.1	25.4
Myeloma	Total	38.3	26.2	7.3
	Male	59.9	39.2	8.5
	Female	15.6	11.4	6.0
Non-Hodgkin Lymphoma	Total	53.6	38.8	21.3
	Male	89.9	62.0	24.1
	Female	15.6	11.8	18.5
Ovary	Female	15.6	12.3	12.5
Testis	Male	15.0	18.1	6.4

Table notes: Rates are expressed as the number of cases per 100,000 persons per year (person-years). Adjusted rates are age and sex-adjusted incidence rates for the county using the remainder of the state as standard. Data from Factsheet for the Cancer Data Registry of Idaho, Idaho Hospital Association. Butte County Cancer Profile. Cancer Incidence 2013-2017. https://www.idcancer.org/ContentFiles/special/CountyProfiles/BUTTE.pdf

The rate of childhood incidence in Butte County is a staggering three times the remainder of the state.

Table 6. Butte County childhood cancer incidence rate compared to the rest of Idaho, 2017.

Cancer type	Sex	Rate in Butte County	Adjusted Rate in Butte County	Rate for remainder of Idaho
Pediatric Age 0 to 19	Total	56.5	57.0	18.1
	Male	54.6	56.6	19.0
	Female	58.4	59.2	17.1

Table notes: Rates are expressed as the number of cases per 100,000 persons per year (person-years). See Table 5 notes.

So, you might wonder why I think the cancers in Butte County, Idaho are largely as the result of radiological airborne emissions from the Idaho National Laboratory. I've dismissed the narrative that always claims INL emissions didn't go off the INL site and studied the data in the reports. More about that in the next article.

High levels of uranium-235 in Arco, Idaho occurred from Idaho National Laboratory radiological air emissions

In 1952, what is now called the Idaho National Laboratory started reprocessing spent nuclear fuel. A variety of fuels were processed, but to a large extent, naval submarine and Department of Energy research reactor fuel, highly enriched in uranium-235, often over 90 percent enriched, was processed at what was called "the chem plant" now called the Idaho Nuclear Technology Engineering Center (INTEC). The reprocessing was conducted to recover uranium-235 because enrichment of uranium to extract the uranium-235 to make high enriched fuel (HEU) is expensive. But reprocessing introduced various radionuclide contaminants that make the recovered uranium-235 difficult to fabricate nuclear fuel with. Most of the uranium-235 recovered from spent fuel in Idaho was stored at Oak Ridge. Due to radioactive impurities such as uranium-232 that make fuel fabrication difficult, only of a portion of the uranium-235 recovered at the INL was used and it was only used by the Department of Energy weapons production reactors at Savannah River. [4]

From 1952 to 1991, a variety of fuels and fuel cladding types were reprocessed at INTEC. But the zirconium-clad high burnup (HB) spent naval fuel was prominent. Liquid High-Level Waste resulting from the fuel reprocessing was calcined at the Waste Calcine Facility from 1963

[4] Brenda Pace et al., Idaho National Laboratory operated by Battelle Energy Alliance, *Idaho National Laboratory Fuel Reprocessing Complex Historic American Engineering Record Report – ID-3-H*, INL/EXT-06-11969, US Department of Energy Idaho Operations Office, December 2006. https://inldigitallibrary.inl.gov/sites/sti/sti/4460713.pdf See page 31.

to 1981 and at the New Waste Calcine Facility from 1982 to 2003. The Department of Energy estimated the air emissions, including fuel reprocessing and calcining, for each year up to 1989 in the Idaho National Engineering Laboratory Historical Dose Estimation issued in 1991 [5] and includes estimates of its airborne emissions after that in varying reports. The list of radionuclides in the INEL HDE is incomplete. For example, plutonium radionuclides are omitted entirely. The data for the curie amounts of radionuclides in the INEL HDE are unreliable because of inadequate stack monitoring and lack of other monitoring, but it does give some indication of the airborne emissions. The amount of uranium radionuclides listed in the INEL HDE is particularly unreliable.

At the INL calcining facility, radiological releases overall were not reliably or continuously monitored and iodine-129 monitors were deliberately shut off. [6] Iodine-129 has a 16-million-year radioactive half-life and was known to be absorbed by the thyroid and was known to pose a large contribution of radiation dose from the stack emissions. Deep well injection of what was termed "low level waste" was also conducted at INTEC until 1984, contaminating the Snake River Plain aquifer. But the aquifer does not flow to Arco, Idaho. So, airborne emissions are key when examining the radiological contamination at Arco.

Several soil sample studies were compiled into a single report in 1996. [7] The soil sampling data tell a story that differs from the claims that the offsite areas sampled were not affected by INL operations.

For example, in soil samples analyzed between 1971 and 1990, europium-152 was found in soil in Arco at 0.059 picocuries/gram (pCi/g) in 1982. Europium-52 has 13.54-year half-life and was rarely detected via gamma spectrometry in soil samples thought to be strongly influenced by Nevada Weapons Testing fallout.

In 1980, at the Crystal Ice Caves further southwest of the INL, europium-152 was also detected at 0.0049 pCi/g in soil. But not only that, uranium-235 was detected at 0.103 pCi/g.

Radioactive manganese-54 is prevalent in highly enriched uranium-235 spent fuel was also detected in Arco in low amounts but it was of the few detections via gamma spectrometry analysis of soil samples.

As is typical of areas both on and off of the INL, americium-241, plutonium-238 and plutonium-239/240 are also regularly detected. But high levels of weapons testing fallout tend to be high in the fission product cesium-137 and the levels of cesium-137 are very low in Arco soil

[5] 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

[6] Chuck Broscious and Erik Ringelberg, Joint News Release from Environmental Defense Institute and Keep Yellowstone Nuclear Free, INEEL Documents Show Radiation Monitors Deliberately Shut Off for an Unknown Number of Years, January 12, 2001.

[7] S. M. Rood, G. A. Harris, and G. J. White, Idaho National Engineering Laboratory, *Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory*, INEL-94/0250, Revision1, August 1996.

samples in the 1996 report. Soil samples from 1990 stated the cesium-137 level at Arco was a mere 0.0212 pCi/g.

Cladding materials as well as radionuclides are found on upper layers of soil in Arco that shouldn't be there. Differences between weapons fallout and INL air emissions can be discerned and important information is gleaned by studying the cladding materials and stable isotopes that are prominent near the Idaho National Laboratory's INTEC. Additional sampling of metals in 1990 found silver is 0.86 mg/kg at Arco while concluding in the report that silver should not be in detectable concentrations offsite. Antimony, selenium and thallium offsite should also be in non-detectable concentrations but are detected in Arco soil samples along with many other metals typical of the cladding processed at the INL.

The INL soil sampling report tries to muddy the results by claiming that its offsite soil samples are unaffected by INL radiological air emissions despite nearly all of the offsite soil samples actually being very influenced by INL emissions. The stated offsite expected concentrations of radionuclides and metals are sometimes inflated in the Rood soil report. In other cases, the averaging of contaminant concentrations at shallow and deep levels reduces the contaminant level significantly because often most of the contamination is concentrated in the top 5 centimeters.

The kidders were even kidding themselves. During the soil sample analyses, it was incorrectly assumed that any detections of uranium-238 and its decay series and of thorium-232 and its decay series would be in secular equilibrium. They tried to compensate by dividing the results by a factor of 10 for thorium and by 14 for uranium **because the decay progeny were not in secular equilibrium with the parent radionuclides.** It remains to this day an unstated fact that nuclear reactors using highly enriched uranium-235 fuels, especially those with high burnup like fuel used for long durations in naval submarines, produce extensive amounts of uranium-232 as well as uranium-236 and plutonium-240 that all feed into the thorium-232 decay series. The uranium-232 rapidly decays into thorium-228, several decay daughters down from thorium-232. This is an example of a so-called "broken chain" because the concentration of decay progeny, such as radium-224 can exceed parent nuclides such as radium-228, in the thorium-232 decay series.

And for the uranium-238 decay series, there are several ways that reactor-made radionuclides are added into our environment. Reactor-made plutonium-238 decays to uranium-234, tying into the naturally occurring decay series for uranium-238. Both enriched and depleted uranium are high in uranium-234, which doesn't fission. So, while there are equal amounts, by activity, of uranium-234 to uranium-238 in ***natural uranium*** (see Table 7), we may see higher amounts of uranium-234 than uranium-238 in our environment because of weapons testing fallout or reactor fuel-related releases.

Table 7. Natural uranium composition.

Nuclide	Mass percent	Activity percent	Picocurie/gram[a]
U-234	0.005	48.85	1 pCi/g
U-235	0.714	2.30	0.047 pCi/g
U-238	99.279	48.85	1 pCi/g
	100 %	100 %	
Ratio of U-235 to U-238, by activity		0.047 or 4.7 percent	

Table notes: a. the picocurie/gram values demonstrate the relative values for a gram of soil contaminated with 1 picocurie of uranium-238 if the uranium composition was that of naturally-occurring uranium.

When using gamma spectrometry to estimate the amount of a radionuclide, interpretation is required when evaluating contamination from weapons testing or not-naturally-occurring radioactive materials. But the INL doesn't discuss its gamma spectrometry interpretation because doing so would involve discussing the abnormal levels of radioactivity from their operations both on and offsite.

Incorrectly assuming that the decay progeny are in secular equilibrium creates large errors in estimation of uranium-238 or thorium-232 parent radionuclide concentrations. What this means is that using the detection of thallium-208, with its high energy gamma and prominent peak detectable via gamma spectrometry of soil samples would overestimate the parent thorium-232 radionuclide concentration when excess thallium-208 has resulted from reactor fuel. Hence, the need to compensate to divide their original results by 10 for thorium-232. But just how gamma spectrometry interpretations were conducted and the fact that the thorium-232 and its decay products were not naturally occurring in our soils is not explained in the soil report issued in 1996. [8]

The Department of Energy, the U.S. Environmental Protection Agency and other federal and state agencies continue to emphasize that the decay progeny of the thorium-232 decay series are naturally occurring. They omit the fact that the thorium-232 and it decay progeny can also be in the environment from the radiological releases associated with reprocessing fuel or chopping of end caps as they do at the INL site's Naval Reactors Facilities. It is only suggested by a few authors that Nevada Testing Site nuclear weapons testing may have used high levels of uranium-235 in what is thought to be predominantly plutonium-239 nuclear testing. But the evidence shows that the weapons testing fallout from the Nevada Test Site did include high amounts of thorium-232 and decay progeny, such as from decay of plutonium-240 and higher actinides as well as depleted uranium.

[8] S. M. Rood, G. A. Harris, and G. J. White, Idaho National Engineering Laboratory, *Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory*, INEL-94/0250, Revision1, August 1996.

Detection of uranium-235 decay series is usually deemed unnecessary because of the expectation that the amount of U-235 is much less than U-234 and U-238. Detection of the entirely man-made uranium-233 series often isn't conducted either. So, usually discussions of estimations of uranium-238 or thorium-232 series results do not indicate the concentrations of the U-235 or U-233 decay series radionuclides. Uranium-233, of the "neptunium series," is also produced in high enriched uranium-235 nuclear reactors or by weapons tests that include fissioning of uranium-235.

The U.S. Environmental Protection Agency collected data for Arco, Idaho from samples takin in1980 for use in a comparison to areas near Pocatello, and selected data are presented in Table 8. [9] While this data excluded radionuclides such as cesium-137 or plutonium that likely would have been present, the data are informative because of the detailed assessment of uranium-234, uranium-235, and uranium-238 for various locations in Idaho. Even though these results were presented in terms of mrem/yr lung dose, **it is the proportions of each of these radionuclides that is of interest.** At Arco, the proportion of uranium-235 to uranium-238 is higher than in naturally occurring uranium and it is also higher than occurring in the Pocatello area, despite higher uranium levels overall in Pocatello due to the phosphate ore industry. The higher levels of uranium-235 at Arco would be explained by INL air emissions from the past reprocessing of highly enriched uranium (HEU) spent fuel at the INL, due to nightly wind reversals and close proximity to INTEC.

The proportion of U-234 to U-238 by activity (and by lung dose) would be 50/50 for natural uranium. But as seen in the Table 8, the amount of U-234 is often higher than U-238 which is indicative of influences of weapons fallout and/or nuclear reactor fuel. I have noted this to be the case to some extent generally throughout the northwest and not just near the INL.

Table 8. Average Annual Lung Dose (mrem/yr) for Insoluble Radionuclides.

Radionuclide	Sewage plant near Pocatello RR	Hayes Fire Station, Pocatello	Pocatello airport	Pocatello courthouse	Chubbuck school	Howe, Idaho	Arco, Idaho
U-234	2.3	0.37	0.41	0.41	0.63	0.12	0.23
U-235	0.13	0.033	0.061	0.11	0.068	0.023	0.06
U-238	1.8	0.32	0.32	0.29	0.58	0.10	0.17
Ratio of U-235/ U-238	***0.072***	***0.103***	***0.19***	***0.379***	***0.117***	***0.23***	***0.35***

Table notes: E. G. Baker, H. D. Freeman, and J. N. Hartley, *Idaho radionuclide exposure study: Literature review*, October 1, 1987.

[9] E. G. Baker, H. D. Freeman, and J. N. Hartley, *Idaho radionuclide exposure study: Literature review*, October 1, 1987.

While the lung doses appear low, and the stated lung dose is low for Arco, what I want to point out is the proportion of U-235 to U-238. **The ratio of U-235 to U-238, by activity, shows Arco, Idaho having a ratio of 0.35 when naturally occurring uranium would have a ratio of 0.047.** So, we are seeing levels of uranium-235 in our environment that are far above naturally occurring levels but, in the table above, the levels are usually below 0.23.

The exception is a curiously high proportion of uranium-235 near the Pocatello courthouse, which points to interesting things going on in Pocatello with highly enriched uranium, not tied directly to INL emissions or to weapons fallout and definitely not related to the phosphate ore industry. Another thing to point out is that the rail roads have been used for transporting not just phosphate ore but also radioactive soils under programs like the Department of Energy's Formerly Utilized Remedial Action Program (FUSRAP) that ship radioactive waste to Idaho's US Ecology Site A (Bruneau, now closed) and Site B (Grandview). In recent years, US Ecology Grandview has been receiving "Special Nuclear Material" in these train car shipments. Special Nuclear Material means uranium-235, plutonium-239 and other fissile material.

The data in Table 8 are from 1980 and show clearly that Arco's proportion of uranium-235 in soil are not naturally occurring and are excessive. The data point to INL air emissions affecting communities off-site that the INL and the Department of Energy are still not being truthful about. There are human consequences to the lies, as can be seen in cancer data for Arco, Idaho. The INL's INTEC fuel reprocessing and calcining have ended. So, a reasonable question is not only what emissions are continuing but also what radionuclides are still building up as higher actinides decay.

Americium-241, plutonium-238 and plutonium-239 are still frequently detected by the Department of Energy's environmental surveillance that includes Arco. INL emissions have continued from cleanup activities, operation of the Advanced Test Reactor, spent fuel handling at the Naval Reactors Facilities, and other operations.

Uranium health effects depend not just on concentration but also on the solubility and chemical form. Health effects estimates are typically based on the studies of miners exposed to natural uranium which is different than the chemical forms of uranium released from INL air emissions. A host of other radionuclides were released along with the uranium-235 as well as cadmium, lead and other toxic metals.

The Department of Energy and the Idaho National Laboratory have lied about the adverse impact they've already caused. They have manipulated and continue to manipulate the environmental monitoring at times to sheer nonsense, and they are saying they are allowed to release far more radionuclides based on Department of Energy Derived Concentration Guidelines for air and water and they are gearing up to do just that with spent fuel pyroprocessing at the INL's Materials and Fuels Complex as well as the Expanded Test Range at INL, that I wrote about in January 2020.

Department of Energy's Derived Concentration Guidelines (DCG) are not protective of health

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. And the DOE emphasizes that it is not exceeding its very own unique radiological Derived Concentration Guidelines (DCGs). [10]

The DOE's DCGs allow about 100 times more radiological contamination than other federal standards. With federal drinking water standards, scientific study has shown that even the federal standards for radionuclides are not protective of human health, see the public health goals for drinking water in Table 9. And to get an idea of just how permissive the DOE's DCGs are, compare the DCGs to federal Maximum Contaminant Levels (MCLs) and the public health goals. To convert the DOE's DCGs as they are typically presented in mircocurie/milliliter, you would multiply by 1,000,000,000 to obtain picocurie/liter. The DOE DCGs are much higher than the federal Maximum Contaminant Level and even farther above the level would be protective of health by scientifically evaluated recommended health goals.

Table 9. Radionuclide monitoring typical of state drinking water monitoring programs of community wells, with comparison of the Federal drinking water standard maximum concentration levels to the Department of Energy's Derived Concentration Guide (DCG) levels.

Code	Analyte	Typical of uncontamin-ated basalt aquifer	Federal MCL[a] Versus (DOE's Derived Concentration Guide)	Public Health Goal[b]	Comment
4000	Gross alpha excluding radon and uranium	Zero	15 pCi/L	Zero	The source of alpha can be radium, thorium, plutonium, or americium. The absence of radium-228 suggests the absence of thorium-232.
4002	Gross alpha including radon and uranium	< 3 pCi/L	See Uranium MCL	See Uranium goal	Gross alpha including uranium would not include gaseous radon. It would include radium-226 which is an alpha emitter. It would not include radium-228 because it is a beta emitter. And it may include radium-224 although typically the radium-224 is not

[10] Department of Energy, DOE-STD-1196-2011, Derived Concentration Technical Standard, April 2011. https://www.standards.doe.gov/standards-documents/1100/1196-astd-2011

Code	Analyte	Typical of uncontaminated basalt aquifer	Federal MCL[a] Versus (DOE's Derived Concentration Guide)	Public Health Goal[b]	Comment
					determined.
4100	Gross beta (excluding K-40)	Zero	4 mrem 50 pCi/L	-	Units of mrem or pCi/L may be used. The source of the beta/photon emitter is usually not identified but can be manmade strontium-90, cesium-237, cobalt-60 or plutonium. Proper determination of mrem requires knowing which nuclides are present.
	Strontium-90	Zero	8 pCi/L (DOE's DCG: 1,100 pCi/L)	0.35 pCi/L	(Sometimes measured and relates to total strontium)
4010	Combined radium-226 and radium-228		5 pCi/L (DOE's DCG: 112 pCi/L)	See radium-226 and radium-228 limits.	Radium ingestion or inhalation can cause lymphoma, bone cancer or diseases of blood formation such as leukemia and aplastic anemia). Radium-224 is typically not regulated and to do so would require gross alpha testing with 48 hours of sample collection
4020	Radium-226		See combined radium MCL (DOE's DCG: 87 pCi/L)	0.05 pCi/L	Detection levels of 1 pCi/L may be too high to discern low levels.
4030	Radium-228		See combined radium MCL (DCG: 25 pCi/L)	0.019 pCi/L	Detection levels of 1 pCi/L may be too high to discern low levels.
4006	Combined uranium		20 pCi/L	0.43 pCi/L	20 pCi/L would correspond to 30 ug/L if natural uranium. Typical conversion using 0.67 pCi/ug assumes natural uranium composition.

Code	Analyte	Typical of uncontamin-ated basalt aquifer	Federal MCL[a] Versus (DOE's Derived Concentration Guide)	Public Health Goal[b]	Comment
4007	Uranium-234		For MCL, see combined uranium MCL. (DOE's DCG: 680 pCi/L)	See combined uranium goal	Uranium-234 is present is natural uranium and non-natural uranium and contributes significantly to activity.
	Radon		Advisory level between 300 and 4000 pCi/L	1.5 pCi/L	No requirement to monitor radon.
4008	Uranium-235		See combined uranium MCL (DOE's DCG: 720 pCi/L)	See combined uranium goal	Uranium-235 concentration is lower in depleted uranium and higher in enriched uranium. Enrichment can range from 3 to 93.5 percent.
4009	Uranium-238		See combined uranium MCL (DOE's DCG: 750 pCi/L)	See combined uranium goal	Uranium-238 concentration is greater in depleted uranium.
	Tritium		20,000 pCi/L (DOE's DCG: 1,900,000 pCi/L)	400 pCi/L	Don't be fooled by the wildly permission federal or DOE tritium standards.

Table notes: Federal maximum contaminant levels (MCLs) set the state and federal levels requiring enforcement are based on EPA's 2012 edition of Drinking Water Standards at oehha.ca.gov/water/phg/allphgs.html. The public health goals in the table are based on California's State Water Resources Control Board 2016 Groundwater Information Sheet on Radionuclides and are not enforceable.

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. [11]

[11] 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

See Environmental Defense Institute comments on the radiological test range expansion on our website. [12]

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. [13] [14]

"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 for the Test Range 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. [15] The EPA standard is 10 mrem/yr for airborne exposure.

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[12] 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

[13] 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.

[14] 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.

[15] "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.

Recent changes to the Idaho Settlement Agreement set to pollute SE Idaho

In early February, the Idaho Settlement Agreement [16] was changed to provide the state with assurance that the Advanced Test Reactor facility would not keep nuclear fuel in wet storage longer than necessary. [17] According to the original Settlement Agreement, all spent nuclear fuel in wet storage was supposed to be put in dry storage by December 31, 2023. The new agreement allows the Department of Energy to keep the ATR spent fuel in wet storage for up to six years before being put in dry storage, excluding test specimen material. After 2035, spent fuel, excluding test specimens, are to be removed from the state within a year of being placed in dry storage.

Last November, other changes were made to the Idaho Settlement Agreement to allow the Idaho National Laboratory to bring in small quantities of spent nuclear fuel for research if the Integrated Waste Treatment Unit began processing radioactive liquid waste called sodium-bearing waste, high-level waste that resulted from spent fuel reprocessing. A one-time waiver will allow 25 spent nuclear fuel rods from Byron Nuclear Generating Station to come to Idaho AND it allows future receipts of spent nuclear fuel pursuant to the 2011 Memorandum of Agreement between Idaho and DOE.

The Department of Energy remains out of compliance with the 1995 Idaho Settlement Agreement for not treating the liquid radioactive sodium-bearing waste by the end of 2012 and also because of transuranic waste shipment backlogs resulting suspended operation of WIPP for 3 years due to two accident at the Waste Isolation Pilot Plant (WIPP) in New Mexico in 2014.

Importantly, the new agreement requires increasing radiological air emissions to southeast Idaho by a factor of 170. The November 2019 agreement ***requires*** the DOE to "treat all Sodium Bonded EBR II Driver Fuel Pins into product material for High Assay Low Enriched Uranium (HALEU)." Idaho required DOE to start within 30 days of signing the agreement and treat at least 165 lbs heavy metal on a 3-year rolling average and DOE must complete the HALEU treatment by December 31, 2028. This gift to the Department of Energy, allowing it to pollute Idaho skies with this HALEU treatment at the INL's Fuel Conditioning Facility is something that families downwind of MFC will pay dearly for, with increased disease, birth defects and cancer.

This HALEU process will be polluting Idaho skies with radioactive material in far greater amounts than in the past. With 2018 air emissions estimated to cause a 0.0102 mrem annual dose, which vastly underestimates the amount and the harm, the annual emissions are slated increase by a factor of 170. But, as we've seen from our area's cancer statistics, the releases from the INL, despite our being told that they were very low in mrem/yr and not going offsite, have

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

[17] Nathan Brown, *The Idaho Falls Post Register*, DOE, "Idaho reach new deal on ATR fuel," February 5, 2020.

caused an awful lot of excess cancers. Other health effects, such as birth defects and shorter life spans are also affected by the radiological releases.

It certainly appears that the state has been preparing for escalation in radioactivity because it dropped radiological air emission laws out of state law effective spring of 2019 after the adjournment of the Idaho Legislature, to IDAPA 58 – Department of Environmental Quality, 58.01.01 – Rules for the Control of Air Pollution in Idaho, Docket No. 58-0101-1801. [18]

The law had included since 1995 a provision for radionuclides. But this section of the clean air law has now deleted the following text:

> *xvi. Radionuclides, a quantity of emissions, from source categories regulated by 40 CFR Part 61,Subpart H, that have been determined in accordance with 40 CFR Part 61, Appendix D and by Department approved methods, that would cause any member of the public to receive an annual effective dose equivalent of at least one tenth (0.1) mrem per year, if total facility-wide emissions contribute an effective dose equivalent of less than three (3)mrem per year; or any radionuclide emission rate, if total facility-wide radionuclide emissions contribute an effective dose equivalent of greater than or equal to three (3) mrem per year.(5-1-95)*

Given the increasing levels of airborne radiological contamination occurring on the lower west Boise-side and the lower east Idaho National Engineering-side of Idaho, this law change certainly is not about protecting human health and the environment.

Nor is the source of increasing radioactive contamination on the Boise side of the state being investigated by the Idaho Department of Environmental Quality.

DOE acknowledges that last year's fire at the INL increased radiological contamination levels around the globe, but won't provide specifics

At the February Idaho Cleanup Project (ICP) Citizens Advisory Board (CAB) meeting held in Idaho Falls, it was admitted that fires like this are major radiological events that "can cause air monitors to register slightly elevated contamination levels during a range fire anywhere in the world." But the Department of Energy was not about to provide any monitoring data and the relevant quarterly reports for 2019 are still not available.

The "Sheep Fire" burned 112,159 acres on the U.S. Department of Energy's Idaho National Laboratory, according to the February presentation. [19] [20] The fire started July 22 and was contained by July 26. The fire started near the Materials and Fuels Complex on the eastern side

[18] Office of the Administrative Rules Coordinator, Department of Administration, Pending Rules, Committee Rules Review Book, Submitted for Review Before House Environment, Energy & Technology Committee, 65th Idaho Legislature, First Regular Session – 2019. January 2019 at https://adminrules.idaho.gov/legislative_books/2019/pending/19H_EnvEnergyTech.pdf

[19] Nathan Brown, *The Idaho Falls Post Register*, "INL facilities closed by 133-square-mile wildfire," July 24, 2019.

[20] Nathan Brown, *The Idaho Falls Post Register*, "Sheep Fire biggest in INL history," July 31, 2019.

of the site but spread westward through the middle of the site, to the edges of major nuclear facilities, including the Naval Reactors Facilities, ATR Complex and the Idaho Nuclear Technologies and Engineering Center (INTEC).

No facilities were damaged; however, 112 power lines were burned.

Outdoor storage of radioactive waste at the Materials and Fuels Complex and other facilities, fortunately, was not affected by the fire. The fire did not burn close to the Radioactive Waste Management Complex and its outdoor storage of radioactive waste and fabric enclosures.

With decades of airborne emissions at the Idaho National Laboratory including long-lived radionuclides that decay to thallium and lead, and other toxic metals such as cadmium heavily laden in the top 5 centimeters of soil, the Department of Energy isn't about to provide any specific information about how monitoring was conducted or what the fire fighters were actually inhaling or what local communities were inhaling during and after the fire.

EPA RadNet air monitoring blackouts are the way nuclear polluters' do business

The May 2000 Cerro Grande Fire near the Los Alamos National Laboratory was recognized as a radiological event in the U.S. Environmental Protection Agency's RadNet air monitoring reporting. Unfortunately, since 2000, the EPA RadNet blackouts from Seattle, Washington, to Hanford Washington, to Boise, Idaho and to Idaho Falls, Idaho are largely still in effect apparently so that the Navy's radiological air emissions won't be recorded. The Department of Energy controls what air monitoring samples are provided to the EPA RadNet and so I doubt that air samples in Idaho Falls were turned over to the EPA.

Cleanup at the Department of Energy's Hanford site near Richland, WA, has been ongoing for the last 20 years and is not near completion. However, Hanford's Plutonium Finishing Plant has now been demolished, the Department of Energy announced February 5. The facility contained processing lines where workers prepared plutonium for shipment to nuclear weapons manufacturing facilities. It would seem that some of the radioactive air emissions from Hanford that blow to Boise, Idaho are involved with why EPA radiological air filter analysis were not conducted in recent years. But was that also the reason that Seattle EPA RadNet monitoring was limited?

Here is a summary of the data blackouts for EPA RadNet air filter analysis.

Seattle, WA air filter data blackouts (1985-2008)

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

Portland, OR (2000 - 2009)

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

Richland, WA (2000 – Oct 1, 2009) and (April 2010 to February 20, 2011)

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 20**10 2**011 2012 2013 2014 2015 2016 2017 2018 2019

Boise, ID beta/gamma (1992 - 1998) and (2003 - 2012) and since 2018

2000 **2001** 2002 **2003 2004 2005 2006 2007 2008 2009 2010 2011 2012** 2013 2014 2015 2016 2017 **2018 2019**

Boise, ID alpha (2004-2011) and (2014 – 2016) and since 2018

2000 2001 2002 2003 **2004 2005 2006 2007 2008 2009 2010** 2011 2012 **2013 2014 2015** 2016 **2017 2018 2019**

Idaho Falls, ID beta/gamma (1987-1999) and (2001-2008) and (2011-2013) and since 2018

2000 **2001 2002 2003 2004 2005 2006 2007 2008** 2009 2010 **2011 2012 2013** 2014 2015 2016 2017 **2018 2019**

Idaho Falls, ID alpha (2014 to present)

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 **2014 2015 2016 2017 2018 2019**

ICP Citizens Advisory Board not endorsing DOE's proposed cleanup funding cuts for 2021

The Department of Energy presented proposed cleanup funding cuts for 2021 at the February 27, 2020 Idaho Cleanup Project Citizens Advisory Board meeting held in Idaho Falls. [21] The Idaho Cleanup Project for 2020 is $446.3 million and the proposed 2021 budget is only $270.9 million dollars.

Fluor Idaho's contact began June 2016 and expires May 2021. Fluor Idaho's Fred Hughes said that Fluor Idaho is remaining associated with parent company Fluor, despite other past announcements. The cleanup contract also has a contract with Spectra Tech, Inc. to manage NRC-licensed facilities at the INL. See cleanup funding levels from 2015 through 2020 in Table 10.

[21] Idaho Cleanup Project Citizens Advisory Board at https://www.energy.gov/em/icpcab/listings/cab-meetings

Table 10. Idaho Cleanup Project spending, 2015 to 2020, including the proposed FY 2021 cleanup budget.

FY-Year	Idaho Cleanup Project, dollars	Source
2015	404,929,000	FY-17 P. 121
2016	401,919,000	FY-17 P. 121
2017	370,088,000	FY-17 P. 121
2018	446,043,000	FY-20 P. 29
2019	443,200,000	FY-20 P. 29
2020	446,300,000	FY-20 P. 29
Proposed 2021	270,954,000	ICP CAB

Sources:
Department of Energy FY (for each year + PG.#) Congressional Budget Request Environmental Management, Volume 5
DOE FY 2014 Congressional Budget Request Environmental Management, DOE/CF-0088, Volume 5
Department of Energy FY 2015 Congressional Budget Request, DOE/CF-0100, Volume 5
Department of Energy FY 2016 Congressional Budget Request DOE/CF-0111 Volume 5
Environmental Management Department of Energy FY 2017 Congressional Budget Request DOE/CF-0123, Volume 5
DOE FY 2020 Congressional Budget Page 28 of 129 and February 27, 2020 ICP CAB presentation.

What the Department of Energy does not convey clearly to the CAB is just exactly how it intends to leave the High-Level Waste calcine, a highly soluble and highly radioactive powdery waste stored in seismically vulnerable bin sets for millennia over the Snake River Plain aquifer, to migrate into the aquifer over time and/or blow in the wind. Grout will be touted big time despite the known failure of grout to contain the radioactive material. Former Idaho Governor Cecil Andrus grasped to risk to Idaho from the calcine waste when the Idaho Settlement Agreement requirements regarding the calcine were put in place.

Not discussed at the CAB meeting was what appears to be the deletion from public access to decades of Idaho National Laboratory cleanup related documents. Because the Department of Energy is leaving buried at the Radioactive Waste Management Complex over 90 percent of the americium-241 is remaining buried, of 230,000 curies of americium-241, after completing buried waste exhumation, an estimated 215,000 curies will remain buried according to composite analysis calculations. [22] [23] [24] The buried americium-241 is not the only radionuclide that

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

[23] U.S. Department of Energy, 2008. Composite Analysis for the RWMC Active Low-Level Waste Disposal Facility at the Idaho National Laboratory Site. DOE/NE-ID-11244. Idaho National Laboratory, Idaho Falls, ID and U.S. Department of Energy, 2007. Performance Assessment for the RWMC Active Low-Level Waste Disposal

contributes to contaminant migration, but it was the dominant contributor according to the buried waste performance assessment. It appears that DOE is sanitizing the data so people can't find what has been left over the Snake River Plain Aquifer, but so far, I haven't gotten an answer admitting why these reports are no longer accessible online at the Administrative Record for the INL cleanup.

The work to redesign and repair the Integrated Waste Treatment Unit (IWTU) continues, much as it has since 2012. Connie Flohr who replaces Jack Zimmerman has stated at the Leadership in Nuclear Energy meeting, also held this month, that "if the modifications are working, waste processing should start by the end of 2020." [25]

'Challenging Wastes Processed at AMWTP,' No Kidding

With appreciation to the Idaho State Department of Environmental Quality for being so open to bending the requirements, Fluor Idaho has treated some very difficult waste streams of above ground storage transuranic waste, but probably not without significant environmental releases. This appears to be another reason why the Department of Energy's environmental surveillance monitoring quarterly reports for 2019 have not been released, beyond the first quarter.

Pyrophoric metals were burned in large quantities in facilities not designed for that function.

They treated 176 suspect waste drums of pyrophoric uranium metal fines, despite hazardous waste permitting games where Fluor was denying that they would be treating this material. The shipments that would allow in the new research spent nuclear fuel won't be allowed in until the IWTU begins processing the radioactive liquid sodium-bearing waste.

Material crushed in the supercompactor, that was not designed for this pyrophoric material, was pulling bolts out of the compactor because the device was not adjusted for the added magnesium oxide sand.

Fluor treated 30 boxes with high fissile gram equivalent waste. One box was discovered to contain a fissile gram equivalent greater than 2,500 FGE levels. WIPP cannot accept drums containing more than 200 FGE of transuranics.

Facility at the Idaho National Laboratory Site. DOE/NE-ID-11243. Idaho National Laboratory, Idaho Falls, ID. Available at INL's DOE-ID Public Reading room electronic collection. (Newly released because of Environmental Defense Institute's Freedom of Information Act request.) See https://www.inl.gov/about-inl/general-information/doe-public-reading-room/

[24] See the CERCLA administrative record at www.ar.icp.doe.gov (previously at ar.inel.gov) and see also Parsons, Alva M., James M. McCarthy, M. Kay Adler Flitton, Renee Y. Bowser, and Dale A. Cresap, Annual Performance Assessment and Composite Analysis Review for the Active Low-Level Waste Disposal Facility at the RWMC FY 2013, RPT-1267, 2014, Idaho Cleanup Project. And see Prepared for Department of Energy Idaho Operations Office, Phase 1 Interim Remedial Action Report for Operable Unit 7-13/14 Targeted Waste Retrievals, DOE/ID-11396, Revision 3, October 2014 https://ar.inl.gov/images/pdf/201411/20141103009 60BRU.pdf

[25] Nathan Brown, The Idaho Falls Post Register, "New cleanup head: IWTU to process waste by year's end." February 7, 2020.

The transuranic waste work is already high risk, and the unique operations they completed required extensive innovation. They took short cuts and high risks so that the Department of Energy could complete this work cheaper. And given how close Fluor came to human and environmental tragedy in 2018 with four waste drums exploded in a fabric enclosure, I hope their luck does not run out. Fortunately for Fluor Idaho, the Idaho Department of Environmental Quality wouldn't dream of enforcing fines for the four drums that exploded despite the fact that Fluor Idaho was ignoring procedures, ignoring state permit requirements and decades of knowledge about the pyrophoric nature of uranium, and years of excessive methane gas generation in waste drums that they failed to study adequately.

The treatment described above was for drums exhumed decades ago. But the exhumation of buried waste at the Radioactive Waste Management Complex is continuing. The "targeted waste" which is only a small fraction of the still buried transuranic waste and none of the non-transuranic radioactive waste is expected to be completed in 2021. Over 90 percent of the buried transuranic waste is remaining buried according to the Department of Energy's waste composite analysis calculations. [26] [27] [28] And the Performance Assessment of the waste doesn't comply with federal drinking water standards, even with a functioning soil cap as it allows 30 mrem/yr from drinking the contaminated water from the RWMC burial ground. [29]

The last Accelerated Retrieval Project (ARP) IX is finding that none of the drums are intact. All that was said at the ICP CAB meeting was that these drums are more degraded than anticipated.

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

[27] U.S. Department of Energy, 2008. Composite Analysis for the RWMC Active Low-Level Waste Disposal Facility at the Idaho National Laboratory Site. DOE/NE-ID-11244. Idaho National Laboratory, Idaho Falls, ID and U.S. Department of Energy, 2007. Performance Assessment for the RWMC Active Low-Level Waste Disposal Facility at the Idaho National Laboratory Site. DOE/NE-ID-11243. Idaho National Laboratory, Idaho Falls, ID. Available at INL's DOE-ID Public Reading room electronic collection. (Newly released because of Environmental Defense Institute's Freedom of Information Act request.) See https://www.inl.gov/about-inl/general-information/doe-public-reading-room/

[28] See the CERCLA administrative record at www.ar.icp.doe.gov (previously at ar.inel.gov) and see also Parsons, Alva M., James M. McCarthy, M. Kay Adler Flitton, Renee Y. Bowser, and Dale A. Cresap, Annual Performance Assessment and Composite Analysis Review for the Active Low-Level Waste Disposal Facility at the RWMC FY 2013, RPT-1267, 2014, Idaho Cleanup Project. And see Prepared for Department of Energy Idaho Operations Office, Phase 1 Interim Remedial Action Report for Operable Unit 7-13/14 Targeted Waste Retrievals, DOE/ID-11396, Revision 3, October 2014 https://ar.inl.gov/images/pdf/201411/20141103009 60BRU.pdf

[29] The U.S. Environmental Protection Agency limit radionuclides in drinking water to a combined radium 226 and radium-228 of 5 picocurie/liter (pCi/L); a gross alpha standard of 15 pCi/L (not including radon and uranium); a combined standard of 4 mrem/yr for beta/photon emitters, and uranium limit of 30 micrograms/L (roughly 20 pCi/L). For uranium in naturally-occurring composition, convert uranium mass to activity by multiplying by 0.67 pCi/ug. https://www.epa.gov/dwreginfo/radionuclides-rule and https://www.epa.gov/sites/production/files/2015-09/documents/radionuclide_rule_overview.pdf

The Idaho Department of Environmental Quality knows just what to do in case of a problem at a state RCRA permitted project: stop radiological air monitoring like it did when the Grandview waste disposal facility exploded, also in 2018. [30]

EDI Comments of Proposed NEPA Process Changes – And the gutting of the NEPA Process is further evidence that citizens should probably abandon all hope

I wasn't always this pessimistic. But seeing how the procedural requirements of the National Environmental Policy Act have not been protecting people or the environment, it is even more disheartening to allow the NEPA process to let agencies like the Department of Energy off the hook, making it a check box for them to say, "Ya, we considered the environmental catastrophe we would cause, and we don't find it a problem." NEPA process done.

Well, no doubt these proposed changes will make it easier for our government to pollute our air, soil and water. But, besides that, these changes don't accomplish much.

The Council of Environmental Quality (CEQ) is proposing simplifications so that it is easier for polluting agencies to pretend they understand and considered the options before wasting money and devastating our health and environment. [31]

EDI has submitted comments on the Proposed NEPA Process Changes and opposes the proposed changes. [32]

The NEPA regulations were intended to require federal agencies to consider the consequences of large projects, evaluate alternatives, and provide detailed information about the consequences of the alternatives.

What was the original NEPA purpose Sec. 1502.1 of Environmental Impact Statement?

"The primary purpose of an environmental impact statement is to serve as an action-forcing device to ensure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government. It shall provide full and fair discussion of

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[30] See the Environmental Defense Institute newsletter article from March 2019, "Two Explosions at Idaho DEQ RCRA-Permitted Facilities in Idaho in 2018 Suggest Idaho DEQ Doing a Bang-Up Job of RCRA Permitting," Environmental Defense Institute at https://www.environmental-defense-institute.org/publications/News.19.March.pdf

[31] See regulations.gov, Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, Docket Number CEQ-2019-0003. Comments due March 10, 2020. https://www.regulations.gov/document?D=CEQ-2019-0003-0001

[32] Public Comment submittals on Proposed Change by the Council on Environmental Quality (CEQ) to Update the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA), Docket Number CEQ-2019-0003. March 9, 2020, by Chuck Broscious, Environmental Defense Institute at https://www.environmental-defense-institute.org/publications/CommentNEPACEQCB.pdf and by Tami Thatcher at https://www.environmental-defense-institute.org/publications/CommentNEPATT.pdf

significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. **Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses**. An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions." [33] [emphasis added]

Instead, CEQ proposes that the agencies determine whether or not to apply NEPA, that they ignore cumulative impacts, and that they just can claim that they are going to do what they consider "practicable." On top of that, the CEQ proposes that more burden be placed on commenters on a NEPA action that on the agency conducting the NEPA action.

While CEQ should focus on the intent of the NEPA process which is to promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." 42 U.S.C. 4331(a), CEQ instead has focused on how it can gut the NEPA process.

Section 102 of NEPA establishes procedural requirements, applying that national policy to proposals for major Federal actions significantly affecting the quality of the human environment by requiring Federal agencies to prepare a detailed statement on: (1) The environmental impact of the proposed action; (2) any adverse effects that cannot be avoided; (3) alternatives to the proposed action; (4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (5) any irreversible and irretrievable commitments of resources that would be involved in the proposed action. 42 U.S.C. 4332(2)(C).

In one example, the CEQ, proposes to change the word "possible" to the word "practicable" which then allows agencies complete unfettered discretion to pollute and harm the environment as much as they wish. It's as much of a joke as the Department of Energy's "As Low As Reasonably Achievable" (ALARA) radiation policy – it is utterly meaningless while sanctifying complete discretion over radiation protection, or lack thereof, of the public and workers.

In no way does CEQ propose changes to strengthen the technical adequacy of the analyses upon which the NEPA study of an action is based.

CEQ is actually proposing to impose more requirements on the commenters of a NEPA action than on the agencies who are pushing for the NEPA action. Here is what the proposed regulation change states: "CEQ also proposes that comments should explain why the issue raised

[33] Authority: NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 et seq.), sec. 309 of the Clean Air Act, as amended (42 U.S.C. 7609), and E.O. 11514 (Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977). Source: 43 FR 55994, Nov. 29, 1978, unless otherwise noted

is significant to the consideration of potential environmental impacts and alternatives to the proposed action, as well as economic and employment impacts, and other impacts affecting the quality of the environment. *See Vt. Yankee,* 435 U.S. at 553 ("[Comments] must be significant enough to step over a threshold requirement of materiality before any lack of agency response or consideration becomes a concern. The comment cannot merely state that a particular mistake was made . . . ; it must show why the mistake was of possible significance in the results . . . ." (quoting *Portland Cement Assn.* v. *Ruckelshaus,* 486 F.2d 375, 394 (1973), cert. denied *sub nom. Portland Cement Corp.* v. *Administrator, EPA,* 417 U.S. 921 (1974))). CEQ also proposes a new § 1503.3(b) to emphasize that comments on the submitted alternatives, information and analyses section should identify any additional alternatives, information or analyses not included in the draft EIS, and should be as specific as possible."

In CEQ's proposed changes to Part 1500, "CEQ proposes to revise this paragraph to reflect that the regulations include direction to Federal agencies to determine what actions are subject to NEPA's procedural requirements and the level of NEPA review, where applicable." CEQ wants to allow the agencies to decide that they simply don't need to conduct a NEPA review.

In CEQ's proposed changes to Part 1508, "CEQ proposes to strike the definition of cumulative impacts and strike the terms "direct" and "indirect" in order to focus agency time and resources on considering whether an effect is caused by the proposed action rather than on categorizing the type of effect. CEQ's proposed revisions to simplify the definition are intended to focus agencies on consideration of effects that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action. In practice, substantial resources have been devoted to categorizing effects as direct, indirect, and cumulative, which, as noted above, are not terms referenced in the NEPA statute…In addition, CEQ proposes a change in position to state that analysis of cumulative effects, as defined in CEQ's current regulations, is not required under NEPA."

The Council of Environmental Quality (CEQ) is proposing simplifications so that it is easier for polluting agencies to pretend they understand and considered the options before devastating our health and environment.

In no way do the proposed changes aim to improve the quality and accuracy of the NEPA process required of federal actions or the public understanding of the consequences of the action.

Comments are due March 10, 2020 and can be submitted electronically via Federal eRulemaking, Portal: https://www.regulations.gov . [34]

[34] See and submit comments for Docket Number CEQ-2019-0003, Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, proposed by the Council on Environmental Quality. Comments due March 10, 2020. https://www.regulations.gov/document?D=CEQ-2019-0003-0001

The Public Comment Period Opens for the INL Site Treatment Plan

The Department of Energy announced at the Idaho Cleanup Project Citizens Advisory Board meeting that the 30-day public comment period for the updated/revised Site Treatment Plan will open in March. No information was provided as to how to obtain the Site Treatment Plan. It was not listed as a public comment opportunity by the Idaho Department of Environmental Quality; however, the reports could be found by a search in the Idaho DEQ website.

The Annual Site Treatment Plan Report that covers progress during fiscal year (FY) 2019, DOE/ID-10559, Revision 20, dated February 20, 2020, is 19 pages in length and can be found at http://www.deq.idaho.gov/media/60183974/annual-site-treatment-plan-report-fy-2019.pdf

The Idaho National Laboratory Site Treatment Plan, for FY 2020, INL-STP, Revision 40, February 2020, is 132 pages in length and can be found at http://www.deq.idaho.gov/media/60183975/site-treatment-plan-fy-2020.pdf

As of March 7, the Idaho Department of Environmental Quality has no public comment opportunity listed on its website for the INL Site Treatment Plan.

The FY 2020 INL Site Treatment plan is out-of-date and disingenuous in the statements about the High-Level Waste calcine and sodium-bearing waste. The Department of Energy has been saying for years now at the Idaho Cleanup Project Citizens Advisory Board Meetings, that despite having officially selected Hot Isostatic Pressing (HIP) as the treatment option for the calcine, that the DOE no longer knows what method it should use to treat the calcine.

The INL Site Treatment Plan states that "The current treatment plan for calcine solids is a calcine disposition facility that will include, at a minimum, retrieval from the bin sets, HIP treatment, and repackaging capabilities. The packaged calcine will be stored on-Site pending shipment."

But several presentations made by DOE about the calcine are aimed at emphasizing that (1) there is no repository, (2) the waste can just be reclassified so that it is no longer High Level Waste, and (3) the DOE doesn't want to spend the money to protect Idaho.

In a December 2009, the DOE issued a Record of Decision as part of the National Environmental Policy Act (NEPA) documentation stating that the DOE would treat SBW using steam reforming technology. The State of Idaho had required, as part of the Idaho Settlement Agreement, the selection of a treatment process for the calcine, in Idaho Settlement Agreement part E.6. The handout at the ICP CAB meeting declares that milestone to be completed as of December 23, 2009.

Specifically, the Idaho Settlement Agreement [35] states in part E.6: "Treatment of Calcined Wastes. DOE shall accelerate efforts to evaluate alternatives for the treatment of calcined waste

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

so as to put it into a form suitable for transport to a permanent repository or interim storage facility outside Idaho. To support this effort, DOE shall solicit proposals for feasibility studies by July 1, 1997. By December 31, 1999, DOE shall commence negotiating a plan and schedule with the State of Idaho for calcined waste treatment. The plan and schedule shall provide for completion of the treatment of all calcined waste located at INEL by a date established by the Record of Decision for the Environmental Impact Statement that analyzes the alternatives for treatment of such waste. Such Record of Decision shall be issued not later than December 31, 2009. It is presently contemplated by DOE that the plan and schedule shall provide for the completion of the treatment of all calcined waste located at INEL by a target date of December 31, 2035. The State expressly reserves its right to seek appropriate relief from the Court in the event that the date established in the Record of Decision for the Environmental Impact Statement that analyzes the alternatives for treatment of such waste is significantly later than DOE's target date. In support of the effort to treat such waste, DOE shall submit to the State of Idaho its application for a RCRA (or statutory equivalent) Part B permit by December 1, 2012."

While the INL STP states that the Hot Isostatic Press treatment process will be used, the Department of Energy has stated at ICP CAB meetings for several years that it has not decided on a treatment method for the calcine.

The INL Site Treatment Plan document avoids admitting that the Department of Energy has now decided that it has not decided with to do with the calcine at the INL. The Department of Energy uses a footnote in the Site Treatment Plan stating that DOE has requested an extension to the dates stated for treating the calcine. And the entire charade is fooling a lot of people. During several DOE presentations, the DOE has strongly signaled that DOE intends to reclassify the calcine and leave it in Idaho, forever.

The INL STP tries to minimize the fact that there is no disposal path for the calcine, no decision whether or not to fill canisters let alone what method to use to fill canisters and no disposal path for the calcine – except to say that that grouting would save money.

Highlights of the INL Site Treatment Plan for FY 2020 are summarized in Table 11.

The INL STP tries to minimize the fact that there is no disposal path for the sodium-bearing waste after it is turned from liquid to solid calcine. There is no plan for whether or not the dry SBW canisters, once filled, will need additional treatment. And there is no disposal path for the SBW waste.

The INL Site Treatment Plan is supposed to give the straight story on wastes that don't have a treatment plan or don't have a disposal path. This plan tries to lull the reader into assuming that plans are in place when in fact for the most important wastes at the INL, barring the spent nuclear fuel, actually have no treatment plan and no disposal path. Of course, the spent nuclear fuel at the INL doesn't have a disposal path either but isn't addressed in the INL Site Treatment Plan.

Table 11. Summary of FY 2020 INL Site Treatment Plan, Milestones/Planning Dates for High Level Mixed Wastes, SBW and Calcine.

Facility	Schedule	Disposal Path
Radioactive Liquid Sodium-bearing Waste (SBW) Treatment at the Integrated Waste Treatment Unit (IWTU)	Commence Operations and fill one canister by June 30, 2021 Fill 100 canisters by end of 2021 Treat 15 percent of the waste annually in FY 2022 and thereafter, assuming current tank volume of 853,900 gal.	The INL-STP states that the SBW is currently being assessed by DOE for proper radiological waste classification. The SBW has long been managed as High-Level Waste and the DOE has no documentation in place to reclassify it to TRU and or LLW. Despite that, the INL-STP does not admit the SBW is actually HLW, stating in Table 3-1 that the SBW is not HLW but without any supporting documentation. The INL STP tries to minimize the fact that there is no disposal path for the SBW canisters, once filled.
SBW treated by the IWTU process called "IWTU Steam Reform Product"	No schedule for 1,078 cubic meters expected from treating the SBW waste.	There is no disposal path. There is no plan for the "IWTU Steam Reform Product." The DOE has been trying unsuccessfully for years to get the Waste Isolation Pilot Plant in New Mexico to accept this waste.
Calcine Disposition Project for 1,078 cubic meters of High-Level Waste 4,386 cubic meters (Table 4-3)	On September 30, 2019, DOE requested an extension to the schedule, but Idaho DEQ did not accept any change According to the INL-STP, construction is to start by September 30, 2020 and operation is to commence by March 31, 2024, but of course, there are no actions being conducted by the DOE to actually make this happen.	There is no disposal path. First, in Table 3-1, the INL-STP states that the calcine disposition facility is "Planned, DOE approved" which is no longer true because the DOE has stated that it has not decided how to disposition the High-Level Calcine waste.

The Department of Energy is strongly signaling its intent to leave the highly soluble calcine in seismically vulnerable bin sets partially above ground, and posing a catastrophic release to the environment, both air and aquifer, even if the Department of Energy decides that the High-Level Waste can now be reclassified as ***sparkling pixy dust***.

Microreactor Disaster in the Making

The Department of Energy has issued a Notice of Intent to Prepare an Environmental Impact Statement for Construction and Demonstration of a Prototype Advanced Mobile Nuclear Microreactor. [36]

Federal officials seek public comments **on the scope** of Environmental Impact Statement:

The U.S. Department of Defense (DOD), acting through the Strategic Capabilities Office (SCO) and in close collaboration with the U.S. Department of Energy, Nuclear Regulatory Commission, U.S. Army Corps of Engineers, as well as industry partners, is exploring modern design concepts and cutting-edge technology developed by industry to meet warfighter mobile power-generation needs. DOD is considering the development of a prototype advanced mobile nuclear microreactor to support DOD domestic energy demands, DOD operational and mission energy demands, and Defense Support to Civil Authorities mission capabilities. SCO invites public comment on the **scope of the environmental impact statement (EIS)** during a 30-day comment period from March 2, 2020 to April 1, 2020. The Notice of Intent is available for viewing online at https://www.federalregister.gov/.

SCO will host a public scoping meeting to provide information about the proposed project and the National Environmental Policy Act (NEPA) process, and to invite public comments on the scope of the EIS. The public meeting will begin with a presentation on the NEPA process and the proposed project. Following the presentation, there will be a moderated session during which members of the public can provide oral comments on the scope of the EIS analysis. Commenters will be allowed **three minutes** to provide comments which will be recorded.

PUBLIC SCOPING MEETING

Wednesday, March 18, 2020
7:00 pm EST/5:00 pm MT
Shoshone-Bannock Event Center
Fort Hall Indian Reservation
777 Bannock Trail, Fort Hall, Idaho 83203

For those who cannot attend the public meeting in-person but are interested in watching the presentation, there will be two options for viewing. The first option is a live webcast of the public meeting. The second option is viewing a recording of the public meeting. The internet address for the live webcast and rebroadcast of the public meeting presentation is https://www.cto.mil/pele_eis/.

[36] You can find the Federal Register notice at https://www.federalregister.gov/documents/2020/03/02/2020-03809/notice-of-intent-to-prepare-an-environmental-impact-statement-for-construction-and-demonstration-of

Comments on the scope of the Environmental Impact Statement may be submitted by email, at the upcoming public meeting, or in written form.

Comments will be accepted via email to: PELE_NEPA@sco.mil

Mailed comments regarding the proposed plan must be postmarked by April 1, 2020, and sent to:

OSD Strategic Capabilities Office
ATTN: Prototype Microreactor EIS Comments
675 N. Randolph Street
Arlington, VA 22203-2114

Articles by Tami Thatcher for February/March 2020.