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Waste Control Specialists Requests NRC to temporarily suspend review of proposed Texas Spent Nuclear Fuel Interim Storage Facility amid financial problems

Texas nuclear waste company Waste Control Specialists says it is losing money on its low level radioactive waste operations and is surprised by the $7.5 million fee NRC wants for review of WCS's proposed interim storage facility for spent nuclear fuel in Andrews County, Texas. WCS president wrote to the NRC hoping that the sale of the company to EnergySolutions would help solve the money problems. [1] [2]

But in June the US government blocked the sale of WCS to EnergySolutions on antitrust grounds.[3] The press release from the US Department of Justice stated that "Substantial evidence showed that head-to-head competition between EnergySolutions and Waste Control Specialists led to better [low level radioactive waste] disposal services at lower prices," said Acting Assistant Attorney General Andrew Finch of the Justice Department's Antitrust Division. "Today's decision protects competition in an industry that is incredibly difficult to enter. While EnergySolutions' preference was to buy its main rival rather than continue to compete to win business, today's decision ensures that customers will benefit from the competitive process."

WCB had submitted to the NRC its intent to seek a license for interim spent nuclear fuel storage to consolidate the storage of SNF from many of the nation's closed nuclear reactors in April 2016. In March 2017, a second company, Holtec International, notified the NRC of its intent to seek a license for an interim spent nuclear fuel storage facility. Holtec International's proposed consolidated spent nuclear fuel facility would be located in New Mexico near the

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[1] Jim Malewitz and Kiah collier, *The Texas Tribune,* "West Texas nuclear waste project on hold – for now: Dallas based Waste Control Specialists has asked the U.S. Nuclear Regulatory Commission to temporarily suspend a review of its application to store tens of thousands of metric tons of spent nuclear fuel at its West Texas dump. https://www.texastribune.org/2017/04/19/west-texas-nuclear-waste-project-hold-now/

[2] Mike Faher, *Reformer*, "Vermont Yankee cleanup partner stops work on Texas nuke dump," April 27, 2017. http://www.reformer.com/stories/vermont-yankee-cleanup-partner-stops-work-on-texas-nuke-dump,505692

[3] U.S. Department of Justice, "US District Court Blocks EnergySolutions' Acquisition of Waste Control Specialists," Press Release Number: 17-684, https://www.justice.gov/opa/pr/us-district-court-blocks-energysolutions-acquisition-waste-control-specialists

Department of Energy's underground salt mine defense transuranic waste disposal facility, the Waste Isolation Pilot Plant (WIPP). [4]

Will Consolidated Interim Spent Fuel Storage Legislation Gain Traction?

This year, as for the past several years, bills have been introduced to pave the way for consolidated interim spent nuclear fuel storage. The securing of consolidated interim storage for commercial nuclear power reactor spent nuclear fuel would provide a place to take the SNF away from closed reactor sites where there is no longer an operating reactor. Thirty-four states have at least one closed nuclear site that has become the home of dry storage spent nuclear fuel storage. Utilities have successfully sued the US Department of Energy for not taking the spent nuclear fuel for disposal as promised.

People living near the now closed reactor sites like the San Onofre Nuclear Generating Station in California would love to see the SNF moved out of their communities. A bill was introduced last January to promote building interim consolidated storage. [5] But with no designated permanent disposal facility, the concern is that obtaining interim storage will take pressure off of securing a permanent solution.

The hazards of a consolidated interim storage facility include transportation accidents that pose the risk of severe radiological releases and second shipping from an interim site to a permanent disposal site that further increases the risk. The spent nuclear fuel canisters degrade over time and if delays in shipping to a permanent disposal facility were encountered, the canisters would require repackaging facilities. Damaged canisters or fuel status may also require repackaging facilities even if shipping is timely. While dry cask storage is safer than spent nuclear fuel pools, especially compared to the severe accidents associated with fuel recently discharged from a reactor then stored in a densely packed spent fuel pool configuration. Neglect of dry canister integrity over time will eventually release catastrophic amounts of radionuclides to the environment. Generations of people who never benefited from the energy produced will be facing the costs of repackaging and the consequences of radionuclide release.

Despite the current lack of enacted legislation, the U.S. Nuclear Regulatory Commission has been moving to license consolidated interim storage facilities. Environmental Impact Statement Public Scoping comments about Waste Control Specialists proposed consolidated interim spent fuel storage facility project are on Docket NRC-2016-0231. See the comments submitted by

[4] U.S. Nuclear Regulatory Commission website at nrc.gov "Consolidated Interim Storage Facility," at https://www.nrc.gov/waste/spent-fuel-storage/cis.html

[5] Darrell E. Issa, Rep.-CA, H.R. 474 – Interim Consolidated Storage Act of 2017, https://www.congress.gov/bill

David B. McCoy, Citizen Action New Mexico on April 27, 2017 on our website [6] or at www.regulations.gov.

The Department of Energy's two repository approach announced in 2015 [7] is rarely mentioned but it designates one repository for commercial spent nuclear fuel and another for Department of Energy spent fuel and high-level waste. DOE's consent-based approach has disappeared, but see EDI's 2016 comments on the consent-based siting of permanent and interim spent nuclear fuel storage and disposal facilities on our website. [8]

This year, the administration proposed funding to attempt to revive Yucca Mountain, but a senate bill put forth in July left out this funding. [9] Idaho should be paying attention to whether or not Yucca Mountain, even if attempts to revive it survive, would actually accept spent fuel and high-level waste from Idaho.

Public Integrity reports that widespread bad behavior of Department of Energy contractors goes unpunished, including Idaho National Laboratory contractor Battelle Energy Alliance

A five part series was reported by The Center for Public Integrity titled "Nuclear Negligence." [10] This series covered Department of Energy contractor bad behavior around the complex and included the Idaho National Laboratory's Battelle Energy Alliance. It found that the lack of meaningful penalties has resulted in continuation of safety problems.

Public Integrity reported that the 2011 plutonium inhalation affecting several workers at the INL's ZPPR facility has resulted in three legal settlements. The settlements have all included

[6] David B. McCoy, Executive Director, Citizen Action New Mexico, to the U.S. Nuclear Regulatory Commission, "Re: Docket No. 72-1050; NRC-2016-0231 – Environmental Impact Statement Public Scoping Comments about Waste Control Specialists LLC's Consolidated Interim Spent Fuel Storage Facility Project (CISFSF) at www.Environmental-Defense-Institute.org/publications/CitizenActionNMWCS2017.pdf

[7] U.S. Department of Energy, "Secretary Moniz's Remarks on "A Look Back on the Blue Ribbon Commission on America's Nuclear Future" at the Bipartisan Policy Center -- As delivered," March 24, 2015, https://energy.gov/articles/secretary-monizs-remarks-look-back-blue-ribbon-commission-america-s-nuclear-future

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

[9] Peter Maloney, *Utility Dive*, "Yucca Mountain: High stakes and high hurdles," July 21, 2017. http://www.utilitydive.com/news/yucca-mountain-high-stakes-and-high-hurdles/447573/

[10] 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/

nondisclosure provisions. The managers of the contractor at INL, Battelle Energy Alliance, had been informed of worker safety deficiencies specific to examining the plutonium plates at the ZPPR facility. The accident investigation determined that the accident could have been prevented had BEA management taken action to address known deficiencies. BEA has continued to deny that any harm to workers resulted from the accident. BEA is in control of the processes and analyses used to estimate radiological doses to the workers.

Public Integrity examined court depositions and found that the INL Materials and Fuels Complex (MFC) safety oversight chairman Ted Lewis who had urged more precautions to protect workers examining plutonium plates had written a "white paper" warning of the problems and **he had shared his concerns with at least 19 others at the laboratory — but they didn't respond.**

None of the workers exposed by the 2011 accident were among those informed of the safety problems. Sixteen workers inhaled plutonium, americium and uranium dust particles because the plastic covering for a plate was cut into. [11] The workers had questioned the abnormal labeling on the plate wrapping but **a supervisor who had been warned about the risks relayed an order for the work to proceed.**

After the accident but prior to completion of the DOE accident investigation, deposition documents indicate that INL's Battelle Energy Alliance attempted damage control by contacting Ted Lewis asking if he wanted to change his prior submittal of safety issues in the informal "white paper." He did not.

As a result of the accident, the ZPPR facility was closed for nine months for extensive and expensive decontamination. Despite the ZPPR accident and five other worker radiation incidents from 2011 to 2014 BEA was paid 92 percent of the maximum fee and at the end of 2014 BEA was paid 97 percent of maximum fee as a Department of Energy contractor at the INL. The cost of resolving the litigation is typically paid for by taxpayers but DOE had not finalized its determination to reimburse BEA for the ZPPR litigation.

Since 2014 two significant worker exposure incidents have occurred: a 2014 airborne americium-241 release at the Fuels Manufacturing Facility at MFC and a September 9, 2014 MFC Analytical Laboratory nitric acid plutonium-238 airborne release.

[11] 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.

BEA's concern was "false positives" and not workers' health

The Center For Public Integrity's series "Nuclear Negligence" described how Idaho National Laboratory's Battelle Energy Alliance briefed the INL Citizens Advisory Board one week after the 2011 ZPPR accident. [12] BEA's Director of Environment, Safety and Health, Sharon Dossett, spoke to the INL Citizens Advisory Board [13] and said that six workers had positive nasal smears; seven had positive contamination on their skin; and 16 had contamination on their clothing. When asked whether workers were given chelating shots, Dossett replied that some of the workers elected to have chelating injections. Not said was that chelation is only offered in very serious intake events. Dossett said that lung scan indicated Americium in one worker's lungs. When asked how asked how it was possible that only one person had internal contamination if 6 had positive nasal smears, she replied that she "has discussed with experts the validity of a nasal smear. Experts agreed with her that a positive nasal smear may be a sign of internal contamination or it may be a false positive."

A false positives mean the evidence of internal contamination incorrectly indicates over exposure when no overexposure occurred. A positive nasal smear with detected disintegrations per minute many times above normal is not likely to be a false positive. And she gave no discussion of the more likely problem — that of false negatives for nasal smears or lung counts. A false negative incorrectly determines no intake occurred when it did.

A worker's concern is proper medical care and fair assessment of the risk of a future radiation-induced illness. A worker would also be concerned about fair accounting of radiological dose because if a cancer developed in the future, a radiation dose reconstruction to determine the dose and eligibility for compensation, based on incomplete records of the event could result in denial of compensation under the Energy Employee Occupational Illness Compensation Act.

The lung count procedure to detect plutonium in the lungs relies on detecting the weak gamma ray of americium-241. But the thicker the chest wall of the worker, the more that gamma ray is shielded and the more difficult it is to detect. That increases the uncertainty in the statistics for the measurement. A typical worker's chest wall thickness is less than 3 inches. The worker closest to the ZPPR contamination has a chest wall thickness greater than 5 inches. The thicker chest wall results in increased measurement uncertainty which can be used to argue they aren't confident in the detection. The worker closest to the contamination was decided by BEA to have no detected americium despite the first lung count clearly detecting americium and with low

[12] 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/

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

uncertainty. The procedure to immediately shower the employee and perform a lung recount was not followed. The initial positive lung count was simply discarded as being due to external contamination. Months later, detailed examination of the spectral results by the Department of Energy would show that the spectral peaks were not on the skin surface.

If the americium-241 was more rapidly cleared from the lungs than the plutonium, there would be no way to detect the remaining plutonium in the lungs via the lung count instrument. Oddly, the urine samples of the crucial timing following the event that would have shown whether the americium clearance was proportional to the plutonium being excreted were destroyed. Even so, there is evidence that the americium clearance was more rapid than the plutonium clearance which could explain reduced next day lung count results.

BEA's Sharon Dossett was asked if the dose received would prevent the workers from performing radioactive work in the future. She replied that "the dose was low enough that it would not prevent the workers from doing radiological work." **But in fact, more than one radiation worker was prohibited from performing radiation work for over 8 months because of continuing elevated bioassay results from urine and fecal analysis of radionuclide excretion.** The criteria for allowing the workers to resume radiation work was undeclared as their urine and fecal excretion was still elevated months after the accident and would have confounded investigation of any subsequent radiological mishap.

BEA quickly chose to discontinue blood tests such as white cell and monocyte measurements that could have been a diverse method of radiological dose assessment not reliant on dose estimates using the International Commission on Radiological Protection (ICRP) method. The ICRP methodology is known to not necessarily be conservative or capable of accurately allowing estimating the intake based on measurements of urine and fecal excretion samples. The ICRP methodology allows wide latitude in the orchestration of analytical assumptions, thus allowing virtually any desired radiation dose estimate value to be obtained.

Workers were denied access to information about their dose estimation for months after the accident. This was not simply the failure to explain highly technical information, but the deliberate avoidance of releasing any information concerning their dose estimation methods or results.

Plutonium-239 and americium-241 are known to be carcinogenic and are strongly retained in the lung following inhalation. Once in the blood stream they are known to be retained in skeletal bones, liver and other organs. The chemical form, solubility, and particle size affect the predicted dose. The ability for the body to confuse Pu-239 with iron continues to be studied. [14] Health harm in addition to cancer and leukemia is typically ignored by the US Department of Energy but includes elevated risk of heart disease and genetic effects.

At no time was since 2011 was BEA's misrepresentation of the severity of the ZPPR accident to the INL Citizens Advisory Board revisited. Nor was any description provided of how

[14] https://miningawareness.wordpress.com/2015/02/26/plutonium-trojan-horse-in-the-body/

the accident was found to have been preventable due to the numerous equipment, procedural and safety basis problems. Nor was any description provided of the 19 times safety oversight chair Ted Lewis had raised the worker safety concerns around plutonium plate inspections to BEA management who over the course of about two years had failed to respond.

EDI obtained ZPPR accident information prior to any legal settlements. Read our many past articles about the ZPPR accident and plutonium radiological dose estimation in our newsletters at Environmental-Defense-Institute.org.

Amory Lovins writes about the harm of nuclear bailouts on renewable energy

Rocky Mountain Institute's Amory B. Lovins has recently written about the harm of bailing out financially uncompetitive nuclear plants in his article "Do Coal and Nuclear Generation Deserve Above-Market Prices?" [15] Lovins is a physicist named by *Time* one of the world's 100 most influential people, and named by *Foreign Policy* one of the 100 top global thinkers.

With increasing operating costs to keep the nuclear plants operating, low gas prices and falling renewables prices older U.S. nuclear plants have been seeking financial bailouts from states. These plants operate at costs far above other options. Lovins writes that if the nuclear plants were shutdown and cheaper replacement power purchased, there would still be money left over that could be used to build renewables.

By ignoring the actual excess costs of operating these nuclear plants, a false argument is sustained that keeping the nuclear plants operating provides carbon-free benefits. In fact, these aging nuclear plants are still too expensive to justify and new nuclear construction will be even less price competitive. And these bailouts come after 60 years of massive taxpayer subsidies to the nuclear industry from uranium mining, enrichment, capital costs, research and development, decommissioning, and nuclear waste management subsidies and excessive ratepayer charges. [16] The profits of nuclear are privatized while the accident and cost overrun risks are paid by the taxpayers and ratepayers.

The recent state-funded financial bailouts for uneconomical operating nuclear plants in New York and Illinois are being challenged in court. [17] The financial burden of the decommissioning cost overruns for these plants and disposing of their spent nuclear fuel and other radioactive

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[15] Amory B. Lovins, Cofounder and Chief Scientist, Rocky Mountain Institute, "Do Coal and Nuclear Generation Deserve Above-Market Prices?" Electricity Journal, July 2017, doi:10.1016/j.tej..2017.06.002 https://www.rmi.org/wp-content/uploads/2017/07/ElJ6May2017_preprint.pdf

[16] Doug Koplow, Earth Track, Inc., Union of concerned Scientists, "Nuclear Power: Still Not Viable without Subsidies," February 2011. http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear_power/nuclear_subsidies_report.pdf

[17] Tim Knauss, *Syracuse*, "NY nuclear subsidies kick in Saturday, but high-stakes legal challenge looms," March 27, 2017. http://www.syracuse.com/news/index.ssf/2017/03/ny_nuclear_subsidies_kick_in_saturday_but_high-stakes_legal_challenge_looms.html

wastes still looms as certainty that is not included in the operating costs. The potential financial burden from a severe accident of even a single reactor should be reason enough to phase out these plants as quickly as possible. But even without an accident, every dollar spent propping up nuclear energy is a dollar that would have paid for cheaper replacement power and still had money left over to build renewables.

France's High Level Waste Repository Concrete Bitumen Woes

Design plans for France's Cigeo high-level waste repository may need to be changed in order to address fire risks associated with its bitumen-laden radioactive waste. The concern over bitumen waste and others were raised by the country's Institute for Radiological Protection and Nuclear Safety (IRSN). Other concerns raised included the ability to ensure that radiation cannot be released into the environment, ways of monitoring risks during the facility's operation, and the possibility of intervening to manage situations likely to lead to contamination of infrastructures. [18]

The proposed repository will be underground in clay formations at Bure, to the east of Paris.

The "most sensitive" issue concerns the consequences of a fire involving packages of bituminous waste of which there are some 40,000 packages or about 18 percent of the waste packages to be stored in the Cigeo repository. The fire will be sustained by the bituminous waste.

In the past, high-level waste from spent nuclear fuel reprocessing in France was packaged by mixing with concrete-bitumen. Another name for bitumen is asphalt — that black sticky form of petroleum. It seemed like a good idea at the time.

A design submittal date has been moved out to the end of 2018. The predicted costs of the French repository are being disputed, ranging from about $20 to $40 billion dollars. [19] It's a safe bet that the repository schedules continue to slip and cost estimates continue to grow for the French repository, but they appear to be light-years ahead of the U.S.

[18] World Nuclear News, "IRSN raises issues with design of Cigeo repository," July 7, 2017. http://www.world-nuclear-news.org/WR-IRSN-raises-issues-with-design-of-Cigeo-repository-0707174.html

[19] World Nuclear News, "Minister sets benchmark cost for French repository" January 18, 2016. http://www.world-nuclear-news.org/WR-Minister-sets-benchmark-cost-for-French-repository-1801165.html

Keeping Pad A Under the Soil Cap Will Be Expensive And is Destined to Fail Over the Long Term

The so-called "Pad A" is a 25 ft high stack of barrels and boxes of radioactive waste upon an asphalt pad at the Radioactive Waste Management Complex at the Idaho National Laboratory, permanently stashed there after the Department of Energy promised to no longer bury radioactive waste from its Rocky Flats weapons plant in Colorado. The DOE Idaho Operations office has long down played the seriousness of this nitrate and uranium laden waste in Pad A. Not satisfied with the waste from Rocky Flats, DOE added about 4,395 lb (or about 2 metric tons) in chucks of spent nuclear fuel from the Idaho National Laboratory into the waste piled on Pad A. About 19 percent of RWMC's uranium-238 is on Pad A. [20]After americium-241, uranium isotopes are the dominant contributors to ingestion dose from aquifer contamination through time. [21] [22]

Uranium waste is an alpha emitter and radiation external exposure is easily shielded; however, uranium wastes are concentrated, in more solvent chemical forms than nature left us, and when ingested in water or food or inhaled, pose serious health issues. The uranium wastes continue to grow more, not less, radioactive with time due to ingrowth of decay products.

The design of the soil cap for the RWMC requires about 20 extra feet of depth due to heap of radioactive waste at Pad A. This significantly complicates the soil cap. But the nitrate-laden pyrophoric wastes in long since deteriorated containers is so scary to think about exhuming that DOE seems willing to say anything and do anything to justify leaving it there. DOE can say that the soil cap will require inspections and maintenance forever yet the CERCLA signs to warn future inhabitants of the contamination are designed predicated on the likelihood of societal collapse and the inability to know what language will be spoken. Natural geologic instability from flooding and wind are likely to have Pad A waste blowing in the wind and/or leaching into the Snake River Plain aquifer beneath it.

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[20] DOE-ID, "Operable Unit 7-13/14 Phase 3 Pad A Focused Feasibility Study," DOE/ID-11541, March 2017. See https://ar.icp.doe.gov

[21] 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/

[22] 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 CleanupProject. 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

From 1972 to 1978, despite the ban on burial of Rocky Flats transuranic waste at the burial ground, on a 2.3 acre asphalt pad called Pad A Rocky Flats uranium-ladden waste in barrels is stacked 19.7 ft for barrels stacked 11 high on their side and 20.7 ft for 4 x 4 x 7 ft wooden boxes. Later Pad A would be covered with about 4 feet of soil. Pad A contains about 18,000 barrels and about 2000 large wooden boxes containing uranium, nitrates and beryllium. (See DOE/ID-11541)

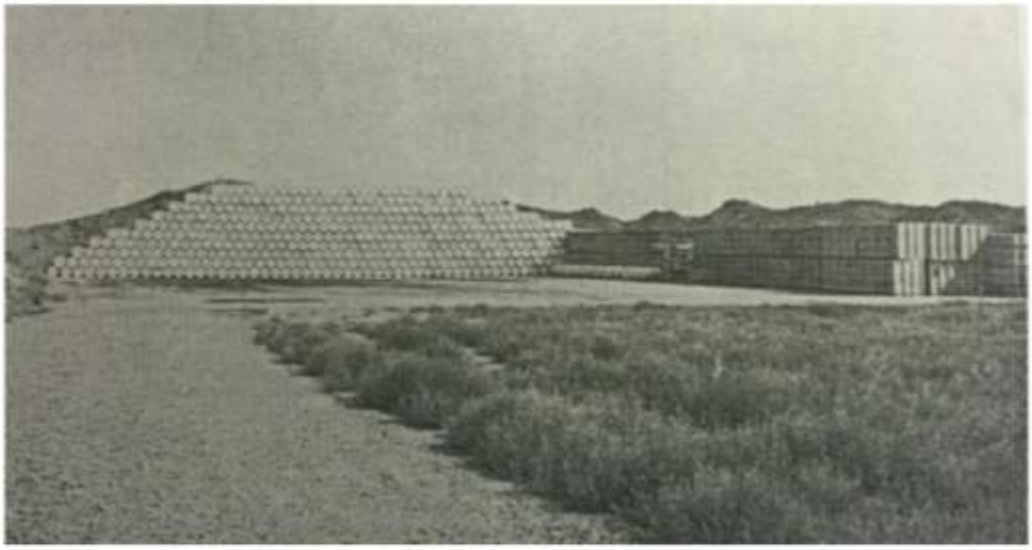

Figure 1-10. Pad A in 1973 showing stacked white 55-gal drums to the north (left) and stacked plywood boxes to the east (right) (Hiaring, Horton, and Schlafman 1992).

In the study published in March 2017 (DOE/ID-11541), a study of Pad A at RWMC documents the recognition that lowering the profile of Pad A would simplify soil cap construction and reduce construction costs. The study punts by saying the final decision will depend on the analysis of the soil cap.

In 2017, a contractor, Daniel B. Stephens and Associates, was selected to design the soil cap for the SDA at RWMC and the two year effort began in February. At the June INL CAB meeting, DOE acknowledged that the soil cap design must last into perpetuity and will require ongoing inspection and maintenance, forever. The presentation to the INL CAB avoided discussing design and construction costs, soil cap height, soil volume or the fact that decisions about what to do with Pad A have not been made. No time was allowed at the meeting for questions to the presenters. There was no discussion of the study of Pad A issued in March or the associated costs of the Pad A. And there was no discussion of how the decisions for the soil cap will be made by the first half of next year.

Radiological Release to ATR Complex Evap Pond

An unspecified amount of what would be remote-handled waste was flushed to the open air radioactive warm waste evaporation pond outside the fence at the Idaho National Laboratory's Advanced Test Reactor Complex and discovered last year. There is no description of how long this had been going on when the radioactive material was finally noticed. The evaporation pond was not designed or intended to handle the radioactive material. There is no description of the total amount and what radionuclides were flushed. There is no description of the size of the area outside the pond that was contaminated. And there is no description of how many years would need to elapse before the radionuclides would not require institutional control.

Anything and everything had been flushed to the retention basin and percolation ponds at the ATR Complex from its operating reactors, spent fuel pools and hot cell and laboratory operations commencing in 1952. From the percolation ponds, radionuclides migrated into the soil and groundwater below. The contamination was the most extensive in perched water above the aquifer. The long touted improvement to use a lined evaporation pond beginning in 1993 instead of percolation ponds was described by the state, by the CERCLA cleanup and by the US Geological Survey to exemplify cleaner operations at the INL. They just failed to mention that while the lined evaporation pond did not push contaminants already in the soil and perched water into the aquifer, the retention basin where waste water was routed on the way to the evap pond that had been used for the earlier percolation ponds still had substantial leakage. In addition, other piping and fuel storage pool leakage had contributed substantially to soil and perched water contamination at the ATR Complex. Deep and shallow injection wells were also used at the facility. Lawn irrigation continues to accelerate contaminant migration.

Despite discovering extensive americium-241 contamination in the perched water investigated as part of CERCLA cleanup in the 1990s at the ATR Complex, [23] the Department of Energy, state and federal Environmental Protection Agencies put their heads in the sand and ignored the transuranic contamination at the ATR Complex. It was not until 2015 that a soil investigation was conducted that torpedoed the Department of Energy's earlier statements that the ATR Complex would be allowed unrestricted use by 2095. [24]

In the tardy 2015 investigation of soils at the ATR Complex, several long-lived radionuclides were found in the soil where the retention basin was located prior to demolition. [25] The soil

[23] Lewis, S.M, et al., EG&G Idaho, "Remedial Investigation (RI) Report for the TRA Perched Water System OU 2-12," EGG-WM-10002, June 1992. https://ar.icp.doe.gov/ This and draft CERCLA evaluation documents in the early 1990s found perched water levels of Americium-241 at the Test Reactor Area of 2110 picoCuries/liter, far exceeding 15 pCi/L that relates to alpha emitters.

[24] See. https://ar.icp.doe.gov/ See WAG 2 Operable Unit 2-13. Various documents beginning around 1997 discuss continuing institutional controls "for at least 100 years." There are public relations brochures saying natural radioactive decay would eliminate the health risk within 1000 years. And proposed actions would make no other actions required after 100 years. See NSI-260002 and other recent documents that have revised these previous statements.

[25] Federal Facility Agreement and Consent Order (FFA/CO) New Site Identification (NSI), "TRA-04; TRA-712 Warm Waste Retention Basin System (TRA-712 and tRA-612)," Site Code: TRA-04, Document Number: NSI-

contamination was 17 times higher for americium-241 than would allow unrestricted use, see Table 1. This means it would take 17 half lifes for natural decay to lower the soil concentration sufficiently to reach the unrestricted use exposure level of 187 picoCurie/gram soil. The half life of americium-241 is 430 years — but it decays to neptunium-239 which has a half life of 2.1 million years. There are several other decay progeny before becoming non-radioactive. In other words, it will take longer than forever to reach unrestricted use levels.

Plutonium-239 levels were also found above unrestricted use concentrations in soil analyzed in 2015 and would take forever to decay to unrestricted use levels.

Subsequent to early mid 1990s CERCLA investigations, the US Geological Survey monitoring and reporting specifically of shallow and deep perched water inexplicably omitted monitoring of americium or an alpha radionuclides in the shallow perched water at the ATR Complex. [26] Eventually, the contaminants in the soil and shallow perched water will migrate downward into the aquifer. Because DOE has wanted to promote the idea that all the significant radiological contamination would naturally decay away within 100 years, the DOE, INL contractors, the state, and the EPA have all actively avoided mentioning the long-lived radionuclide contamination. The cesium-137 and cobalt-60 radioactivity and others will decay away within 400 years. But the long-lived plutonium-239 and americium-241 contamination at TRA in the soil will never decay to unrestricted use concentrations (see Table 1).

At INL's INTEC facility, asphalt covers are installed to reduce the driving of known contamination into the aquifer. At INL's ATR Complex, no such action has been taken. At INTEC, a lined disposal facility called the Idaho CERCLA Disposal Facility is used for disposing of CERLCA wastes. At the ATR Complex, resins are left underground in buried piping and no one gets excited if the radioactively laden resins are flushed to the open air evaporation pond undetected possibly for years.

DOE-ID Operational Summaries are posted online, albeit currently nearly one year late. [27] The final public Occurrence Reports can be found in a database in the Department of Energy's Dashboard. [28]

26002, Rev. 1., prepared July 2015. This NSI states that the retention basin cannot be released for unrestricted use by 2095. Nor can it be released for unrestricted use in 2310 as a 2011 DOE 5-yr review indicated. The document incorrectly states that institutional controls will require 24,100 years to elapse. But they have forgotten that americium-241 decays to neptunium-237 and so have underestimated to time for americium-241 to decay to levels not requiring institutional controls by a few million years.

[26] Linda C. Davis, US Geological Survey "An Update of the Distribution of Selected Radiochemical and Chemical Constituents in Perched Ground Water, Idaho National Laboratory, Idaho, Emphasis 1999-2001. The is NO Americium monitoring at the Test Reactor Area now called the ATR Complex. There is not even gross alpha monitoring in the perched water found to have exceeded the MCL for americium in CERCLA studies conducted just a few years before this report was written although it was not released until 2006.

[27] DOE-ID Operations Summaries, http://www.id.doe.gov/NEWS/OperationsSummarys.htm retrieved May 25, 2017, with no report of events since August 2016.

[28] Department of Energy Final Public Occurrence Reports as of May 2017. See https://energy.gov/ehss/policy-guidance-reports/dashboards

Table 1. Past retention basin soil sample results compared to concentrations allowing unrestricted use and an estimate of potential resin radioactivity concentrations.

Radionuclide (Half Life)	2015 Retention basin soil samples (pCi/g)	CERCLA Unrestricted access level (pCi/g)	Years Until Unrestricted Use	Note
Americium-241 (432.2 y)	3210	187	**1,772	This estimated years indicated in the NSI is incorrect because of the continuing decay progeny, notably Np-237. Potential resin concentration is 7000 pCi/g.
Neptunium-237 (2.1 million y)	(would increase over time due to Am-241 decay)	13		Np-237 contamination concentrations are restrictive than Am-241.
Plutonium-239 (24,065 y)	520	259	24,100	Potential resin concentration is 6000 pCi/g.
Plutonium-238 (87.7 y)	671	297	103	Pu-238 would decay to acceptable levels after one half life. Potential resin concentration is 5000 pCi/g.
Cesium-137 (30.2 year)	45000	6	388	Cs-137 would decay to acceptable levels after 13 half lifes. Potential resin concentration is 2 million pCi/g.
Europium-152 (13 y)	9950	4.16	146	Potential resin concentration is 7500 pCi/g.
Cobalt-60 (5 y)	124,000	3.61	79	Potential resin concentration is 5 million pCi/g.

From Table 1 of NSI-26002. units pCi/g are picocurie/gram. Potential resin concentrations are based on INL/EXT-06-11601 and assume 1 gram per cubic centimeter when conversion from Ci/m^3 was needed. The actual resin radioactivity concentrations released and reported in 2016 may be less.

The Department of Energy Idaho Operations Summary for the event phrased the May 12 Occurrence report mildly: "Contaminated soil was discovered outside of a contamination area near the Advanced Test Reactor (ATR) evaporation ponds. Pre-work surveys were being performed in preparation for the ATR Complex Warm Waste Evaporation Pond liner replacement project. A radiological buffer area had been established to support surveys of the area surrounding the evaporation pond contamination area. A normally unoccupied area was surveyed and contamination was found in the soil. Following the discovery, the area was posted as a soil contamination area. Surveys of the road around the evaporation pond were conducted and no additional contamination was found."

However, the full Occurrence Report (OR) stated **that soil contamination levels were as high as 250,000 disintegrations per minute per 100 square centimeters near the pond.** The contractor admitted that radionuclides were being sent to the open air pond that the pond was not designed for. And the OR stated that snow fence was erected to limit the spread of radioactivity among other actions. [29]

This is not the first time radioactively laden resins, intended to capture radionuclides and clean up the waste water, have escaped the resin beds. Resin beads were found near an underground piping leak in waste water lines headed for the evap pond. [30] Radiation monitors that should have detected the elevated radiation levels in the waste water going to the pond were either kept off or were otherwise ineffective in detecting the elevated radiation levels in the waste water. The damaged pipe and resins inside it were then left in the ground.

But in the 2016 OR, it was admitted that the resins escaped to the open air evaporation pond and resulted in contaminating the pond and soil near the pond. The reality is that resins may have been sent to the pond since the evap pond was installed in 1993. The degree to which the release may have increased in recent years or months is not described.

When resins were previously found as described in DOE/NE-ID-11139 in the 2001, federal cleanup CERCLA Track 1 documentation was prepared. But apparently this has not occurred for the 2016 OR despite the radioactivity involved being above ground rather than occurring underground where a pipe was leaking.

The evap pond installed in 1993 was to accept only warm waste water that had been filtered through resin cleanup systems and the main radionuclide to be released was to be tritium. Based on DOE/NE-ID-11139, the normally accepted levels of radioactivity released to the evap pond are not trivial and the tritium released to the evaporation pond is in concentrations far exceeding

[29] Department of Energy Occurrence Report NE-ID—BEA-ATR-2016-0014. "Contaminated Soil Outside Warm Waste Evaporation Pond at the ATR Complex." a copy made available on our website www.environmental-defense-institute.org/publications/ATR-2016-0014.htm

[30] 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

drinking water standards, over 9 million picocuries/liter. [31] But the Battelle Energy Alliance does not estimate its releases of tritium from the ATR Complex to the skies. This requires others to make rough estimates when creating air emissions reports for the INL.

Instead of just sending filtered waste water to the evap pond, the resin beads laden with the radionuclides that they are supposed to be removing from the waste water have been sent to the evap pond potentially greatly increasing the radioactivity. The levels of radioactive concentrations for a few of the many dozens of radionuclides they may contain are provided in Table 2 based on INL/EXT-06-11601.

Table 2. Maximum resin concentrations for a few selected radionuclides based on INL/EXT-06-11601.

Radionuclide (Half Life)	Potential Used Resin Concentration (pCi/g)	CERCLA Unrestricted access level (pCi/g)	Average (mean) soil background levels at INL (pCi/g) [a]	Note
Americium-241 (432.2 y)	7000	187	0.005	Am-241 decays to Np-237.
Neptunium-237 (2.1 million y)	(would increase over time due to Am-241 decay)	13	not compiled	Np-237 contamination concentrations are restrictive than Am-241.
Plutonium-239 (24,065 y)	6000	259	0.024	
Plutonium-238 (87.7 y)	5000	297	0.0014	Ci/m3 coverted to Ci/g assuming 1 g per cubic centimeter.
Cesium-137 (30.2 year)	2,000,000	6	0.44	
Europium-152 (13 y)	7500	4.16	not compiled	
Cobalt-60 (5 y)	5,000,000	3.61	not compiled	

Units pCi/g are picocurie/gram. Potential resin concentrations are based on INL/EXT-06-11601 and assume 1 gram per cubic centimeter when conversion from Ci/m^3 was needed. The actual resin radioactivity concentrations released and reported in 2016 may be less. Note a: Soil background concentrations based on S. M. Rood et al., Idaho National Engineering Laboratory, "Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory," INEL-94-0250, August 1996. Table 23.

[31] DOE/NE-ID-11139, "Track 1 Decision Documentation Package for TRA-605 Warm Waste Line," January 2005. http://ar.inel.gov/images/pdf/200503/20050303002 31KAH.pdf

The 2006 INL report (INL/EXT-06-11601) characterized potential ATR resins from experiment loops and the main primary coolant system in order to investigate waste disposal options. [32] The ATR resins require remote handling and are too radioactive to be accepted by most commercial low-level radioactive waste disposal facilities. Basically Texas will only accept the federal waste if DOE agrees to take possession of the dump. [33] There are federal disposal facilities in Washington and Nevada but those states don't want to accept the waste. The resins likely include cesium-137, strontium-90, and may include long-lived radionuclides significant for migration to the aquifer including americium-241, neptunium-239, plutonium-239, iodine-129, technetium-99 and others.

For that reason, these radioactive resins with long-lived radioisotopes are shallowly buried over the Snake River Plain aquifer at the Radioactive Waste Management Complex and soon to be buried over the aquifer at the Remote-handled Low-level Waste facility outside the fence at the ATR Complex. And for now, some unknown quantity of the radionuclides from the resins have apparently been flushed to the open air evaporation pond and may be blowing in the wind. Don't worry. The DOE occurrence report says they put up snow fence to reduce the blowing.

In addition to the radiological contamination posed by the release of used resins to the evap pond that can have a long term environmental effect, workers conducting work near the pond at any time since the release may have received both external and internal exposures. The alpha and beta radioactivity would not be measured by a workers radiation badge although the badge, if worn outside the fence, would detect increased gamma radiation. The inhaled radionuclides would be undetected. Subsequent illness compensation claims may never factor in their possible unrecorded inhalation internal radiation doses.

The INL Battelle Energy Alliance public affairs folks, quite predictably, refused to answer any questions about their significant radiological release, including whether or not the release was intentional. And so far, there is no indication that the Idaho Department of Environmental Quality has done anything but facilitate INL's radiological release coverup.

Articles are by Tami Thatcher, for August 2017.

[32] 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

[33] INL/EXT-06-11601 rev. 1, p. 3-2, from 2006 states that "Texas has a state law that requires DOE to take possession of the site after closure, if a 'federal waste' site is opened. DOE has not made a policy decision to accept future liability for the site after closure."