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An Update on the INL's 2011 Plutonium Inhalation Accident

As we approach the anniversary of the 2011 plutonium inhalation event at the Idaho National Laboratory, I gave public comment at the October meeting of the INL Citizens Advisory Board to update CAB members on the November 8, 2011 plutonium plate inspection accident at the INL's Materials and Fuels Complex. [1]

Meeting minutes from 2011 document how the CAB had been assured that the radiation doses from the accident were so low that no worker would be restricted from returning to radiation work. [2]

But more than one worker was restricted from radiation work for months. And bioassay at eight months still showed elevated plutonium and americium excretion. [3] Bioassay results and other details of their radiation dose estimates were withheld from workers.

Several MFC workers were affected by a subsequent americium inhalation event in 2014 involving a different process. [4]

According to The Center for Public Integrity investigation in 2017 titled "Nuclear Negligence" [5] that covered bad behavior around the Department of Energy Complex, INL's MFC managers were warned 19 times by the Safety Oversight Chairman about worker safety

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

[2] Idaho National Laboratory Citizens Advisory Board, meeting minute archive for November 2011 at http://inlcab.energy.gov/pages/meetings/archive.php

[3] Private communication with radiation worker 2012 through 2015, witness of NIOSH data capture interview regarding the ZPPR dose analysis in 2014 and access to INL's "Dose Assessments for November 8, 2011 ZPPR Event" with redactions, INL/INT-12-27269, September 2012.

[4] Department of Energy Occurrence Report NE-ID-BEA - - FMF – 2014- 0001. "MFC-704 FMF Suspect Contamination Found on CAM Filters," Sept 24, 2014. "On October 9, 2014, it was reported that low levels of transuranic contamination were detected on four separate filters, two each taken from a Continuous Air Monitor (CAM) and a Portable Low Volume Air Sampler operating in the Fuel Manufacturing Facility between August 25 through September 2. Multiple workers were found, weeks later, to have internal contamination as determined by bioassay. Battelle Energy Alliance wrote in the occurrence report that no cause analysis of the undetected elevated levels of airborne contamination was needed.

[5] Patrik Malone, Peter Cary, *The Center for Public Integrity*, "Nuclear Negligence – Part Five: The inhalation of plutonium by 16 workers is preceded and followed by other contamination incidents but the private contractor in charge suffers only a light penalty," June 28, 2017 https://apps.publicintegrity.org/nuclear-negligence/repeated-warnings/

issues concerning plutonium plate inspections but no action was taken. And Public Integrity reported that three legal settlements have resulted from the plutonium plate accident.

Radiation worker training today still implies that a 5 rem annual dose would not be harmful even though radiation worker epidemiology has indicated elevated health risks at doses ten times less than 5 rem annually. [6] [7] Radiation workers are still not warned of reproductive health risks such as sterility or increased risk of birth defects. [8] [9]

The Department of Energy contractors who can be fined for workers getting excessive radiation exposures are in charge of conducting radiation dose assessment as well as handling samples and records used to estimate the radiation dose. Most workers do not understand the wide latitude allowed in making assumptions that can bias radiation dose estimates, nor the large uncertainty in the dose estimates. [10]

Investigations conducted of historical INL operations for energy worker illness compensation during the last two years have found shattering revelations about inadequate worker protections at the INL especially regarding inhalation of alpha emitters such as plutonium and the inability to estimate what doses these workers had received. The investigations partially include the early decades of INL operation until the 1980s but have not investigated all years of operation. [11] [12] [13]

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

[7] Email communication with INL's public relations and Director Mark Peters confirmed that radiation worker training did not include training about recent epidemiology indicating higher health risk following Peter's editorial in the Post Register on January 3. 2016 that promised more transparency, "New INL director looks ahead."

[8] See the September EDI newsletter p. 2 and Kate Brown, *Plutopia – Nuclear Families, Atomic cities, and the Great Soviet and American Plutonium Disasters*, Oxford University Press, 2013. ISBN 978-0-19-985576-6. Note that many publications use spelling variation Mayak instead of Maiak.

[9] "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. BEIR VII findings are not included in Department of Energy radiation worker training, nor are the findings included in public radiation protection standards.

[10] "See the March 2017 EDI newsletter "How DOE underestimates the harm of plutonium inhalation," at http://www.environmental-defense-institute.org/publications/News.17.March.pdf and other newsletters.

[11] See the EDI September 2017 newsletter and the Advisory Board on Radiation and Worker health meetings webpage for August 2017 at https://www.cdc.gov/niosh/ocas/pubmtgs.html See the NIOSH/DCAS: Idaho Laboratory SEC Evaluation Report SEC-00238 from that page at https://www.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2017/dc-inlsec238-082317.pdf

[12] See the July 20, 2017 presentation to the NIOSH radiation board (See August 14, 2017 board meeting) describing various problems at the Idaho National Laboratory's INTEC prior to 1981 at https://www.cdc.gov/niosh/ocas/pdfs/sec/inl/inler-238-r0.pdf

[14] [15] [16] [17] [18] Yet, as these studies for the National Institute for Occupational Safety and Health have begun to allow more workers to obtain compensation, many more studies need to be completed for various INL facilities and various years of operation. Roughly two thirds of INL illness compensation claims have been denied and these workers or their eligible survivors may die before the studies are complete.

I read with interest that the Idaho Falls mayor or mayor candidates, state legislators, and congressman often claim to be well connected with regard to promoting the INL.

But unfortunately I have yet to see any of these people advocating for INL workers by learning about or attending meetings to show support for workers who have been denied energy worker illness compensation under the Energy Employee Occupational Illness Compensation Act passed in 2000. [19] [20]

Public Comment to National Institute of Occupational Safety and Health Regarding Radiation Dose Reconstruction

The following public comment by former Idaho National Laboratory worker Ralph Stanton is taken from the transcription of the August 23, 2017 teleconference meeting in Santa Fe, New Mexico of the Advisory Board on Radiation and Worker Health, 118th meeting, James M. Melius, presiding chair. [21]

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[13] INL May 2, 2016 NIOSH Radiation Advisory board recommended Special Exposure Cohort: https://www.cdc.gov/niosh/ocas/pdfs/abrwh/secrecs/bdrecinl-219.pdf

[14] ANL-West May 2, 2016 NIOSH Radiation Advisory board recommended Special Exposure Cohort: https://www.cdc.gov/niosh/ocas/pdfs/abrwh/secrecs/bdrecanlw-224.pdf

[15] See p. 19 of "INL SEC Proposed Class – Update SEC00219" at https://www.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2015/dc-inlsec219-111015.pdf

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

[17] SC&A, Inc., "Draft Review of NIOSH's Evaluation Report for Petition SEC-00219, Idaho National Laboratory: Burial Ground, 1952-1970," SCA-TR-2017-SEC007, May 2017.

[18] Department of Labor presentation August 2017 https://www.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2017/dol-update-082317.pdf p. 10-12.

[19] 42 USC 7384, The Act--Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA), as Amended and see the website for the Center for Disease Control, National Institute of Occupational Safety and Health, Division of Compensation Analysis and Support at http://www.cdc.gov/niosh/ocas/ and U.S. Department of Labor, Office of Workers' Compensation Programs, EEIOCPA Program Statistics, http://www.dol.gov/owcp/energy/regs/compliance/weeklystats.htm

[20] See the NIOSH Radiation Dose Reconstruction Program at http://www.cdc.gov/niosh/ocas. See the Idaho National Laboratory status at http://www.cdc.gov/niosh/ocas/ineel.html and see the portion of INL formerly ANL-W at http://www.cdc.gov/niosh/ocas/anlw.html

[21] NIOSH Advisory Board meetings for August 2017 at https://www.cdc.gov/niosh/ocas/pubmtgs.html#aug14 and transcripts for the August 23, 2017 meeting at https://www.cdc.gov/niosh/ocas/pdfs/abrwh/2017/tr082317.pdf starting on page 344.

CHAIR MELIUS: Okay. Can we go to the phone? Is anybody on the phone? I have a Ralph Stanton that, I think, called in, said he was going to comment from the phone.

MR. STANTON: Yes, this is Ralph Stanton.

CHAIR MELIUS: Okay.

MR. STANTON: Am I on? Okay. Thank you, Dr. Melius and Members of the Board. My name is Ralph Stanton. I worked at the Idaho National Laboratory, and I was involved in a radioactive release in November of 2011. My experience with the aftermath of this accident has direct bearing on the LANL and other SEC petitions. I've been very frustrated in gathering dose-related information through the FOIA [Freedom of Information Act] process.

I put in a request for copies of the log books that were used to document the facility surveys, as well as my own radiological surveys, and the DOE FOIA officer tells me that they're now missing. This is only six years ago, so sounds like it's not only happening at LANL, but other places, as well.

The long-time rad employee who, for a short time, had possession of one of these log books, came forward in January of 2014 and said that there was a very big difference between the survey levels that Battelle reported and the levels he saw in those log books. Battelle had a legal duty to preserve this evidence, due to the litigation over the accident, but now this very crucial dose evidence is gone, and this accident just barely happened, compared to others. I've still been able to gather a lot of evidence pertaining to my dose, and every bit of it points to falsification and manipulation of the data. Now, your dose calculations in records, they're very crucial to receiving benefits from an exposure, and it would seem to me that NIOSH would be just as concerned with the dose falsifications, especially if you can prove it, than anything because if the doses are not ethically calculated and the logs are disappearing, then sick workers have no chance of proving their sicknesses are at least 50 percent caused by working at one of these DOE facilities.

I shared some of my dose data with NIOSH experts in November of 2014. They agreed, at that time, that my dose calculations had issues, but very strangely, they didn't document their conclusions in the report they sent me.

Since then, I've acquired much more evidence that overwhelmingly points towards falsification, and I would be glad to share all of this

incriminating evidence with anybody who has any doubts. NIOSH is trying to tell you that everything was okay after January 1, 1996. In

light of the overwhelming evidence to the contrary, I'm telling you that this is done completely wrong, and you cannot assume that the contractors obeyed the law in every instance. I ask that you reject NIOSH's presumption. That's all I have.

CHAIR MELIUS: Okay, thank you.

MR. STANTON: Thank you.

I urge people to attend or listen in to NIOSH Advisory Board meetings regarding radiation illness compensation. Significant new investigations continue to indicate the need for more Special Exposure Cohorts at the Idaho National Laboratory and former Argonne National Laboratory West. Special Exposure Cohorts can provide compensation without requiring a radiation dose reconstruction, because the inadequacy of radiation dose monitoring or records is acknowledged.

Aquifer Monitoring Using Westbay Multilevel Sampling Wells Not Always Monitoring the Aquifer; PCE Contamination From Inner Tube in Wells

Unexpected PCE contamination in Westbay wells is determined to not result from aquifer contamination according to the Department of Energy. The source of the contamination has not been pinpointed but is believed to be from well construction or post-construction activities. The investigation and well monitoring results were presented at the Idaho National Laboratory's Citizens Advisory Board meeting in October. [22]

Eleven Westbay multilevel sampling wells at the Idaho National Laboratory have a unique design to allow samples to be drawn at different depths in the aquifer. This differs from typical well construction that allows the water to enter the well casing through openings in the casing at various depths and mix as water is sampled.

The Westbay wells are drilled through the aquifer rock and then the tubing is placed in the well. The tubing has valve ports at different depths that are only to be open as the sample is taken. The tubing is filled with water from a source other than the well water itself as these wells have no pump and the sample ports remain closed. The source of the Westbay well inner tube

[22] Idaho National Laboratory Citizens Advisory Board, meeting presentations for October 26, 2017 and June 22, 2017 by Nolan Jensen, Department of Energy, at http://inlcab.energy.gov

water was the "Fire Station" well north of the ATR Complex. Water quality data is not taken for the "Fire Station" well.

Along with unexpected contamination in the inner tubing of the Westbay wells, sometimes while intending to take aquifer samples through the valve port openings, water from the inner tubing was being collected in the sample bottle. The U.S. Geological Survey installed the wells and took samples. The first Westbay well was installed in 2005. Now in 2017, we know that some of the samples taken did not actually sample the aquifer. The occasional malfunction of the sample valve malfunction was not identified for years.

In a USGS report documenting multilevel well sampling from 2009 through 2013, the report did not sample for the chemical PCE. [23] However, samples were analyzed for "total organic compounds." But because the results of the sampling had "poor reproducibility" the USGS made the decision to discontinue measurements of "total organic compounds." No other chemical constituent analysis was to be conducted despite potential sources of aquifer chemical contamination. Interestingly, the USGS monitoring noted the poorest reproducibility for total organic compounds as being from the two Westbay wells found in 2016 and 2017 as having the highest PCE contamination in the inner tubing. The PCE levels inside the Westbay well tubing, isolated from the aquifer, are shown in Table 1.

See past EDI newsletters following the PCE contamination in March and July 2017 and October and November of 2016.

Mystery Alpha Contamination in USGS Aquifer Samples

A US Geological Survey report [24] published in 2017 noted an unsolved mystery of high levels of gross alpha radioactivity in field blanks of 29 pCi/L and 23 pCi/L collected in June 21, 2012 and April 17, 2013. These levels are about 10 times the expected aquifer level of less than 3 pCi/L.

The USGS report did not identify where the contaminated field blanks were taken. The USGS report took uncontaminated samples from the source and concludes that the unidentified source of water was not contaminated.

Why doesn't the USGS identify where the contaminated field blanks were taken? Why doesn't the USGS provide transparent information, especially when contaminated field blanks

[23] U.S. Geological Survey, "Chemical Constituents in Groundwater from Multiple Zones in the Eastern Snake River Plain Aquifer, Idaho National Laboratory, Idaho, 2009-13," Report 2015-5002, (DOE/ID-22232), 2015. See p. 31.

[24] U.S. Geological Survey, "An Update of Hydrologic Conditions and Distribution of Selected Constituents in Water, Eastern Snake River Plain Aquifer and Perched Groundwater Zones, Idaho National Laboratory, Idaho, Emphasis 2012-15," Report 2017-5021, (DOE/ID-22242), 2017. See p. 31 for gross alpha detected in "field blanks."

Table 1. PCE Contamination in Westbay well inner tubing.

Westbay Well	Year Installed	PCE Concentration (ug/L)	Sample Date
MIDDLE-2050A Located east of INTEC	2005	999 953 756 829	2017 2017- 2017 2016
MIDDLE-2051 Located southeast of MIDDLE-2050A, and north of RWMC	2005	394 471 642 662	2017 2017 2017 2016
USGS-137A Located south of RWMC at the Spreading area near the south INL border	2012	17.9 23 15.6 0.2	2017 2017 2017 2016
USGS-132 Located south of RWMC	2006	0.99 1.02 1 0.52	2017 2017 2017 2016

Notes:

1. The federal drinking water standard for PCE is 5 micrograms/liter or 5 ug/L.
2. PCE is also known as “Perc” or tetrachloroethylene.
3. Other Westbay wells having 2.13 ug/L or less PCE contamination were USGS-103, USGS-105, USGS-108, USGS-131A, USGS-133, USGS-134, and USGS-135.
4. The sample results are from the June and October 2017 INL Citizens Advisory Board presentations.

are used to compare to other aquifer samples. The statistical comparison of a contaminated field blank would result in an artificially low radioactivity result for the aquifer sample it is compared to, as counting of decays is conducted.

If the USGS is interested in providing meaningful aquifer sampling, it must start being more transparent especially about irregularities. The USGS has a long standing practice of downplaying or completely dismissing radioactive contamination in the groundwater, either the aquifer or perched water, because the sample results were not consistently reproduced, not just for the total organic compound samples it dismissed that is described above.

With the irregularly timed waste water disposal intervals, why would the USGS expect contamination levels to be consistently repeatable? And as the USGS pointed out at the October INL Citizens Advisory board meeting, in years of high water runoff that raise well water elevations, the samples taken from the typical well casing, especially for perched water, sample concentrations are diluted relative to samples taken when the well water elevations are low. [25] Also, when the Westbay wells are actually monitoring the aquifer, contamination stratification should be expected, yet typical well samples mix to a random degree the various stratified levels of contamination as the samples are taken.

Frankly, the USGS too often dismisses aquifer contamination that it finds and fails to take repeat samples which can result in "no discernible trend" by design. See EDI reports on the aquifer including "Tritium at 800 pCi/L in the Snake River Plain Aquifer in the Magic Valley at Kimama: Why This Matters." [26]

DOE Has Concerns Over On-Going Safety Incidents in All of Fluor Idaho's Operations

A Department of Energy presentation at the October Idaho National Laboratory's Citizens Advisory Board meeting gave a "red" dashboard indicator for cleanup contractor Fluor Idaho stating that the poor rating was due to "concerns over on-going safety incidents in all of Fluor Idaho's operations." But even when questioned, DOE didn't elaborate on the specifics.

So I was curious and set about looking up DOE Occurrence Reports that are publically available. Since Fluor Idaho took over the contract in 2016, a few incidents do stand out. The "Excavator Slides into an Exhumation Pit From Soil Sloughing" [27] created a photo opportunity that would not have made the Department of Energy proud. More precautions could have and

[25] Idaho National Laboratory Citizens Advisory Board, meeting presentations for October 26, 2017 by Roy Bartholomay, USGS, at http://inlcab.energy.gov

[26] Tami Thatcher, Environmental Defense Institute Special Report, "Tritium at 800 pCi/L in the Snake River Plain Aquifer in the Magic Valley at Kimama: Why this Matters," 2017. www.environmental-defense-institute.org/kimamareport.pdf

[27] EM-ID- - FID-RWMC-2017-0001, "Excavator Slides into an Exhumation Pit From Soil Sloughing."

should have been taken but probably the excavator work had been conducted in the same manner before Fluor took over the contract. The event apparently did not harm any workers and didn't actually pose a risk to the public.

In a less known incident, a spent fuel handling unit became ungrappled during movement in the underwater spent fuel pool at INTEC. [28] This event seemed to have more potential for harming workers because if fuel is dropped, fission products can bubble up to the air workers are breathing. Some load drops can damage the pool liner or if heavy enough, the pool structure. And the damaged fuel may create other difficulties in handling, storage and disposal.

The third event I note here involves the "Incorrect O-ring Installed On TRUPACT-II Unit 174 Inner Containment Vessel Vent Port." [29] TRUPACTs are used to transport transuranic waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico. The consequences of using the wrong O-ring would seem to involve a greater potential for a release of radiological material to the public during shipment.

Overly eager installation of the CPP-603 Tandem Crane resulted in bypassing work control reviews and "could have inadvertently challenged the Documented Safety Analysis for the facility." [30]

A significant worker radiological contamination event on skin or clothing under the protective clothing yielded over 21,000 disintegrations per minute (dpm) alpha on a boot, 3000 dpm alpha on modesty clothing, and over 400 dpm alpha on skin. The typical use of Endura over a Tyvek suit was not used. Industrial Safety specified the use of two fire retardant Endura suits. Unfortunately, the Endura layers allowed more spread of radioactive contamination through the layers of protection clothing. [31]

Several Occurrence Reports resulted from problems with equipment or safety documentation for the Integrated Waste Treatment Unit including deteriorated isolation damper seals, [32] use of temperature averaging versus individual temperature measurements for a mode change checklist was questioned, [33] inadequate safety analysis of a potential waste tank breach underestimated the potential release, [34] and inadequate safety analysis of radiological and hazardous material release consequences of events involving process vessels which can introduce up to 13 molar nitric acid concentrations. [35]

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[28] EM-ID- - FIS-FUELRCSTR-2016-0001, "Fuel Handling Unit (HU) Un-grappled During Handling & Inspection."
[29] EM-ID- - FID-AMWTF-2017-0003, "Incorrect O-Ring Installed On TRUPACT-II Unit 174 Inner Containment Vessel Vent Port Cover."
[30] EM-ID- - FID-FUELRCSTR-2017-0001, "Potential Inadequacy of the Documented Safety Analysis – CPP-603 Tandem Crane Installation."
[31] EM-ID- - FID-RWMC-2016-0001, "Clothing Contamination Following Weld Repair Evolution."
[32] EM-ID- - FID-IWTU-2016-0003, "IWTU Failure of Process HEPA Filter Bank Inlet Damper Seals."
[33] EM-ID- - FID-IWTU-2017-0001, "IWTU Negative USQ – Potential Inadequacy With Mode Change Checklist."
[34] EM-ID- - FID-IWTU-2017-0002, "IWTU Positive USQ – Analysis of Waste Feed Tank Breach Event."
[35] EM-ID- - FID-IWTU-2017-0004, "IWTU Positive USQ – Events Involving Decontamination system not Analyzed In Safety Basis."

Discoveries of problems with the IWTU may actually be a sign of good performance by Fluor. It is worth remembering an IWTU occurrence report from the previous cleanup contractor in early 2016 that involved heat exchanger tube weld quality and end cap alignment problems when heat exchanger shell inspections were conducted. [36] The problems with the high temperature and complex IWTU stem from being poorly designed and inadequately tested, initially, in small scale testing. Fluor has been conducting additional small scale testing. But design and fabrication problems have long been indicated not only by the 2016 occurrence report for the heat exchanger but also many other equipment problems that have been discovered following brief trial runs with a non-radioactive "simulant" material.

Changes to CERCLA Cleanup Depths and Years Requiring Institutional Controls To Restrict Access

It is worth remembering that what the public was told about how clean the CERLCA cleanup would make the Idaho National Laboratory by 2095 has been hugely degraded. The Department of Energy implied that the ATR Complex, formerly the Test Reactor Area, would allow unrestricted access by 2095. Residential cleanup standards of 10 ft were to be met.

When the DOE determined that it would rather use a 4 ft cleanup up depth, it asked the Citizens Advisory Board to concur with the change from 10 ft to 4 ft cleanup depth. I heard the CAB ask DOE questions about the contamination at the ATR Complex and the fact that the CAB had received no information from the DOE. In the end, the CAB did not reach a consensus and did not concur with the DOE's change. [37]

The CAB communicated to DOE formally that some members of the CAB viewed it as "an inappropriate attempt to roll back clean-up standards that were negotiated in good faith with the State, the Environmental Protection Agency, and the public, including the CAB at that time."

On many occasions, presenters to the CAB have focused exclusive attention to radionuclide contaminants with moderate half lives, such as cesium-137, strontium-90, and tritium. These radionuclides will decay away within 300 years. But oddly left out of the presentations have been the very long-lived radionuclides such as uranium, plutonium, and americium.

[36] EM-ID- - CWI-IWTU-2016-0002, "IWTU Defective Superheater Shell."
[37] Idaho National Laboratory Citizens Advisory Board, communications dated May 6, 2015 from the CAB to the Department of Energy. http://inlcab.energy.gov

In fact, long-lived radionuclides are present not only at INL's INTEC facility where naval and research spent nuclear fuel was reprocessed, long-lived radionuclides including americium-241 are present at the ATR Complex. [38] [39]

Because of the habitual omission of long-lived radionuclides, even the Department of Energy had not properly determined the number of years that institutional controls limiting access to contaminated areas would be required. The 2095 date was incorrect, then in 2010, 300 years was added to create the later 2310 date, which was also incorrect. Then NSI-26002 stated an additional 24,100 years needed to be used. But the number of years that needed to be added was actually far larger because more than one half life of americium-241 decay was needed and they forgot that americium-241 must decay through several radioactive decay progeny before reaching a stable non-radioactive isotope. [40]

Add to this now the flushing of highly radioactive resin beads to the open air evaporation pond at the ATR Complex, and covering up contaminated soil with 1 ft of soil without any transparency or accountability to Idaho citizens what-so-ever. [41]

Challenges Remain For the Idaho Settlement Agreement

A presentation at the October INL Citizens Advisory Board meeting showed the milestones completed since 1994. [42] The Department of Energy and its cleanup contractor like to provide milestone completion statistics that ignore the milestone dates that have not yet elapsed. So, they emphasize that they have completed 95.7 percent of the milestones that have elapsed so far.

Of 45 completed milestones since 1994, by October 2017 only 2 had been missed. But while the milestones develop a logical progression of activities, some tasks have multiple milestones while other very important tasks have few milestones.

If the statistic were to include only the milestones since 2012, at the end of 2017 there would be 3 missed milestones out of 8. Then DOE would have to say it had met 62.5 percent of the

[38] Federal Facility Agreement and Consent Order New Site Identification (NSI), "TRA-04: TRA-712 Warm Waste Retention Basin System (TRA-712 and TRA-612). NSI-26002, signed August 2015. See the CERCLA Administrative Record at ar.icp.doe.gov

[39] Federal Facility Agreement and Consent Order New Site Identification (NSI), "TRA Courtyard Area," NSI-26011, signed April 2014. See the CERCLA Administrative Record at ar.icp.doe.gov. Table 9 includes extensive americium-241 contamination in soil along with europium-152, cesium-137, and cobalt-60.

[40] Federal Facility Agreement and Consent Order New Site Identification (NSI), "TRA-04: TRA-712 Warm Waste Retention Basin System (TRA-712 and TRA-612). NSI-26002,, signed August 2015. See the CERCLA Administrative Record at ar.icp.doe.gov See page 7 of Rev. 1. showing americium-241 contamination at 3210 pCi/g yet the unrestricted use concentration is 187 pCi/g.

[41] See EDI newsletters on ATR Evaporation Pond release in August and September 2017 at www.environmental-defense-institute.org

[42] Idaho National Laboratory Citizens Advisory Board, presentation "Status of Idaho Settlement Agreement," October 26, 2017, to CAB by the Department of Energy. http://inlcab.energy.gov

Idaho Settlement Agreement milestones since 2012 which doesn't look nearly as good as 95.7 percent since 1994 to mid October 2017.

Some milestones are considerably more important than others. "Remove all DOE-owned and naval spent fuel from Idaho" is significantly more important than the milestone to "Commence negotiations to schedule spent fuel transfers out of wet storage." The point is that simplistic statistics based on completed milestones since 1994 tends to provide an overly rosy perspective of the Department of Energy's progress overall that doesn't actually provide an informative status to a concerned citizen.

Citizens should be shown how much buried waste is remaining buried, not just the fraction of targeted waste retrieved. Citizens should be shown how much radioactive waste is being buried, still and will continue to be buried over the aquifer.

Citizens should be shown how much spent fuel and high-level waste remains in the state in terms of the number of Snake River Plain Aquifers it would require to dilute the radionuclides to drinking water standards if it were dissolved in the aquifer, as a way of comprehending the enormous toxicity of the waste.

Citizens would be told of the amount of continuing emission of radionuclides and chemical wastes to the Idaho skies. They would be told how much of the radionuclide emissions are estimated rather than known. And they would be told of the ways that the monitoring data that is provided for public consumption in ways designed to prevent people from identifying the source of the radionuclide emissions as being the INL.

Citizens should also be warned about milestones that DOE is charting a course to miss. This would include DOE's delaying the treatment of EBR-II fuels via pyroprocessing. [43] It might include a discussion about how the delays at IWTU could delay treatment of the calcine. And a discussion about when a spent fuel repackaging facility is going to be built.

Despite meeting Settlement Agreement milestones that in 2009 selected how to treat calcine, in 2000 committed to treat EBR-II sodium-bonded spent fuel, and had determined how to package spent fuel for shipment and disposal, DOE seems to be hinting at missing future milestones because "the unavailability of a repository makes it difficult to plan for treatment." While it is a true statement, it is startling true now that the DOE has no credible plan or program to obtain a repository.

DOE issued and continued to issue Environmental Impact Statements based on the eventual existence of the Yucca Mountain repository for spent nuclear fuel and high level waste like the calcine.

If after claiming it could assume the waste would be accepted for disposal, now the Department of Energy seems to claim it can't choose the treatment plans for getting the INL's

[43] Beatrice Brailsford, Snake River Alliance, "DOE Must Keep Its Word," August 16, 2017. http://snakeriveralliance.org/doe-must-keep-its-word/

high-level calcine waste and spent nuclear fuel out of the state— so DOE ought to admit that it's NEPA analyses are inadequate. Before now, DOE could pretend that if they just got rid of Nevada's Harry Reid, they could grease the road to the Yucca Mountain repository. Before now—just a year ago—DOE claimed to have a plan for siting interim and permanent disposal of spent fuel and high level waste. But now, in 2017, DOE cannot make those claims. I think it is significant new information that requires reanalysis of various Environmental Impact Statements that affect the Idaho National Laboratory.

The DOE seems to be setting the stage for missing the 2035 milestones that are fundamental to the Idaho Settlement Agreement. And people who want to renegotiate the Idaho Settlement Agreement without any pretense of a suitable environmental impact statement for leaving the waste in Idaho need to grasp the magnitude of the environmental devastation they are placing on future generations.

The Idaho Settlement Agreement milestones as delineated in the DOE presentation are provided in Table 2. Missed milestones for transuranic waste, including the "Agreement to Implement" are due to the temporary closure of WIPP. The expectation is that these milestone dates will slip only a few years. The missed sodium-bearing high-level liquid waste treatment milestone has been missed since 2012 and continuing problems with the IWTU could result in substantial delays or, I speculate, that a many year delay for a complete redesign is not out of the question.

The table of Idaho Settlement Agreement milestones is only part of the complete picture. [44] In addition to the Idaho Settlement Agreement milestones are numerous other expensive and difficult challenges including RCRA closures of high level waste tanks and calcine bin sets once emptied, RCRA closure of MFC's Radioactive Scrap and Waste Facility, completion of CERCLA cleanup including installation of the soil cap over the Radioactive Waste Management Complex including the 25 ft tower of stacked barrels and boxes referred to as "Pad A," shipping of mixed low-level radioactive waste from MFC, disposal of greater-than-class-C "like" waste including ATR beryllium, disposal of high level waste from MFC electrorefining, disposal of various remote-handled and contact-handled transuranic radioactive waste at MFC, disposal of depleted uranium ingots at MFC, excess ZPPR plutonium fuel, and miscellaneous special nuclear materials at MFC. And likely there is also the disposal of the highly enriched uranium resulting from research and naval spent fuel at INTEC, which is probably considered to be HEU that is not feasible to utilize in commercial reactor fuel or naval fuel because of impurities resulting from reprocessing. All this is to be followed by CERCLA cleanup Long Term Stewardship — forever— to prevent people from being exposed to the buried waste and aquifer contamination that it not being cleaned up. [45] [46] [47] [48] Advertised cleanup standards are rarely met because it is too expensive or just not possible to cleanup the chemical and radionuclide contamination.

[44] See more this newsletter and our July 2017 EDI newsletter for more information about the status of INL cleanup at http://www.environmental-defense-institute.org/publications/News.17.July.pdf

[45] See Idaho Department of Environmental Quality HLW consent decree.

Table 2. Settlement Agreement Milestones from INL CAB October 26, 2017 meeting, arranged by category and in order of descending milestone dates.

Milestone Date	Milestone Description	Milestone met?
DOE Spent Fuel		
01/01/2035	Remove all DOE-owned and naval spent fuel from Idaho (ISA C.1) (Note that there were later negotiated allowances for keeping a specific amount of naval SNF.)	**No**
12/31/2023	Complete transfer of all spent fuel from wet storage (ISA E.8)	**No**
07/01/2003	Begin loading spent fuel into dry storage (ISA F.2)	Yes
06/01/2001	Complete moving Three Mile Island fuel into dry storage (ISA E.7)	Yes
12/31/2000	Empty CPP-603 south basin (ISA K.3.4)	Yes
12/31/1999	Commence negotiations to schedule spent fuel transfers out of wet storage (ISA E.8)	Yes
03/31/1999	Begin moving Three Mile Island spent fuel into dry storage (ISA E.7)	Yes
12/31/1998	Complete construction of Three Mile Island dry storage facility (ISA E.7)	Yes
12/31/1998	Receive no more than 40 Foreign Research Reactor fuel shipments (ISA D.2.a)	Yes
12/31/1997	Receive no more than 20 Foreign Research Reactor fuel shipments (ISA D.2.a)	Yes
12/31/1996	Receive no more than 10 Foreign Research Reactor fuel shipments (ISA D.2.a)	Yes
12/31/1996	Move 244 units of spent fuel from CPP-603 to CPP-666 (ISA K.3.4.a)	Yes
12/31/1995	Move additional 189 units of spent fuel from CPP-603 to CPP-666 (ISA K.3.4.12)	Yes
12/31/1995	Begin removal of 718 units of fuel from south basin of CPP-603 (ISA K.3.4.c)	Yes
11/15/1995	Designate INL as lead lab for DOE Spent Fuel (ISA F.1)	Yes, but INL was later defunded in this area.
12/31/1994	Inspect CPP-603 spent fuel and place in compliant storage (ISA K.3.4.c)	Yes
09/30/1994	Move 189 units of spent fuel from CPP-603 to CPP-666 (ISA K.3.4.a.1)	Yes
09/01/1994	Issue schedule for removing spent fuel from CPP-603 (ISA K.3.4.d)	Yes
Naval Spent Fuel [see also "Addendum to 1995 Settlement Agreement]		
2001 to 2035	Ship average of no more than 20 Naval shipments/year (ISA D.1.b)	DOE counts this as Yes

[46] Here is one example of the "Site Treatment Plan" at https://www.deq.idaho.gov/media/60179380/inl-annual-site-treatment-plan-report-1116.pdf These plans involve the Idaho Department of Environmental Quality and appear to provide a status but do not impose time limits on INL waste storage. The State of New Mexico, however, does impose time limits on above ground outdoor storage of RCRA transuranic waste.

[47] See Fluor Idaho cleanup project and Battelle Energy Alliance INL regarding environmental liabilities.

[48] INL Waste Area Group Institutional Controls Report. Dated February 16, 2016. https://cleanup.icp.doe.gov/ics/ic_report.pdf from the EPA page: https://cleanup.icp.doe.gov/ics/

04/30/1999	Issue DOE and Naval RODS [Record of Decisions on the NEPA analysis] preparing spent fuel for shipment using canisters (ISA F.4)	Yes
12/31/1997 1997 to 2000	Receive no more than 20 naval shipments/yr (ISA D.1.b)	Yes
1996	Receive no more than 36 naval shipments in 1996 (ISA D.1.b)	Yes
1995	Receive no more than 24 naval shipments in 1995 (ISA D.1.b)	Yes
High Level Waste		
12/31/2035	Complete treatment of all HLW at INL to be moved out of Idaho for disposal (ISA C.3)	**No**
12/31/2012	Complete treatment of sodium bearing high level liquid waste (ISA E.5)	**No – MISSED**
12/01/2012	Submit RCRA Part B permit application [for calcine] (ISA E.6)	Yes
12/31/2009	Submit ROD for EIS to treat calcined waste (ISA E.6)	Yes
06/01/2001	Begin calcining sodium bearing high level waste by June 2001 (ISA E.6)	Yes
12/31/1999	Negotiate plan and schedule for calcine waste treatment (ISA E.6)	Yes
06/30/1998	Complete calcining all remaining non-sodium liquid HLW (ISA E.4)	Yes
12/31/1997	Reduce tank farm liquid waste volume by 330,000 gallons (ISA E.3)	Yes
07/01/1997	Solicit proposals for feasibility studies to treat calcined waste (ISA E.6)	Yes
10/31/1996	Begin operation of high level waste evaporator (ISA E.3)	Yes
Transuranic Waste		
12/31/2018	Ship 65,000 cubic meters of TRU waste out of Idaho (ISA B.1)	**No**
2003 to 2018 (Counted as 16 milestones)	Ship a running average of no less than m3/yr of TRU waste out of Idaho annually (ISA B.1.c)	**Not since 2016.**
03/31/2003	Begin operating AMWTP (ISA E.2)	Yes
12/31/2002	Permit and construct AMWTP (ISA E.2)	Yes
12/31/2002	Ship at least 3,100 cubic meters of transuranic waste out of Idaho (ISA B.1.b)	Yes
04/30/1999	First shipment of transuranic waste out of Idaho (ISA B.1.a)	Yes
06/01/1997	Award contract for the Advanced Mixed Waste Treatment Project (ISA E.2)	Yes
Agreement to Implement [2008]		
12/31/2023	Exhume and ship not less than7,485 cubic meters of buried waste (exhume at least 5.69 acres) AI V.A.1	**No**
2018 through 2023 (Counted as 6 milestones)	Ship from Idaho TRU retrieved from SDA (subsurface disposal area) AI VIII	**No**

Idaho Settlement Agreement and INL Cleanup Depend on a Non-existent Repository for Spent Nuclear Fuel and High-Level Waste; Environmental Impact Statements Invalid

The Department of Energy is required to use the National Environmental Policy Act (NEPA) process and develop Environmental Impact Statements (EIS) relevant to the INL management of spent nuclear fuel and high-level waste.

When an alternative analyzed in an EIS is chosen, a Record of Decision (ROD) is announced in the Federal Register. Amended RODs are not unusual and may create more specific information about a path being taken or may change the previous ROD.

A supplemental analysis document can be developed to supplement information not specifically contained in the existing EIS. For example, when the Idaho National Laboratory wanted to bring two shipments of commercial spent nuclear fuel to INL for research, a draft supplemental analysis was developed by the DOE. That supplemental analysis relied on the existence of a spent nuclear fuel repository. Specifically, that supplemental analysis cited the Yucca Mountain repository and cited its EIS. [49] [50]

After decades of failed efforts to obtain a repository for spent nuclear fuel and high-level waste, the Department of Energy cannot even claim to have a plan or a program to obtain a repository. The DOE disposed of all the documents and public comment pertaining to last year's "consent-based siting" effort. The political realities are as insurmountable as the scientific difficulties to attempt to predict the concentrations of contaminants that migrate from a repository over thousands of years.

A table of National Environmental Policy Act NEPA Environmental Impact Statements relevant to the INL that may be affected by the unavailability of a spent fuel and high level waste repository is provided in Table 3.

[49] See EDI comments to the Department of Energy on the U.S. Department of Energy Draft Supplement Analysis on Two Proposed Shipments of Commercial Nuclear Fuel to Idaho National Laboratory for Research and Development Purposes 2015 (DOE/EIS-0203-SA-07), July 2015 at our website.

[50] See the Yucca Mountain Environmental Impact Statement including DOE/EIS-0250F and supplement analysis DOE/EIS-0250F-S1.

Table 3. List of several key Environmental Impact Statements affecting the INL that depend on DOE obtaining a repository for spent fuel and high level waste.

Identifier	Title	Dates
DOE/EIS-0203-F	Programmatic Spent Nuclear Fuel and INEL Environmental Restoration Waste Management Program, known as the "1995 EIS." Requires a Supplement analysis to document review every 5 years. (?)	EIS 1995. Supplemental analysis DOE/EIS-0203-SA-01 issued in 2002. DOE/EIS-0203-SA-02 issued in 2005. Amended Record of Decision (ROD) in 1996.
DOE/EIS-0200-F	Waste Management Programmatic EIS	EIS 1997. Supplemental analysis DOE/EIS-0200-SA-02 in 2005 DOE/EIS-0200-SA-03, ROD in 2008 for Treatment of Transuranic Waste at the INL imported to INL. Amended ROD in 2008.
DOE-EIS-0218	Foreign Research Reactor EIS	EIS 1996 Supplemental analysis EIS-0218F-SA-05: Transfer and Return of Low-enriched Uranium Fuel Elements from INL to the Research Reactor in Vienna. ROD 2004. See also EIS-0203-SA-05
DOE/EIS-0306	Treatment and Management of Sodium-Bonded Spent Nuclear Fuel	EIS 2000 Record of Decision (ROD) 2000, ~25 MTHM EBR-II spent fuel to be treated with electrometallurgical treatment (also called pyroprocessing). No decision on 34 MTHM Fermi-1 blanket fuel. (Preceded by DOE/EA-1148, 1996, Electrometallurgical Treatment Research)
EA-1954	Resumption of Transient Testing of Nuclear Fuels and Materials	EA 2014
DOE/EIS-0251	Dry Storage Container System for Management of Naval SNF	EIS 1996 RODs 1997 (January and May)
DOE/EIS-0251-SA-01	Multi-Purpose Canister or comparable System for INEL SNF	EIS-0251-SA-01, 1999 ROD 1999
DOE/EIS-0287	Idaho High-Level Waste and Facilities	EIS 2002.

	Disposition Final EIS	Amended ROD 2005 for tank grout. Amended ROD 2010 to choose Hot Isostatic Press to treat calcine
EA-1793	Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site	EA 2011. This allows continued burial of long-lived radioactive waste to continue at the INL after closure of the RWMC burial grounds, which has continued to bury waste through 2017.
DOE/EIS-0026 DOE/EIS-0026-S-2	Waste Isolation Pilot Plant (WIPP) Disposal Phase Final Supplemental (SEIS)	EIS 1980. Supplement analysis SEIS-I, 1990 DOE/EIS-0026-S-2 (SEIS-II) 1997
DOE/EIS-0250F-S1	Final Supplement EIS for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada	Final Supplemental analysis 2008
DOE/EIS-0426	"NNSS SWEIS" Department of Energy/National Nuclear Security Administration (NNSA) Nevada National Security Site (NNSS) and Offsite Locations in the State of Nevada	EIS 2013
DOE/EIS-0283-S2	Surplus Plutonium Disposition	ROD 2016
DOE/EIS-0240	Disposition of Surplus Highly Enriched Uranium	ROD 2011
DOE/EIS-0229	Storage and Disposal of Weapons Usable Fissile Materials	ROD 2007
DOE/EIS-0229-SA-4	Storage of Surplus Plutonium Material at the Savannah River Site	ROD 2007
DOE/EIS-0310	Expanded Civilian Energy Research	EIS 2000
DOE/EIS-0279	Savannah River Site Spent Nuclear Fuel Management Final EIS	EIS 2000 Amended ROD 2013 Aluminum-clad fuel including Advanced Test Reactor fuel is shipped to the SRS

Note: Apologies for this no doubt incomplete list and any incorrect or incomplete information as the issuing, re-issuing, and supplementing of EISs evolves over time and is difficult to track. Links to Environmental Impact Statements at http://www.id.doe.gov/insideNEID/PublicInvolvement.htm and https://www.energy.gov/nepa/office-nepa-policy-and-compliance

Open Letter to Idaho Department of Environmental Quality

Email to the Idaho Department of Environmental Quality, October 6, 2017:

To John.Tippets@deq.idaho.gov

I appreciated getting to talk to you at the Wednesday LINE meeting and that you were aware of the recent public comment submittal I had made to the Idaho Department of Environmental Quality (DEQ) on a new above ground outdoor radioactive waste storage facility at the Materials and Fuels Complex (link to the comments are at http://www.environmental-defense-institute.org/publications/EDIRCRAcomments2017.pdf

I am providing information in this rather long email about the unintended flushing of highly radioactive resin beads at the ATR Complex Evaporation pond at the Idaho National Laboratory. The "evap pond" is a radioactive waste water pond that receives tritium and other radionuclides from the Advanced Test Reactor, from its experiments, and from elsewhere at the INL.

I have spoken to several folks at the Idaho Department of Environmental Quality who were courteous but basically I was telling them what happened, not the other way around, which is odd with all the meetings and coordination between IDEQ and the Department of Energy. I seemed to be the one informing IDEQ of the release, many months after it was reported. And importantly, DEQ was not involved with the actions taken.

One of the actions was to cover the contaminated soil with 1 ft (30 cm) of soil. This is odd because CERCLA cleanup depths are at least three feet. This contamination was covered over without, as far as I have been able to find, evaluation of the time is will take to decay to low enough levels to be beneath CERCLA cleanup levels. To evaluate how long it would take for the radionuclides to decay to cleanup levels would have required determining which radionuclides (plutonium, americium, strontium, cesium, etc) were present and in what amounts (in curies or grams).

As I have sought information as to the magnitude of the release (radionuclides and their curie amounts), the size of area affected, and how long the release went on undetected, my concern has continued to grow.

The Department of Energy Occurrence Report about the release to the evap pond is sketchy and it is basically the only documentation about the event I have been able to obtain. Battelle Energy Alliance refused to answer any questions: first by listening to my questions and saying they'd get back to me. Then by asking me to put my questions in writing, so I did. Then, a week after my initial call, they responded that they would not being answering any of my questions about the environmental release to the evap pond at the facility they operate for the DOE.

The DEQ has an air permit for the ATR Complex (formerly the Test Reactor Area) Evaporation pond. I was told by DEQ that the documentation regarding the evap pond air permit had been "archived" as in forget even trying to get it.

Along with having the evap pond air permit, DEQ conducts environmental monitoring at the INL and is part of the three parties (DOE, EPA and DEQ) involved with CERCLA cleanup. I had certainly expected DEQ to be more interested in understanding the release of radioactive material to the evap pond "that it had not been designed to receive" and the wind blow release from the pond the surrounding soil.

It is important to understand that radioactive contamination outside the fence at the ATR Complex and outside the boundaries of the Evaporation pond for warm waste water was covered over with soil rather than being removed to a radioactive disposal facility as would typically be conducted periodically for the evap pond which actually has two separate ponds so that one can be cleaned while the other is in service. There should be data about the radioactive debris collected on the Evaporation pond liner. But the air permit allows BEA to destroy this data every two years, and guess what, about two years has elapsed since the unintended release to the evap pond was discovered.

After my review of the history of radioactive waste water to the evap pond, including a pipe leak in the pipe to the evap pond, as well as my personal experience hearing about the frequent radiation alarms of the gamma alarm on the pipe line to the pond, it appears to me that the release of radioactive resin beads from warm waste cleanup systems has been a long standing problem that would have resulted in their release (due to filter breakage) perhaps for many years.

The one foot (30 cm) cover of the contamination with soil peaked my interest because the INL Citizens Advisory board (CAB) spent months deliberating whether to bless the change DOE made from original cleanup publications to clean up to a shallower industrial cleanup depth at the ATR Complex (of something like 3 ft) versus the residential cleanup depth (of something like 10 ft). The INL CAB never came to a decision to bless the shallower cleanup depth although some folks agreed with it. Importantly, it stood out to me that the INL CAB was not able to get any of their questions answered about contamination in the soil at the ATR Complex – DOE refused to provide any information about in soil contamination at the ATR Complex despite the information available in the public domain.

I knew about the tritium in the perched water and aquifer from historical operations at the ATR Complex underneath the ATR Complex from US Geological Survey reports. But now I know more about the radioactive contamination at the ATR Complex. From studying CERCLA cleanup reports I learned of the cobalt-60, and other radionuclides including americium-241. But I had thought that this was only from historical operations. I had not known that the releases of long-lived transuranics was still going on at the ATR Complex, intended and unintended.

THE DOE OCCURRENCE REPORT

A Department of Energy Occurrence Report (OR) was identified last year, in May of 2016. The OR number is NE-ID-BEA-ATR-2016-0014 "Contaminated Soil Outside Warm Waste Evaporation Pond at the ATR Complex." The OR, attached, describes soil contamination being found during non-routine monitoring that was conducted for evaporation pond liner replacement at the ATR Complex at the Idaho National Laboratory.

The soil contamination was very high at 250,000 disintegrations per minute (per square cm). The corrective actions for the event included covering contaminated soil with 30 cm (1 ft) of clean fill, installing snow and silt fences to "mitigate contamination migration" and removing contaminated resin from the East evaporation pond, and other actions. But the brief information in the OR raises many questions regarding the total contamination released, the area of contamination spread and why the contamination that spread beyond the pond was not disposed of but left in place.

No state environmental quality or state CERCLA personnel, as confirmed by IDEQ, were involved with the event and mitigations. The mitigations are hinted to in the corrective actions portion of the Occurrence Report.

THE EVAPORATION POND AIR PERMIT

The conditions of the state's air permit were apparently exceeded but it seems that no action has been taken by the state a year and a half after the event. The radioactivity of the resins and of radionuclides that are allowed to bypass the radioactive waste water treatment systems may contain long-lived radionuclides including americium-241 and plutonium that have made disposal options for the resins limited to Department of Energy disposal facilities. What was flushed to the evap pond may be called "low level" radioactive waste, but the resins are not allowed to be disposed of in a commercial low level radioactive waste disposal facility such as the one in Clive, Utah.

Despite the reported contamination levels in pond water being cited as within bounds of the air permit, the required gamma monitor on the pipe to the pond didn't prevent the release of resin beads and the required radiation monitoring did not identify the release of the resin beads. And there may other sources of excessive radionuclide disposal to the evaporation pond as it also allows trucked in liquid waste disposal.

It should be noted that the air permit as described in Environmental Monitoring documentation for INL (DOE/ID-11485, 2014) allows waste water from other INL facilities and allows the bypassing of waste water treatment systems. For this reason, the typical waste water from reactor operations of the Advanced Test Reactor do not provide indication of the waste waters released to the evaporation pond. Transuranic separations processes are apparently continuing at the ATR Complex, making the secrecy issue one that may be having a large role in the difficulty in obtaining information about the environmental release.

WHY ISN'T A CERCLA "NEW SITE INFORMATION" REPORT BEING GENERATED?

I have been very surprised that no "New Site Information" report was being conducted. How is the location of the contamination that the contractor placed 30 cm of clean fill over going to be known as there would be no clue that future investigation or D&D was needed for the contaminated soil? How is it known to be acceptable if the radionuclide concentrations and estimated total are not known?

It is also important to understand the history of millions of dollars being spent to "remediate" the soil contamination of the past percolation warm waste water ponds at the ATR Complex, formerly the Test Reactor Area.

The IDEQ CERCLA person, Darryl Koch, stated to me that DOE had not contacted him to say that a "massive release" had taken place, therefore he was not preparing a New Site Information report nor was he taking any steps to learn anything more about the resin release.

The Department of Energy has apparently claimed that this was "an in facility event." The release is on the Idaho National Laboratory site but is located outside any boundary that would be considered for future D&D. A "facility" would go through a decommissioning and disposal process when it ceases to operate. But how would this contamination outside of the fence at the ATR Complex and outside the evaporation pond boundaries be slated for evaluation or D&D?

RADIONUCLIDES IN USED RESIN BEADS

The radionuclides in the resin beads flushed to the open-air evaporation pond can be long-lived and highly concentrated. I suspect that the resin bead escape to the evaporation pond has been happening for years.

Important insights can be gained from a 2005 document for a warm waste water line break in the line going to the evaporation pond. This line break, unidentified for years, was the source of continued water standing, mysteriously, in the retention basin that had been taken out of service when the new evaporation pond was put in service. In the rare occasion that the gravel area around the retention basin was survived, it was roped off for alpha contamination. This only occurred because of the frequent mention of the mystery water in the retention basin as no routine alpha monitoring appeared to be conducted.

DOE/NE-ID-11139, "Track 1 Decision Documentation Package for TRA-605 Warm Waste Line," January 2005. http://ar.inel.gov/images/pdf/200503/2005030300231KAH.pdf

The leakage of a warm waste line was likely the cause of the water remaining in the retention basin and the leakage was found to be extensively radioactive, 300,000 dpm/100 cm2. Resins had been able to go past gamma monitoring to the line break and there was only piping between the leak and the pond. The Track 1 report indicates that the facility had no way to know the volume of resins released. As there was no building or filter between the line leakage and the pond, it would seem that nothing would stop radioactive resins from being flushed to the pond although this fact was not stated in the Track 1 report.

The very limited two year records retention period in the Idaho Air Permit regarding what is removed from the pond liner and the lack of transparency regarding this disposed of contamination suggests to me that resins may have been expected to collect in the liner debris waste.

The following new site information report shows the extensiveness of transuranic contamination from warm and hot waste water piping and is indicative of the contaminants found at the ATR Complex. (See Frank Webber, Idaho Cleanup Project, Federal Facility Agreement and Consent Order New Site Identification, "TRA Courtyard Area," NSI-26011, March 2014. https://ar.icp.doe.gov/images/pdf/201501/20150126009 71BRU.pdf) Numerous areas around various buildings used by much of the personnel at the Test Reactor Area was found contaminated at grade and below by hot and warm radioactive waste pipe leakage. Concentrations of Am-241 were 2870 pCi/g in TRA-632 drains (a hot cell).

The high concentration of radionuclides in the resins at the ATR Complex is described in an INL report that looked at disposal options, INL/EXT-06-11601. (Timothy Carlson et al., Idaho National Laboratory for the Department of Energy Office of Nuclear Energy, "Low-level Waste Disposal Alternative Analysis Report," INL/EXT-06-11601 rev. 1, September 2006. Table B-2-4. https://inldigitallibrary.inl.gov/sites/sti/sti/3661678.pdf)

INVESTIGATIONS REGARDING THE AQUIFER

The following CERCLA investigation found extensive americium contamination but the Department of Energy never provided waste water disposal reports or data to the CERCLA investigators regarding its waste and waste water discharges. S. M. Lewis et al., Dames and Moore, Denver, CO for EG&G, "Perched Water System Remedial Investigation/Feasibility Study for the Test Reactor Area of the Idaho National Engineering Laboratory (Operable Unit 2-12), EGG-WM-10002, March 1992. (See ar.icp.doe.gov)

The shallow perched water at the Test Reactor Area, now dried up, but had been found to have americium concentrations over 16,000 pCi/L. The DOE and US Geological Survey had never before or since reported any americium contamination at the Test Reactor Area. And monitoring ceased until the shallow perched water took several years to dry up, and then ceased thereafter as the contamination remained in the soil.

I worked at the ATR Complex, formerly called the Test Reactor Area. I was never given security clearance for classified or NOFORN information and I did not learn of any of it, so I know that I am not releasing this information. But from studying cleanup reports and resin bead disposal analysis I have noted the surprising levels of long-lived transuranics in perched water and soil contamination and ongoing used resin radionuclide concentrations.

THE FUTURE RADIOACTIVE WASTE DISPOSAL FACILITY AT THE ATR COMPLEX

I wonder if the evap pond contamination was treated to casually because of the high amounts of in-soil radioactive contamination and the future replacement facility for the Radioactive Waste Management Complex to be located at the ATR Complex. The acceptance of vast amounts of unremediated radioactive waste at the ATR Complex and the future disposal of radioactive waste at the ATR Complex should not be used as an excuse to release anything and everything into the

open-air evaporation pond at the ATR Complex or to take inadequate actions to address releases to soils near the pond.

RADIATION WORKER PROTECTIONS

I think it is relevant to point out that continuing investigations of the radiation doses that former radiation workers received at the INL, conducted for the Energy Employee Occupational Illness Compensation Act (EEOICPA) for all DOE sites including the INL have, in the last two years, found that historically the INL has not implemented adequate worker protections for radioactive alpha emitters.

The investigations have be finding that at the INL, worker radiation programs were ineffective for alpha inhalation, up to 1980. They have not concluded that the worker protection programs after 1980 were effective because they have not investigated later years.

There are long standing practices at the INL that have inadequately protected workers and the historical practices have not necessarily been improved as much as one might have assumed.

The DEQ's air permit does not limit or monitor the alpha emissions from the waste water to the evap pond. I suspect that workers performing monitoring and other work near the evap pond may have been inhaling significant unmonitored levels of radioactive alpha particles.

The Department of Energy at the INL has not necessarily come into the twenty-first century with adequate worker protection against radioactive alpha emitters that it has long been denying existed in abundance at the ATR Complex.

WHAT NEEDS TO HAPPEN (IN MY VIEW)

1. The DEQ air permit is inadequate regarding its mitigations and monitoring and must be revised to protect the environment. It is not preventing unintended releases as intended by the radiation monitoring of the pipe going to the evap pond and it is not finding excessive contamination after the waste gets to the pond.

2. The DOE needs to ensure that radiation worker protections at the ATR Complex evaporation pond are actually protecting workers, especially from radioactive alpha emitters from americium, plutonium and other actinides and transuranics being flushed in abundance to the open air evaporation pond. DOE-ID needs to heed the EEOICPA investigations that are continuing to find that historical operations at the INL have not adequately protected workers from alpha inhalation. It can do this by periodic urine and fecal bioassay of workers conducting work there.

3. DOE needs to state what the sources of the releases to the evap pond were, that it was not designed to receive and how long this has been going on.

4. DEQ needs to know any preventive measures or changes DOE and BEA made to prevent reoccurrence of what happened. The effectiveness of the changes may have provided little improvement. Is there any reason for optimism that this won't happen again?

5. DEQ needs to insist on having credible documented analysis of what radionuclides and in what amounts were left in the soil outside the evap pond and that information needs to be publically available as is consistent with CERCLA cleanup reports. It ought to be documented in a New Site Information report, which may or may not conclude that it was a new CERLCA contamination site.

6. DOE and BEA need to understand that their action of covering contamination with 1 ft of clean fill outside the boundaries of the evap pond is different than painting over contamination on a floor inside a building that will later by D&Ded. They seem to need better training and better coordination with DEQ.

7. If DEQ intends to have any credibility with Idaho citizens, it needs to change how it is doing things with regard to the INL. DEQ environmental monitoring seems geared toward not finding problems and/or covering up problems more than it is geared toward enlightenment. Since the removal of DEQ environmental reports prior to 2010 from DEQ's website obscures taxpayer funded information, a good start would be to put the DEQ's environmental monitoring reports back on the DEQ website.

Finally, regarding another issue, the calcine waste, perhaps you could forward to Mark Rudin in the LINE subcommittee for calcine, this link to a report I wrote about the calcine in 2016: http://www.environmental-defense-institute.org/publications/EDICalcineComments.pdf

Articles are by Tami Thatcher, for November 2017.