Environmental Defense Institute

Troy, Idaho 83871-0220
http://environmental-defense-institute.org

Comments on U.S. Department of Energy Final Environmental Assessment Replacement Capacity for Disposal Remote Handled Low-Level Waste Generated at Idaho National Laboratory

December 2011
DOE/EA-1793 [1]

Submitted by
Chuck Broscious
on behalf of
Environmental Defense Institute

3/13/12 [Rev.3]

[1] The Final Environmental Assessment and Finding of No Significant Impact prepared in accordance with the National Environmental Policy Act, herein after referred to as EA-1793, is available at: http://www.id.energy.gov/insideNEID/PDF/Final EA DOE_EA-1793 2011-12-20.pdf

Summary

This short-cut Environmental Assessment (EA) and attached Finding of No Significant Impact is a violation of the National Environmental Policy Act (NEPA) that – if appropriately applied - would require a full Environmental Impact Statement (EIS) given the major potential environmental, health and safety impact of this proposal. Moreover, given DOE/INL gross mismanagement of existing nuclear waste disposal at the Idaho National Laboratory (INL) over six decades – resulting in extensive contamination of the underlying Snake River Aquifer, the public has no confidence that this new remote handled low-level landfill dump will not further impact their health and safety. [2] Thus, at the minimum, a full scale EIS must be conducted.

"DOE classifies some of the LL W generated at the INL as remote-handled LL W because its potential radiation dose is high enough to require additional protection of workers using distance and shielding. Remote-handled wastes are those with radiation levels exceeding **200 millirem** per hour at the surface of a container, and includes debris, used materials (i.e., gloves, tools, hardware, and other activated metal components), ion-exchange resins, and filters." [3]

The EA states: "The scope of the proposed action only addresses the need for **final disposal location** of remote-handled LLW waste generated by various operations at various facilities on the INL Site. The environmental impacts from operating facilities at the INL Site that will or may generate remote-handled LLW in the future are out of the scope of this EA." [4] [Emphasis added] The public is justifiably angry that DOE and the Navy is building yet another permanent nuclear waste dump over the sole-source aquifer that these agencies mismanagement – over 6 decades - have extensively contaminated.

Specific Deficiencies of this Environmental Assessment (EA)

* No detailed waste characterization (including curie content) of known waste streams slated for dump internment;
  1. Naval Reactor Facility (Naval Nuclear Propulsion Program) ;
  2. Advanced Test Reactor;
  3. Materials and Fuels Complex (MFC) (formally Argonne National Lab – West) to include the restart of the Transient Reactor Test Facility;
  4. Idaho Nuclear Engineering and Technology Complex (INTEC) formerly called Idaho Chemical Processing Plant (ICCP);
  5. Other specific INL operations to include RWMC non-compliant WIPP/ICDF waste;
  6. Other Non-INL waste shipped to INL (past/future);
* No cumulative radioactive/curie content of annual/final estimate waste to be dumped;
* Inadequate flood plain documentation;
  The proposed candidate dump(s) are above the Snake River Plain Aquifer and right beside to the Big Lost River;
* No disclosure of Greater than Class-C Low-level waste slated for the dump. According to Nuclear Regulatory Commission regulations, GTCC waste is prohibited from shallow landfill dumps and must be interred in a deep geologic repository; [5]
* No disclosure of credible onsite interim "road-ready" storage currently operating;
* No cumulative doses from all INL operations to the aquifer – the public has a right-to-know how much this new dump will add to existing INL contamination to the aquifer and general environment;

[2] See EDI Snake River Plain Aquifer Report available at, www.environmental-defense-institute.org
[3] EA-1793, pg. 1
[4] EA-1793, pg. A-9.
[5] Title 10 Code of Federal Regulations (CFR) Subsections 72.3 and 61.55

* No discussion of “Consent Order” compliance that all high-level , transuranic and alpha-emitting waste is to be shipped out of state for permanent disposal. [6]

The Environmental Protection Agency and the Idaho Department of Environmental Quality are complacent in this six decade long mismanagement of INL waste disposal because they failed to exercise their regulatory/legal oversight. These regulatory agencies with jurisdiction must demand a full EIS of the INL new dump and make their comments available to the public. Neither the Environmental Protection Agency, Nuclear Regulatory Commission, nor the Idaho Department of Environmental Quality bothered to even comment on the Greater-than-Class-C (GTCC) Waste EIS despite DOE’s disclosed intent to construct a new GTCC and Transuranic waste dump at INL. Where is the “due-diligence?”

The EA states: “No other federal or state agencies were formally consulted during preparation of this Environmental Assessment.” [7] DOE’s Notice of Intent states: “In addition, DOE proposes to include DOE LLW and **transuranic waste** having characteristics similar to GTCC LLW and which may not have an identified path to disposal (herein referred to as GTCC-like waste) in the scope of this EIS.” [emphasis added] [8]

DOE fails to disclose if this new dump is permanent. “At the end of the operational life [50 years] of the disposal facility, an engineered cover would be placed over the disposal vaults.” [9] This sounds permanent by any reading.

The EA states: “Before DOE authorizes disposal of LLW under DOE Order 435.1, it must be demonstrated that the disposal facility will do the following:

“Before sited, designed, operated, maintained, and closed such that the total all-pathways exposure to the public is less than 25 mrem/year effective dose equivalent (EDE) from the facility and to less than 30 mrem/yr EDE for all potential sources of radionuclides.

“Limit the radionuclide concentrations for near surface disposal so that the potential exposure received by an inadvertent intruder (more than 100 years post-closure) would be limited to **100 mrem/year for acute exposure and 500 mrem total EDE for chronic exposure**.” [Emphasis added] [10]

“Dose to representative members of the public shall not exceed **25 mrem** (0.25 mSv) in a year total EDE from all exposure pathways, excluding the dose from radon and its progeny in air. Dose to representative members of the public via the air pathway shall not exceed **10 mrem** (0.10 mSv) in a year total EDE, excluding the dose from radon and its progeny.” [11]

The EA also states: “The Idaho Ground Water Quality Rule (IDAPA 58.01.11) establishes minimum requirements for protection of groundwater quality through standards and an aquifer categorization process. Primary constituent standards are based on protection of human health, and secondary constituent standards are generally based on aesthetic qualities. The primary constituent standards for radionuclides incorporate standards set by EPA (40 CFR 141.66). These limits are typically specified as a maximum contaminant level (MCL). MCLs found in 40 CFR 141 include values for beta-gamma-emitting radionuclides and alpha-emitting radionuclides. The

[6] U.S. District Court for the District of Idaho, Settlement Agreement and Consent Order, Cv. No. 91-0035-S-EJL and 91-0054-S-EJL, 8/17/95; and Agreement to Implement U.S. District Court Order Dated 5/25/06, signed 7/1/08.

[7] EA-1793 pg. 6-1

[8] Federal Register / Vol. 72, No. 140, DOE Notice of Intent, 7/23/07.

[9] EA-1793, pg. 2-5

[10] EA-1793, pg. 2-1

[11] EA-1793, pg.5-1

MCL for beta-gamma-emitting radionuclides is the concentration that, assuming an ingestion rate of about one-half gallon of water per day for 365 days per year, the dose equivalent to the whole body or critical organ does not exceed **4.0 mrem/year**. Other specific limits include a maximum gross alpha activity of 15 pCi/L (excluding radon and uranium isotopes), a maximum combined Ra-226 and Ra-228 concentration of 5 pCi/L, a maximum uranium mass concentration of 30 μg/L, and maximum H-3 and Sr-90 concentrations of 20,000 pCi/L and 8 pCi/L, respectively." [Emphasis added] [12]

DOE fails to disclose all INL contaminate contributions to the underlying Snake River Plain Aquifer. The EA only discloses some contributors and ignores Radioactive Waste Management Complex (RWMC). The EA states: "Assessing the cumulative impacts to groundwater requires consideration of other sources of contaminants that either exist in the aquifer currently or will enter the aquifer in the future. Locations of the sources include upgradient [sic] contaminants that could migrate through the aquifer volume potentially impacted by the remote-handled LLW disposal facility, nearby sources that could overlap the impacted region and those sources downgradient [sic] that might be affected by the remote-handled LLW disposal facility. The potential for cumulative impacts to groundwater were analyzed for each candidate onsite location (INL 2011a)." [13]

Based on Environmental Defense Institute's Freedom of Information requests limited information, the below document previous waste streams at INL. Clearly, DOE/INL is failing to disclose detailed characterization (including radiation/curie content) of the nuclear waste slated for the new dump.

The EA states: "DOE is planning to develop capabilities to support nuclear research, development, and testing at the INL Site and at facilities located in Idaho Falls (DOE-ID 2011). At the INL site, the restart of the Transient Reactor Test Facility is being considered for testing fuel behavior over a brief interval of time. Potential new capabilities include an analytical laboratory for post-irradiation examination and facilities for conducting laboratory-and engineering-scale testing of aqueous separations and materials disposition. These projects are in the initial planning phases and insufficient data exists to support evaluation of whether they could have a cumulative effect on a remote-handled LLW disposal facility. As these projects progress, their potential for cumulative effects will be considered as part of project planning." [EA pg. 4-15] This waste stream must be characterized – if only estimated.

For instance, this EA does not disclose Materials and Fuels Complex (MFC's) underground transuranic/GTCC waste site Radioactive Scrap and Waste Facility (RSWF) which – according to previous DOE documents has 81 cubic meters of waste containing 9,823,000 curies of radioactive materials including 40.73 grams of plutonium. [14] The RSWF consists of a large array of vertical carbon steel pipes that contain the waste. The EA states: "In addition, DOE is continuing to remove and process for disposition remote-handled waste that was placed in storage at the Radioactive Waste and Scrap Facility at MFC between 1965 and 2007 (DOE 2009)." [15] DOE fails to disclose the current RSWF inventory/characterization slated for the new dump. Also the MFC's pyrophoric REB-II sodium coolant post-treatment residual waste is not disclosed.

INTEC's Integrated Waste Treatment Unit (IWTU) incinerator - currently operating to treat

[12] EA-1793, pg. 4-2
[13] EA-1793, pg. 4-13
[14] See DOE/INL document # ID-10054-81, page 19
[15] EA-1793 pg. 2-2

900,000 gallons of high-level liquid waste remaining in the Tank Farm – post treatment waste destination is not disclosed. [16]

DOE fails to fully characterize Advanced Test Reactor (ATR) waste slated for the dump. The EA states: “At the ATR Complex, change-out of reactor core components generates remote-handled activated-metal approximately every 8 years. These components are stored in water-filled canals to allow radioactivity to decay.” [17] This designated waste includes irradiated reactor fuel and irradiated experimental fuel units and “reactor core components.”

“INL also provides infrastructure and research, development, and testing for other federal tenants and sponsors. Remote-handled LLW could be generated over the next 50 years from other INL support facilities and operations as part of ongoing activities (such as spent nuclear fuel management) or from potential new missions.” [18]

“The alternative of interim storage involved storage of remote-handled LLW at either the generator facilities or another acceptable, safe location until disposal capability is available. The generator facilities have very limited storage capacity available and there are no plans to expand interim storage capability. No other facilities exist or are planned onsite that could accommodate the remote-handled LLW for interim storage. Even if storage were available, implementation of an alternative for storage instead of disposal does not provide for permanent disposal of remote-handled LLW generated at the INL site beyond 2017.” [19]

The EA states: “The alternative of storage for decay considered storage of remote-handled LLW for sufficient time to enable its radioactive source term to decay to levels that would make it acceptable for disposal as contact-handled LLW. Storage for over 80 years would be required to provide time for the remote-handled LLW isotopes to decay to contact-handled LLW. Storage facilities do not exist to support this alternative. Even if storage were available, disposal capability for 80 to 130 years in the future is uncertain. In addition, an alternative for storage instead of disposal does not provide for permanent disposal of remote-handled LLW generated at the INL site beyond 2017.” [20]

The above EA statements are grossly miss-leading because it fails to acknowledge existing onsite temporary “road-ready” storage of highly radioactive waste. The INL INTEC has for many years managed (Independent Spent Fuel Storage Instillation) – under NRC permit – heavily shielded dry casks filled with waste as interim-storage pending final geologic disposal facility availability.

“The Naval Nuclear Propulsion Program is a joint Navy and DOE organization responsible for all matters pertaining to U.S. nuclear-powered submarines and aircraft carriers. At the INL site, NRF supports the Naval Nuclear Propulsion Program by receiving, examining, and processing spent fuel assemblies as part of preparations for final disposition. Naval spent nuclear fuel is shipped by rail in shielded shipping containers from naval shipyards to NRF, where it is removed from the shipping containers and placed in water pools for examination. The assemblies are then prepared for dry storage prior to shipment for final disposition. The process for preparing spent fuel assemblies involves removing non-fuel structural components (activated metals), which are remote-handled LLW that require disposal. Filtration of water in the NRF pools as part of ongoing maintenance also generates spent ion-exchange resins that are remote-

[16] Idaho Cleanup Project Progress Report 2009, CH2M-WG.
[17] EA-1793 pg.2-1
[18] EA-1793 pg. 2-2
[19] EA-1793 pg. 2-4
[20] DOE/EA-1793, page 2-5

handled LLW." [21]

Naval Reactors FY 2013 Congressional Budget allocates $35,493,000 for the Remote-Handled Waste Disposal Project. [22] Since the Navy is the primary funder of this dump, it's a credible assumption that Navy waste will dominate the volume interned. The Navy's $70,895,000 expansion of the NRF Expanded Core Facility to accommodate significant additions to its Nuclear Navy Propulsion fleet additionally indicates corresponding increased waste flow to the new INL dump. [23]

"Outyear [sic] funding [2013] supports Naval Reactors' core mission of providing proper maintenance and safety oversight, and addressing emergent operational issues and technology obsolescence for 103 reactor plants. This includes 71 submarines, 11 aircraft carriers, and four research and development and training platforms (including the land-based prototypes)." [24] Even this near-term level (103 reactors) of decommissioning will generate significant quantities of highly radioactive remote-handled waste destined for the new INL dump. Therefore, it is crucial for the Navy to disclose full characterization of waste planned for internment in the new dump. [See pg. 17 below for past NRF waste dumped at INL]

"FY 2013, FY 2014 and FY 2015 includes an allocation to Naval Reactors from the Department of Defense's (DoD) Research, Development, Testing and Evaluation (RDT&E) account entitled "NNSA PROGRI-'M SUPPORT". The amounts included for Naval Reactors from this DoD account are FY 2013 $5.8 million; FY 2014, $2.0 million; and FY 2015, $0.9 million." [25]

Additionally, the Naval Reactor Facility (NRF) continues to use its dry cask storage for highly radioactive waste and thus is obliged to continue storing (not dump) its own waste until a permanent geologic repository is permitted. See below attached NRF pictures that document the Navy's existing extensive capacity to generate "road-ready" nuclear waste for interim storage. There is no credible/legitimate reason these and/or comparable interim storage facilities cannot be used for all INL nuclear remote-handled low-level waste.

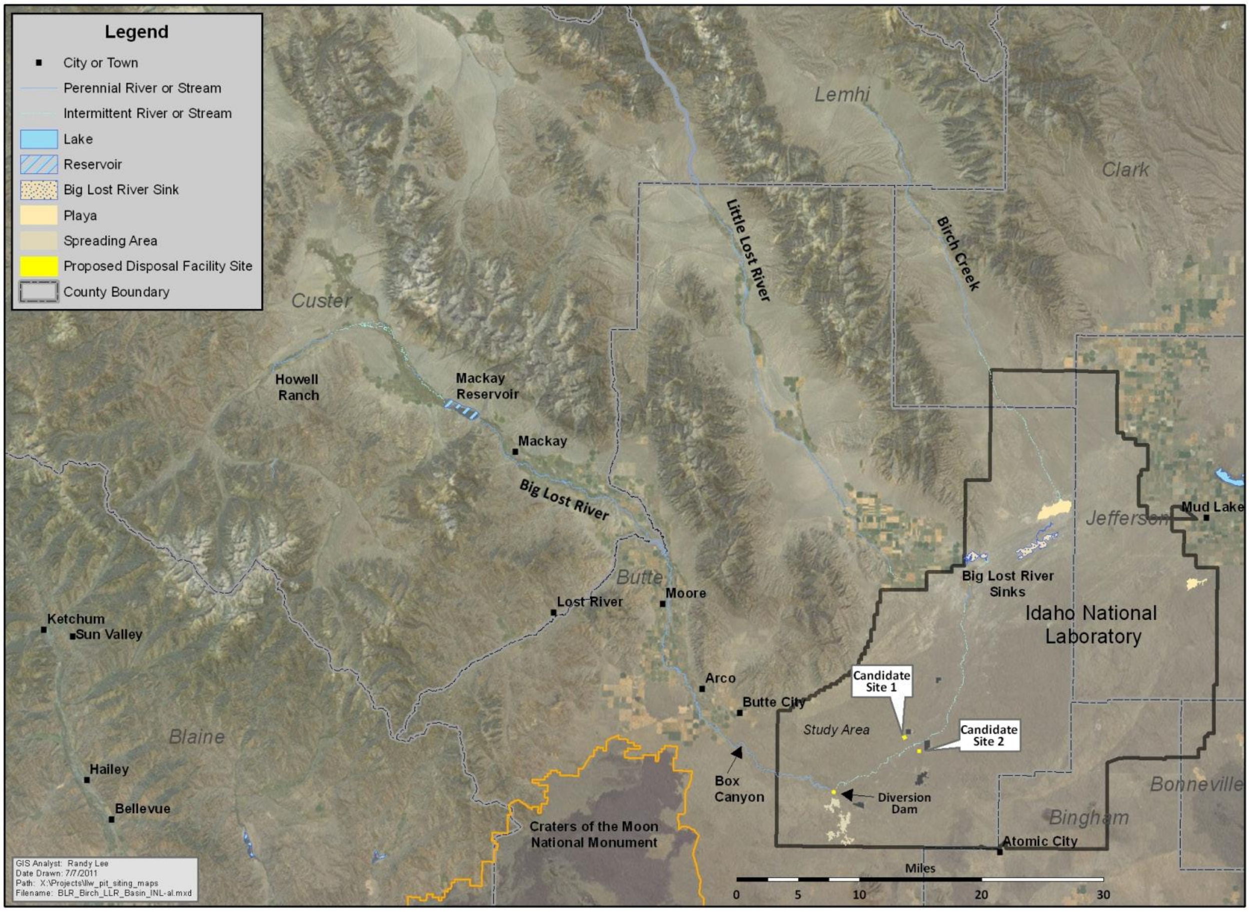
DOE's Notice of Intent states: "The Low-level Radioactive Waste Policy Act Amendments of 1985 specifies that the GTCC low-level waste covered under section 3(b)(1)(D) is to be disposed of in a facility licensed and determined to be adequate by the [Nuclear Regulatory Commission] NRC." "NRC regulations at 10 CFR 61.55(a)(2)(iv) define GTCC LLW as that waste which would require disposal in a geologic repository as defined in 10 CFR Part 60 or 63." [26]

The DOE/INL EA apparently offers no confirmation of NRC "determination" or disclosure of "adequate" compliance of siting criteria of the new INL dump.

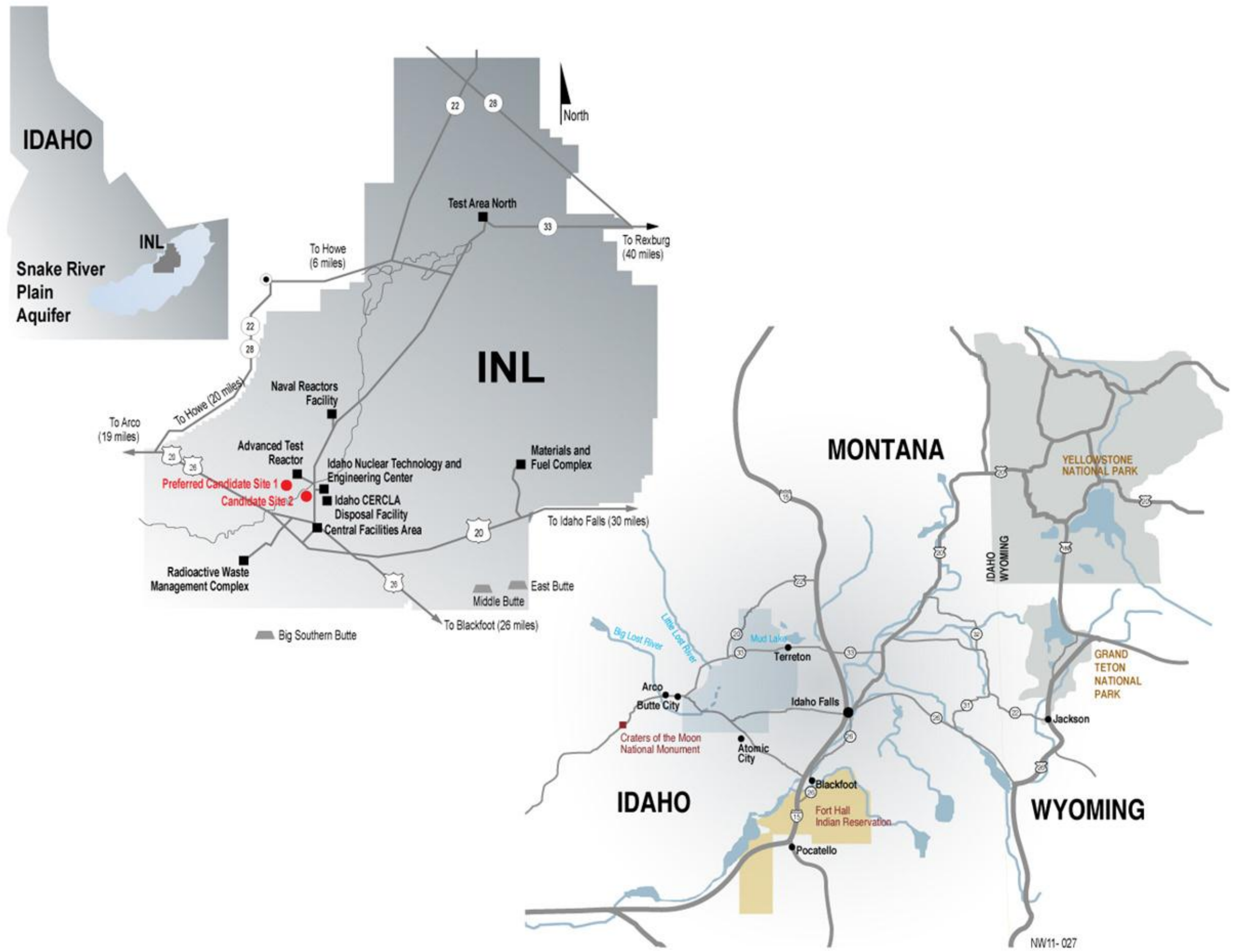
DOE's EA postulates that the new dump: "Be sited, designed, operated, maintained, and closed [once filled] such that the total all-pathways exposure to the public is less than 25 mrem/year effective dose equivalent (EDE) from the facility and to less than 30 mrem/yr EDE for all potential sources of radionuclides. [And] Limit the radionuclide concentrations for near surface disposal so that the potential exposure received by an inadvertent intruder (more than 100 years post-closure) would be limited to **100 mrem/year for acute exposure and 500 mrem**

[21] EA-1793 pg.2-2
[22] Naval Reactors FY 2013 Congressional Budget, Total Estimated Cost, pg. 489.
[23] Ibid.; Also see; Notice of Intent, To Prepare an Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling and Examination at the Idaho National Laboratory
[24] Naval Reactors, Overview, Appropriations Summary by Program, FY-2013 Congressional Budget, pg.480.
[25] Ibid.
[26] Federal Register / Vol. 72, No. 140, DOE Notice of Intent, 7/23/07.

total [effective dose equivalent] EDE for chronic exposure." [emphasis added] [27]



[27] DOE/EA-1793, page 2-1



Flooding Issues for the New Remote-Handled Waste Dump

DOE claims that the new Remote-Handled nuclear waste dump is "outside the 10,000 year flood plain. [28] This is statement is grossly inaccurate.

The US Geological Survey (USGS) released a 1998 report that modeled the **median** 100-year flow rates in the Big Lost River (that flows by the ICPP now called INTEC) downstream of the INL Diversion Dam (6,220 cf/s). The USGS report cross section number 22 at the ICPP puts the median flood elevation at 4,912 feet.[29] Again, this is only the mean flow rate (as opposed to the maximum rate of 11,600 cf/s) of just a 100-year flood, and **not** including any additional cascading events like the failure of Mackey Dam. The USGS flood map shows the northern half of the ICPP under water. There are only five-foot differences between the Idaho CERCLA

[28] Final Environmental Assessment, DOE/EA-1793 , page 3-4.

[29] Preliminary Water-Surface Elevations and Boundary of the 100 Year Peak Flow in the Big Lost River at the Idaho National Engineering and Environmental Laboratory, Idaho, US Geological Survey, Water-Resources Investigations Report 98-4065, DOE/ID-22148

Disposal Facility (ICDF) (south end of ICPP) elevation of 4,917 feet and the USGS predicted elevation of 4,912 feet through the middle of the ICPP. The USGS study also employed current modeling technics and plotted 37 separate cross sections on the INL site. The ICPP as a whole is about as flat as a table top with only a couple feet change in elevation north to south.[30] The crucial point here is that even the slightest variation in a Big Lost River flood would put the ICDF underwater assuming the dump was on the surface. Proportionally less variation in floods would inundate the dump the deeper the ICDF is buried below the surrounding terrain.

The EA states the following on dump site locations.

"1. Candidate Site 1 (the preferred location): located approximately 0.5-miles southwest of the ATR Complex. Surficial sediment thickness determined from wells in the vicinity of Candidate Site 1 ranges from 43 to 73 ft. with a mean thickness of 55 ft. Candidate Site 1 is located at an approximate elevation of 4,943 ft. and approximately 0.7 mi northeast of the Big Lost River channel.

"2. Candidate Site 2: An alternative area located southwest of the Idaho Nuclear Technology and Engineering Center (INTEC) and across Lincoln Boulevard to the west of ICDF. Surficial sediment thickness determined in wells in the vicinity of Candidate Site 2 ranges from 20 to 49 ft. with a mean thickness of 31 ft. Candidate Site 2 is located at an approximate elevation of 4,927 ft. and approximately 0.4 miles southeast of the Big Lost River channel." [31]

The above disclosed dump elevations are ground level **NOT the bottom** of the dump which would unquestionably be flooded when compared to above previous USGS flood estimates. Moreover, no disclosure that the INTRC/ICPP has been flooded on numerous times. Clearly costs dominated risks in the candidate dump site selection – it's easier to dig in the soft alluvial sediments along the Big Lost River. The EA states: "The initial evaluation of both sites indicates they are well suited for LLW disposal. Each site has adequate soil depth to support a remote-handled LLW disposal facility."

An earlier USGS study in 1996 also estimated the flow range for the Big Lost River at the INL; "The upper and lower 95-percent confidence limits for the estimated 100-year peak flow were 11,600 and 3,150 cubic feet per second (cf/s), respectively." [32]

Since 1950, INL has experienced significant flooding events (localized and site-wide) in1962, 1965, 1969, 1982, and 1984. In an effort to mitigate the flooding problem, DOE built a diversion dam on the Big Lost River that is designed to shunt flood waters to the south and away from INL facilities. USGS's 1998 report modeled the mean (midrange) 100-year flow rate of 7,260 cf/s upstream of the INL diversion dam. USGS estimated that the Big Lost median flow rate downstream of the diversion dam at 6,220 cf/s with a thousand cf/s going down the diversion channel for a total median flow rate of 7,260 cf/s upstream of the INL diversion dam. [33] "This peak flow was routed downstream [of the Big Lost River] as if the INL diversion dam did not exist. On the basis of a structural analysis of the INL diversion dam (U.S. Army Corps of

---

[30] Topographic Map of Block 21, National Reactor Testing Station (now called INL) showing works and structures, U.S. Atomic Energy Commission, Idaho Operations Office, shows three feet change in elevation between the north and south end of the ICPP.

[31] EA-1793, page 2-11.

[32] Estimated 100-Year Peak Flows and Flow volumes in the Big Lost River and Birch Creek at the Idaho National Engineering Laboratory, Idaho, U.S. Geological Survey, Water-resources Investigations Report 96-4163, L.C. Kjelstrom and C. Berenbrock, 1996, page 9.

[33] Preliminary Water-Surface Elevations and Boundary of the 100 Year Peak Flow in the Big Lost River at the Idaho National Engineering and Environmental Laboratory, Idaho, US Geological Survey, Water-Resources Investigations Report 98-4065, DOE/ID-22148

Engineers) assumed the dam incapable of retaining high flows. The Corps indicated that the diversion dam could fail if flows were to exceed 6,000 cubic feet per second."[34]

This USGS study acknowledged that the northern half of the ICPP would be flooded with four feet of moving water, even at this midrange (mean) flow rate. If ICDF excavation goes two feet **below** present surfaces, it will be below the elevation of the mean 100 year flood zone. Plans are to excavate ICDF pits most of the entire 50 feet to bedrock.

Since the radioactive waste will be extremely hazardous for tens of thousands of years and flooding will flush contaminates down into the aquifer, a conservative risk assessment would model the upper 95-percent confidence limits for the estimated 100-year peak flow of 11,600 cf/s. USGS has proposed this additional research to DOE, but the Department is not willing to provide the funding. A USGS hydrologist notes, "The flow of 11,600 cf/s represents the upper 95 percent confidence limit flow for the estimated 100-year peak flow (Kjelstrom and Berenbrock, 1996, p6). Future modeling needs are to model the area with this flow. We've expressed this to the INL and also have expressed that the WSPRO model used has limitations and that an application of more stringent models (two dimensional) is needed to refine and better delineate the extent of possible flooding of the Big Lost River." [35]

USGS estimates the mean 500-year Big Lost River flood rates at 9,680 cf/s (34% greater flow rate than the mean 100 year flood).[36] This 500-year flood would inundate the ICPP and surrounding area. These potential hazards are being ignored when making hazardous mixed radioactive waste internment decisions in these vulnerable areas despite the long-term consequences and the potential for additional aquifer contamination.

Cascading events also are not considered. This is known as a worst case scenario where one event triggers another event. For instance a 500-Year flood plus failure of Mackay Dam (built in 1917) resulting in estimated flows of 9,700 + 54,000 cubic feet per second respectively would be an example of a cascading event. Failure of Mackey Dam is non-speculative in view of the 1976 failure of the Teton Dam of similar construction and the fact that Mackey Dam lies within 11 miles of a major earthquake fault line that produced the 1983 Borah Peak 7.3 magnitude quake. An internal 1986 DOE report that analyzed the impact of Mackey Dam failure scenarios notes that, "Mackay Dam was not built to conform to seismic or hydrologic design criteria," and "the dam has experienced significant under seepage since its construction." [37] This EG&G study acknowledged that the ICPP, Navel Reactors Facility, and the Test Area North (LOFT) facilities would be flooded with at least four feet of water moving at three feet per second.

USGS did not consider cascading events but noted previous studies showing that failure of Mackay Dam alone would result in 6 feet of water at the INL Radioactive Waste Management Complex (RWMC) waste burial grounds. Other studies recognized by USGS note that, "Rathburn (1989, 1991) estimated that the depth of water at the RWMC, resulting from a paleo-flood [early] of 2 to 4 million cf/s in the Big Lost River in Box Canyon and overflow areas, was 50-60 feet." "If Mackey Dam failed, Niccum estimated that peak flow at the ICPP would be at 30,000 cf/s." [38] Comparing these flow rates with the USGS estimate 100-year mean flow of

---

[34] USGS 98-4065, page 8

[35] Charles E. Berenbrock, U.S. Geological Survey Hydrologist, March 25, 1999 email to Chuck Broscious

[36] Estimated 100 Year Peak Flows and Flow Volumes in the Big Lost River and Birch Creek at the Idaho National Engineering Laboratory, U.S. Geological Survey, Water Resources Investigations Report 96-4163, page 11 shows flow rates for 5-year, 10-year, 100-year, and 500-year floods

[37] Flood Routing Analysis for a Failure of Mackey Dam, K. Koslow, D. Van Hafften, prepared by EG&G Idaho for U.S. Department of Energy, June 1986, EGG-EP-7184, page 15

[38] USGS 98-4065, page 6

6,220 cf/s that would flood the north end of the ICPP with four feet of water, and a Mackey Dam failure becomes a real disaster potential with respect to the existing underground waste tanks and underground spent reactor fuel storage at the ICPP. [39]

DOE is relying extensively on the Big Lost River Diversion Dam (located at the western INL boundary) to shunt major flood waters away from INL facilities. The last comprehensive analysis of this diversion dike system (below the diversion dam) was conducted by USGS in 1986 in a report titled *Capacity of the Diversion Channel below the Flood Control Dam on the Big Lost River at the INEL*. In this study, USGS estimated a mean flow rate of 9,300 cf/s, 7,200 of which went into the diversion channel; and "2,100 cf/s will pass through two low swells west of the main channel for a combined maximum diversion capacity of 9,300 cf/s." "A sustained flow at or above 9,300 cf/s could damage or destroy the dike banks by erosion. Overflow will first top the containment dike at cross section 1, located near the downstream control structure on the diversion dam." [40] This USGS study did not analyze the construction of the diversion dikes but they would likely fail as did the upstream diversion dam, built at the same time, that the Army Corps of Engineers found structurally deficient. "On the basis of a structural analysis of the INL diversion dam (U.S. Army Corps of Engineers, written comments, 1997), the dam was assumed incapable of retaining high flows. The Corps indicated that the diversion dam could fail if flows were to exceed 6,000 cf/s. Possible failure mechanisms are: (1) erosion of the upstream face of the dam that results from high-flow velocities and loss of slope protections (rip-rap), (2) overtopping of the diversion dam by flows exceeding the capacity of the diversion channel and culverts, (3) piping and breaching of the diversion dam because of seepage around the culverts, and (4) instability of the dam and its foundation because of seepage."[41]

Waste Characterization and Disposal Issues
Low-Level Radioactive Waste and GTCC-Like Waste
(DOE/EIS-0375-D) February 2011

Environmental Defense Institute's (EDI) comments on DOE's Greater-than-Class-C (GTCC) waste EIS must be considered because Department of Energy (DOE) fails to include all relevant legacy waste under the department's control. Additionally, below referenced Bodman letter submitted previously does not include all of Idaho National Laboratory (INL) stranded waste issues resulting from the Nuclear Navy Propulsion Program that has no disposal path forward. Given the documented evidence of radioactive and hazardous waste migration into the INL underlying Snake River Plain Aquifer, and DOE current near-surface dumping and proposed additional waste dumping in deeper "soil vaults" at the INL Radioactive Waste Management Complex must stop. This waste must be returned to generator within six months of receipt as specified in Idaho/DOE Settlement Agreement where it can be put in generators robust above ground safe/monitored storage until a licensed disposal site is established outside of Idaho. The GTCC draft EIS must discuss alternatives for the current Navy waste and other Spent Nuclear Fuel dumped at INL because there is no current National Environmental Policy Act (NEPA) analysis for what to do with this waste.

---

[39] For more current information see David McCoy's report on EDI website; "Mackey Dam Vulnerabilities"

[40] Capacity of the Diversion Channel below the Flood Control Dam on the Big Lost River at the Idaho National Engineering Laboratory, US. Geological Survey Water Resources Investigations Report 86-4204, C. M. Bennet, page 1 and 25

[41] USGS 98-4065, page 9

The joint 5/14/08 letter to Department of Energy (DOE) Secretary Bodman by five organizations lead by Natural Resources Defense Council correctly challenges the Amendment to DOE's Waste Management Programmatic Environmental Impact Statement (PEIS) Record of Decision (ROD) and accompanying Supplement Analysis 3/7/08 and 2/08 respectively.

Specifically, this Bodman letter questions DOE's "proposed action of shipping up to 9,019 cubic meters of contact-handled (CH) and remote-handled (RH) [to radioactive for human contact] transuranic (TRU) waste to the Idaho National Laboratory (INL) and to the Waste Isolation Pilot Plant (WIPP)." DOE offers no evidence that this waste shipped to INL meets WIPP Waste Acceptance Criteria and therefore will become stranded at INL with no path forward for disposal. [42] This joint letter to Secretary Bodman continues; "Thus, if those waste streams are included in the proposed action, they would be 'stranded' at INL, in violation of the Idaho Settlement Agreement. That possibility for those waste streams is not analyzed in the ROD or [Supplement Analysis] SA." [43] EDI fully endorses this joint letter to Secretary Bodman and all the issues articulated therein.

Other Stranded Waste at INL

Below EDI offers another category of "stranded" or "orphaned" [44] waste resulting from Spent Nuclear Fuel (SNF) shipped to INL for processing that generates non-TRU remote handled (RH) waste that cannot be sent to WIPP or any other disposal site. [45] DOE designated INL as the central collection site for all SNF (foreign and domestic) with stainless steel/zirconium cladding. Ongoing processing at INL Idaho Nuclear Technology Center (INTEC) of this imported SNF for reprocessing/ storage/ disposal also generates significant amounts of remote handled highly radioactive waste that falls in the category of Greater-than-Class C (GTCC) low-level waste. [46]

DOE created a new category of waste called GTCC-"**Like**" waste that contains TRU waste [47] and/or mixed radioactive and hazardous waste regulated under the Resources Conservation Recovery Act (RCRA) that also fails to meet WIPP Acceptance Criteria (WIPP/WAC). DOE estimates the combined stored and near-term projected GTCC and GTCC-like waste volume at 5,600 cubic meters containing 140 million curies [48] of radioactivity. [49]

---

[42] In addition, DOE proposes to include DOE low-level waste (LLW) and transuranic (TRU) waste having characteristics "like" greater-than-Class-C (GTCC) LLW and which may not have an identified path to disposal (hereafter referred to as GTCC-**like** waste) in the scope of this EIS. DOE's GTCC-like waste is owned or generated by DOE. The use of the term ''GTCC-like'' does not have the intent or effect of creating a new classification of radioactive waste.

[43] See Attachment A Below for the full text of the joint Bodman letter. Also for more information contact Don Hancock at Southwest Research and Information Center; 505-262-2371; sricdon@earthlink.net

[44] Don Hancock, "What Will Happen to 'Orphan' Nuclear Waste," *Voices from the Earth*, Fall 2007, Vo.8, No. 3.

[45] See Federal Register Vol. 72, No. 140 7/23/07; "GTCC LLW is defined by the Nuclear Regulatory Commission (NRC) in 10 CFR 72.3 as ''low-level radioactive waste that exceeds the concentration limits of radionuclides established for Class C waste in [10 CFR 61.55].'' GTCC LLW is generated by NRC or Agreement State-licensed activities (hereafter referred to as NRC-licensed activities).

[46] DOE also designated its Savannah River Site as the collection site for all foreign/domestic aluminum-clad SNF due to existing reprocessing infrastructure for this category of SNF and INL existing infrastructure can reprocess SST/ZR clad fuels.

[47] Transuranic waste is radioactive waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for: (1) High-level waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the Administrator of EPA, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the NRC has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

[48] A curie of radioactivity is a huge amount within the context of EPA regulations limiting public exposure in units of pico-curies or one trillionth of one curie.

[49] Federal Register, Vol.72, No.140/ Monday, 7/23/07, page 40137.

The US Navy Nuclear Propulsion Program continues to send spent nuclear fuel (SNF) from various sites to the Idaho National Laboratory/ Naval Reactor Facility as part of its regular decommissioning or refueling program of its nuclear fleet. Possessing of this SNF for reprocessing/storage/disposal generates significant amounts of highly remote handled radioactive waste that falls in the category of GTCC low-level waste. According to Nuclear Regulatory Commission regulations, GTCC waste is prohibited from shallow landfill dumps and must be interred in a deep geologic repository. [50] Given that there is no final disposal site for this waste and DOE finally issued a Notice of Intent (7/18/07) to prepare an Environmental Impact Statement (EIS) for the disposal of GTCC waste. [51]

This is a violation of the State of Idaho's Settlement Agreement with DOE despite Susan Berke, coordinator for Idaho Department of Environmental Quality (IDEQ) INL Oversight Program statement; **"**Paragraph E.2.a of the Idaho Settlement Agreement and similar terms of the Site Treatment Plan require that treatable waste shipped into the State of Idaho shall be treated within six months of its receipt and shall be shipped outside of Idaho within six months of any treatment. Incoming waste is subject to these terms whether it is shipped to WIPP, another storage or disposal facility, or is returned to the shipping facility. " [52]

IDEQ refuses to admit that ongoing waste imports to Idaho/INL results in "orphan waste" that has no permitted/regulatory compliant path forward for disposal especially the non-compliant INL Radioactive Waste Management Complex/ Subsurface Disposal Area (RWMC/SDA).

Background

U.S. Federal District Court Judge Ryan issued his summary judgment September 21, 1992 which contained minor changes to the then Idaho Governor Andrus, DOE, and Navy agreement. One change included giving the State full veto rights over any additional shipments beyond the 19 shipments stipulated. The Navy appealed Judge Ryan's final Order Modifying Order of June 28, 1993 decision in the Ninth Circuit Court of Appeals on September 24.The concessions that DOE and the Navy had agreed to be required by law were overturned by the US Court of Appeals which remanded back to Judge Ryan. Economic threats from the single largest employer in the state of Idaho have clearly influenced the Governor's decision to allow the 19 additional Navy waste shipments. According to Judge Ryan, the immediate threat to Idaho's environmental security far outweighs the unsubstantiated military security issues presented by the Navy. Idaho's then Republican Governor Batt announced that the State will allow the Navy to send 18 additional spent fuel shipments to INL (now INL).

Navy Spent Reactor Fuel Operations

The US Nuclear Navy sends all its spent reactor fuel to INL for inspection and processing. As of 1992, the Nuclear Navy has 126 vessels active and 63 in retirement. The 126 active vessels contain 147 reactors. The 63 retired vessels contain 65 reactors. The Navy has produced, over its history, a total of 600 reactor cores for its 189 commissioned vessel fleet. Within the next eight years, the Navy will retire an additional 85 submarines. Counting refueling and retired reactors, INL has received a total of 259 core assemblies. In eight years (2000) that number will jump to 359 core assemblies. [Greenpeace]

"Outyear [sic] funding [2013] supports Naval Reactors' core mission of providing proper

[50] Title 10 Code of Federal Regulations (CFR) Subsections 72.3 and 61.55
[51] http://www.gtcceos.anl.gov
[52] Susan Burke 6/4/08 email to Chuck Broscious

maintenance and safety oversight, and addressing emergent operational issues and technology obsolescence for 103 reactor plants. This includes 71 submarines, 11 aircraft carriers, and four research and development and training platforms (including the land-based prototypes)." [53]

The Naval Reactor Facility's (NRF) Expended Core Facility at INL receives the whole reactor fuel assembly module. This facility is being expanded to include a Dry Cell for cutting reactor cores to accommodate the increased volume from refueling and decommissioning. The fuel rods are not easily removed from the rest of the assembly as are most conventional reactor cores. The steel structural core assemblies are designed to withstand combat shocks and maintain fuel rod configuration within the core during combat scenarios.

The Navy's Notice of Intent to conduct an Environmental Impact Statement states: " A second [Naval Nuclear Propulsion Program – NNPP] component of the mission is to support the design and maintenance of nuclear propulsion systems by providing for the examination of naval spent nuclear fuel and irradiated materials. This examination includes the receipt and unloading of the spent nuclear fuel; preparation of irradiated materials for examination using various visual, microscopic, and metallurgical techniques; and preparation of small fuel and non-fuel test samples for insertion into test reactors, where they are irradiated.

"The NNPP ensures that naval spent nuclear fuel handling and examination are performed in a safe and environmentally responsible manner in accordance with 50 U.S.C. 2406, 2511 (Codifying Executive Order 12344). Nuclear fuel handling and examination are intricate and intensive processes requiring a complex infrastructure. Naval spent nuclear fuel handling includes the transfer of spent nuclear fuel removed from a reactor to the ECF at the Naval Reactors Facility (NRF) at the INL, where it is received, unloaded, prepared, and packaged for disposal. Currently, naval spent nuclear fuel examination and the examination of some irradiated specimens are performed at the ECF. Examination of spent naval fuel and irradiated materials is essential to the mission of the Navy for three reasons: to provide data on current reactor performance, to validate models used to predict future performance, and to support research to improve reactor design." [54]

According to Thereon Bradley, Manager of the NRF, the Expended Core Facility cuts (or in some cases unbolts) the metal ends from the spent fuel elements in order to inspect fuel and cladding integrity and evaluate how the fuel survived service in the reactor. [Bradley'] Other core structural components are also cut off the spent fuel assembly. "All naval fuel modules have non-fuel bearing metal structures above and below the fuel region to facilitate coolant flow and maintain proper spacing within the reactor. These upper and lower non-fuel bearing structures must be removed to permit inspection of the modules. Removal reduces the storage space ultimately required for the fuel by approximately 50%." [DEIS(b) @ B-10] The core assembly components containing the uranium fuel sections are then sent intact to the Idaho Chemical Processing Plant (ICPP) now called INTEC for storage. The remaining reactor fuel element parts and structural components are sent to the INL Radioactive Waste Manage-Management Complex (RWMC) for shallow burial as "low-level" Class A or B waste. Until the mid-1970's this waste was dumped in the center of pits and trenches while less radioactive waste was dumped around it to provide additional shielding. Current practice is to use individual holes or "soil vaults" at the RWMC.

---

[53] Naval Reactors, Overview, Appropriations Summary by Program, FY-2013 Congressional Budget, pg.480.

[54] Notice of Intent to Prepare and Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling and Examination at the Idaho National Laboratory. 2010, hereinafter referred to NNP-NOI-EIS; www.ecfrecapitalization.us

On some select core assemblies, the Navy does a destructive examination in the water pool by cutting up the fuel elements as a more detailed evaluation of the uranium fuel and its cladding. In the past this process of cutting away the structural components was routine when the fuel was being reprocessed at the INTEC and the structural parts had to be separated from the uranium fuel components prior to reprocessing, as was the practice prior to 1990. The INTEC and other spent fuel facilities also routinely cut off metal parts of fuel rods on non-Navy fuel that was slated for reprocessing or storage, and sent these metal components to the RWMC for shallow land burial as "low-level waste." The Navy now acknowledges that "some of the structural material exceeds the 10 CFR 61 Class C concentration limits and is being stored in the water pools. Under the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240), DOE is responsible for ensuring safe disposal of all Greater than Class C waste in a facility licensed by the Nuclear Regulatory Commission." [DEIS(b) @ B-10]

This is a very recent policy shift by the Navy to even consider this waste Greater than Class C. Still, the Navy continues to ship this waste to the RWMC violating its own policy and DOE continues to receive and bury the waste in shallow holes. Extremely limited storage capacity in addition to DOE's inability to account for this waste in storage further challenges the Navy assertions that Greater than Class C waste is going anywhere but to the burial ground. As recently as 7/12/94 this writer observed a heavily shielded transport canister routinely used by the Navy at the RWMC beside a crane ready to unload.

Since this reactor core waste going to the burial grounds contains long-lived radioactive isotopes due to many years of exposure in the reactor core, it should be properly classified and treated according to Nuclear Regulatory Commission (NRC) disposal standards; i.e. Greater than Class C waste category. NRC disposal criteria require that "waste that will not decay to levels which present an acceptable hazard to an intruder within 100 years is designated as Greater-than-Class C waste (GTCCW)." [10 CFR 61.7] GTCCW waste, must, for this reason, be disposed at a greater depth than other classes, or, if that is not possible, under an intruder barrier with an effective life of 500 years. "At the end of the 500 year period," according to NRC regulations, "remaining radioactivity will be at a level that does not pose an unacceptable hazard to an intruder or public health and safety." [Ibid.] The adequacy of the NRC regulations is discussed more fully in the NRC Regulation section in this paper. There is considerable debate over NRC's non-enforcement that allows class-C and greater than class-C waste to be dumped in shallow land burial at INL.

DOE data shows that individual NRF waste shipments to the RWMC containing greater than 81,000 curies are common. [55] It also should be noted that this waste is currently dumped in shallow unlined holes (called "soil vaults") that would not qualify as a municipal garbage landfill, much less a RCRA Subtitle C hazardous waste disposal site, or a NRC GTCC radioactive waste repository. At the RWMC/SDA there are >20 rows of near-surface soil vaults with over 1,200 waste holes each containing several drums. More recently, this remote handled highly radioactive greater than Class C waste is dumped in near-surface Pit 20 in about 600 concrete lined vaults each containing at least two drums.

Another category of Navy waste is irradiated test specimens. "The irradiated materials program evaluates small specimens of materials for use in naval reactor systems. The specimens are loaded in sample holders, and the holders are placed in test assemblies at NRF/ECF. The assemblies are irradiated at [Advanced Test Reactor] ATR, and returned to ECF for

[55] DOE/ID, Radioactive Waste Management Information System (RWMIS) verification process that was released by initiation of Freedom of Information Act by EDI publicized the data. See EDI Citizens Guide to INL.

disassembly." "After completion of the final examination, specimens are shipped to ICPP now called INTEC for storage or to the INL Radioactive Waste Management Complex for disposal." [DEIS (b) @ B-12] Over 4,450 specimen shipments to and from the ECF have occurred as of 1989. [Ibid. @ A-9]

Releasable Radionuclides from Navy Test Specimens [INL ER/WM DEIS @A-68]

Fission and Corrosion Products		Fission and Corrosion Products	
Nuclide	**Activity (curies)**	**Nuclide**	**Activity (curies)**
Iodine-131	1,300	Eu-156	37.5
Tritium	351	Lu-177	15.9
Iodine-132	310	Eu-152	14.1
Eu-156	37.5	Zr-95	10.7
Eu-152	14.1	Zn-65	10.7
Zr-95	10.9	Co-60	7.68
Zn-65	9.8	Ce-141	6.6
Co-60	7.68	Eu-154	6.15
Eu-154	6.15	Cs-136	4.69
Sc-46	3.25	Sc-46	3.25
Cs-137	1.78	Iodine-131	2.37
Ru-106	0.336	Pr-144	0.219
Nb-95	0.264	CE-144	0.219

The Naval Reactor Facility Expanded Core Facility (ECF) was built in 1957. It has four separate unlined concrete water pools that contain 3 million gallons of water. The ECF does not meet current spent nuclear fuel (SNF) storage or seismic code requirements. NRF workers claim that 16,000 gallons per day are leaking from the pools. In an attempt to slow these leaks, NRF tried injecting grout around the perimeter of the pools. The grouting caused increased hydrostatic pressure that forced some horizontal leakage into the perimeter access corridor around the pools which then must be pumped out. ECF also a lacks leak detection system. All other fuel storage and processing facilities at the INL with similar characteristics have been designated unsafe and scheduled for closure. Therefore, the Navy's claim “that operation of the INL-ECF does not result in discharges of radioactive liquids" is inaccurate. [DEIS(b) @ 5.2-12] Because "three separate milling machines in the water pools are used to separate spent fuel components into smaller sections for examination in the shielded cells" [DEIS(b) @ B-13] This suggests that significant contaminates are released to the water in the pools. These processes make the uncontrolled leaks uniquely significant.

The Navy fails to provide seismic analysis documenting that the super structure of the ECF can sustain design basis earthquake and accident scenarios during transfer of fuel using the ECF bridge crane. Water Pits 1, 2, and 3 were only constructed to "Zone 2 earthquake requirements which were judged to be appropriate under the USGS's classification of the area at the time [1957] of their construction." Subsequent USGS requirements for INL raised that standard to zone 3.

"The [NRF] Expended Core Facility $44 million Dry Cell Project has a dry shielded fuel handling, disassembly, examination and shipping facility, a decontamination shop, and a shielded repair shop. The Dry Cell contains a semi-automated production line to receive and prepare fuel for shipment to the INTEC for chemical dissolution and recovery of unused uranium. The decontamination and repair shop will be integrally connected to the Dry Cell, and to existing water pits, to allow routine servicing of equipment without removing equipment from a shielded environment. A 10,000 foot extension to the existing facility will be used to house necessary control, receiving, storage and training spaces.

"Core examinations and preparations for shipping and dissolution are currently performed in water pits. This method is labor intensive, has notable technical disadvantages, and involves a significant burden of deliberately redundant administrative and physical controls for nuclear safety. The receipt of expended nuclear cores is expected to have increased by 1992. This surge will be compounded because many of these cores will be larger and heavier than those that are currently processed in the water pits. Existing facilities and systems cannot be economically upgraded and automated to meet the projected workload increases. The Dry Cell Project is essential to continued timely handling of expended cores in support of scheduled Naval nuclear-powered vessel refueling and inactivation's." [DOE Fy93] Because of severe deterioration of the concrete, leaks in the pool walls, and the gate seal leaks, the ECF pools cannot be isolated.

The Navy's Notice of Intent to prepare and EIS states: "This action is needed because, although the ECF at the NRF, where this work is currently supported, continues to be maintained and operated in a safe and environmentally responsible manner, a significant portion of the ECF infrastructure has been in service for over 50 years. Deterioration of the ECF infrastructure could immediately and profoundly impact the NNPP mission, including the NNPP's ability to support refueling and defueling of nuclear powered submarines and aircraft carriers. The ECF abilities to transfer, prepare, examine, and package naval spent nuclear fuel, and other irradiated materials are vital to the NNPP's mission of maintaining the reliable operation of the naval nuclear-powered fleet and developing militarily effective nuclear propulsion plants." [56]

Navy Waste Characterization

Publicly available summary DOE data recorded between 1952 and 1981 cites the Navy's NRF as dumping 3,195,000 Ci. at the RWMC, making the Navy the second largest curie contributor to INL's dump. [ID-10054-81@15] Yet, DOE's restricted access Radioactive Waste Management Information System Solid Waste Master (RWMIS) Database (gained by EDI FOIA request) attributes 187,050,351 curies to Navy's NRF dumping at the RWMC between 1960 and 1981. [RWMIS, P61SH090] Between 1960 and 1989 the Navy dumped 188,140,668 curies at the RWMC. [ibid] This figure makes the Navy the largest curie contributor to INL's dump. DOE recently revised these figures claiming a mistake in data entry more fully described below. DOE now claims that there was an entry error in their database that went undetected for 24 years.

DOE/ID responded to Environmental Defense Institute (EDI) Freedom of Information Act (FOIA) request with a copy of INL contractor EG&G's Radioactive Waste Management Information System (RWMIS) verification process that was initiated because EDI publicized the data.   According to the RWMIS 1/4/88 and 10/24/89 computer runs, there were four waste shipments on 9/15/69 from the Naval Reactors Facility (NRF) to the Radioactive Waste

[56] NNPP-NOI-EIS, 2010

Management Complex (RWMC). The RWMIS lists the times of the four shipments at 820, 830, 840, and 850. The 820 NRF shipments are listed as "metal scrap".

The Navy's reactor core wastes that have been buried at the RWMC must be exhumed at considerable expense and hazard to workers. The core assemblies are extremely radioactive and require remote handling. Individual NRF shipments to the RWMC of 81,000 curies attest to this hazard. Furthermore, the cores are not packaged in any radiation containment unit. NRF officials only acknowledge that the waste is shipped in a canister from the NRF, and the shipping canister is returned to the facility.

Until the mid-1970's the Navy dumped fuel element parts and specimens into the RWMC pits and trenches. Since then, the Navy continues to dump reactor core assemblies at the RWMC in "soil vaults", which are defined as shallow (2 to 6 feet diameter) holes in the ground where the waste is dropped in and covered with 3 feet of soil. As of 1979, there are 1,150 "soil vaults" in 20 separate rows. Currently the RWMC is undergoing environmental restoration under the CERCLA Superfund cleanup process. Remediation projects have begun, starting with Pit 9. Even the most pedestrian of observers can see how ludicrous cleanup activities are when dumping continues in the immediate vicinity creating new Superfund cleanup actions. The Environmental Protection Agency is responsible in that the agency has been unwilling to promulgate radioactive exposure and waste disposal standards - mainly due to inter-agency disputes among DOE, NRC, and EPA. Previous attempts (1987) by EPA to establish standards were struck down by the courts as not protective of human health. It is outrageous that simultaneously the INL burial grounds are undergoing Superfund cleanup of radioactive wastes that are contaminating the aquifer below, and in the immediate vicinity, the Navy continues to bury highly radioactive waste that will be the object of future cleanup activities.

The unique nature of the Navy spent fuel assemblies and the Naval Reactor Facility's processing/ inspection operations is secret. The highly enriched Navy waste poses a significantly greater environmental threat than other conventional low-enriched reactor fuel that goes directly into storage cooling ponds. Additionally, the Navy waste going to the RWMC must be classified as transuranic waste and/or GTCC waste by virtue of the fact that it contains reactor core assembly sections contaminated with long-lived radionuclides. The extremely high curie content of these waste shipments attests to this fact. Institute for Energy and Environmental Research's book *High-Level Dollars, Low-Level Sense* challenges the NRC radioactive waste disposal standards that states in part:

"In examining the NRC regulations, one is thus led to believe that the class limits [Class A, B, C, and greater than C] were derived from the requirements imposed by these hazard definitions and time frames. However, even according to NRC's own definitions of what is 'hazardous' and what is 'acceptable' the time frames of 100 years [Class A] and 500 years [Class C] are logically incompatible with the class limit definitions, raising serious questions about their environmental and public health adequacy." ... "For example, much of the '100 year' waste (Classes A & B), for example, will not decay to NRC-defined 'acceptable' levels in 100 years. Consider nickel-63. Buried at Class B concentrations levels of just under 70 curies per cubic meter, waste containing nickel-63 would still have concentrations of about 35 curies per cubic meter after the institutional control period of 100 years had elapsed. According to NRC regulations, at this point the waste should have decayed to the point where it 'will present an acceptable hazard to an intruder.' Yet, at 35 curies per cubic meter, the waste, if retrieved from the disposal site and re-buried, would still be classified as Class B waste since it has concentrations levels which are 10 times higher than the Class A limits. As a matter of fact, this waste would take a total of well over 400 years to decay just to the Class A upper limits (at which point the NRC regulations would still define it as hazardous for another 100 years if it were being buried for the first time)." [IEER© @ 74&75]

"This analysis makes an even stronger case against the NRC regulations when applied to the Class C limits, which pertain to 'long-lived radionuclides'. Class C waste contaminated with technetium-99, however, buried at concentrations of just under the Class C limit of 3 curies per cubic meter, will be hazardous according to NRC definitions for far longer than 500 years. It will take such waste over the three half-lives - some 640,000 years - just to decay to the upper boundary of Class A levels. The illogical nature of the above regulatory approach is made even more explicit in the NRC's discussion of the 'long-lived' radionuclides in the waste. According to the NRC, in managing low-level waste, 'consideration must be given to the concentration of long-lived radionuclides ... whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures'". [IEER(c)]

"In essence, there is an admission that the hazard due to long-lived radionuclides 'will persist long after' the controls imposed by the regulations fade away. This is an extraordinary admission of the regulations fundamental inadequacy right in the text of the regulation. The only thing the NRC regulations will apparently do with respect to the long-lived components of low-level waste, is push the hazard into the future, since NRC-mandated controls will, at most, only 'delay the time when long-lived radionuclides could cause exposure'. In the case of many long-lived radionuclides, they will continue to be present in almost exactly the same concentrations when institutional controls have lapsed as when they were first buried." [IEER(c)] [www.ieer.org]

The Nuclear Regulatory Commission (NRC) requires in classifying a specific waste shipment that the part of that volume that contains 90% of the radioactivity be separated and used to determine the concentration and thereby the waste classification. The Navy and DOE continue to use the entire volume of the shipment to calculate the average concentration. The result is that the radioactive concentration appears low because of dilution. The NRC's Staff Technical Position specifically prohibits this practice of factoring in other material as a means of dropping the average concentration. The Navy is also using total volume averaging to avoid NRC regulations in burial of reactor shells at the DOE Hanford site. An EG&G groundwater sampling report found radioactive contaminates at the 600 foot level under the INL burial grounds.

Summary of Nuclear Navy Waste (1960-1993)
Dumped at INL's RWMC Burial Ground

Year Dumped		Curie Content of Waste *
1960		1,364
1961		6,717
1962#		20,900
1963		34,933
1964 Navy Knolls Lab. Reactor	Core + Loop Comp.	6,400
1964		24,050
1965		517,571

1966	787,300
1967	801,100
1968#	198,600
1969#	644,000
1970	3,572,048
1971	54,669
1972	10,577
1973	9,411
1974	5,782
1975	4,911
1976	73,348
1977	144,758
1978	34,962
1979	109,171
1980	39,206
1981	19,219
1982	8,401
1983	39,035
1983 NRF S1G Reactor Vessel	5,579
1984	372,614
1985	141,748
1986	35,928
1987	29,664
1988	6,722
1989 #	126,400
1990 #	74,120
1991 #	102,600
1992 #	49,300
1993 #	27,560
Total 1960 through First Quarter 1993	**8,140,668**

Source for above table:
[Radioactive Waste Management Information System Master Database, P61SH090, 10/24/89]; [#][Senate Armed Services Committee, Subcommittee on Nuclear Deterrence, Arms Control and Defense Intelligence, Hearing on: shipment of Spent Nuclear Fuel, 28 July 1993, Questions and Answers for the Record, @ 25]

* The above table curie content of shipments less than 1 curie were not added to the above summary table, therefore, the totals are understated. Also **not included** are Navy contractors, General Dynamics' (Electric Boat Div. and General Atomics Div.) seven shipments of "irradiated fuel" to the RWMC; and General Electric's eleven shipments of "irradiated fuel" and ten reactor "core + loop" assemblies; and Office of Isotopes Specialists' one shipment of "irradiated fuel" to RWMC. DOE and Navy officials publicly deny that spent fuel was dumped at the INL burial ground (RWMC) in direct contradiction to their own data base entries. (See Spent Nuclear Fuel Dumped in Burial Ground that shows 90.282 metric tons of irradiated fuel dumped in RWMC).

Navy Waste Characterization
Partial listing of isotopes found in Navy waste dumped at INL

Isotope	Symbol	Half-Life in days	Half-Life in Years
Americium-241	Am-241	1.7 E+5	465.7
Antimony-125	Sb-125	877	2.4
Barium-133	Ba-133	12	-
Cerium-144	Ce-144	290	-
Cobalt-58	Co-58	72	-
Cobalt-60	Co-60	1,900	5.2
Chromium-51	Cr-51	27	-
Cesium-134	Cs-134	840	2.06
Cesium-137	Cs-137	1.10 E+9	30.17
Europium-154	Eu-154	5,800	15.89
Hafnium-181	Hf-181	46	-
Iron-55	Fe-55	110	-
Iron-59	Fe-59	45	-
Iridium-192	Ir-192	74	-
Lead-210	Pb-210	7,100	19.4
Manganese-54	Mn-54	300	-
Neptunium-237	Np-237	8.0 E+8	2,191,780
Nickel-59	Ni-59	2.9 E+7	79,452
Nickel-63	Ni-63	2.9 E+4	79.4
Niobium-95	Nb-95	35	-
Potassium-40	K-40	.50	-
Plutonium-238	Pu-238	3.3 E+4	87.7
Plutonium-239	Pu-239	8.9 E+6	24,131
Plutonium-240	Pu-240	2.4 E+6	6,575
Plutonium-241	Pu-241	4.8 E+3	14.35
Plutonium-242	Pu-242	1.4 E+8	383,561
Promethium-147	Pm-147	920	2.5
Radium-226	Ra-226	5.9 E+5	1,616
Ruthenium-106	Ru-106	365	-
Silver-110M	Ag-110M	270	-
Sodium-22	Na-22	950	2.6
Strontium-89	Sr-89	50	-
Strontium-90	Sr-90	10,512	28.8
Technetium-99	Tc-99	7.7 E+7	210,958
Thorium-232	Th-232	5.1 E+12	13,972,600,000
Tin-119	Sn-119	112	-

Uranium-233	U-233	5.9 E+7	161,643
Uranium-234	U-234	9.1 E+7	249,315
Uranium-235	U-235	2.6 E+11	712,328,767
Uranium-236	U-236	8.7 E+9	23,835,616
Uranium-238	U-238	1.6 E+12	4,383,561,644
Zirconium-95	Zr-95	63	-

Source: USDOE, Radioactive Waste Management Information System Master Solid Database, 10/24/89

The above table shows clearly how Navy waste dumped in the burial grounds contains transuranic elements. One of the reasons for this is the lack of precision in cutting off the structural parts of the fuel element in preparation for reprocessing or storage. Destructive tests of fuel assemblies additionally add to the fissile content of the waste stream. In recent DOE documents characterizing the waste streams going to the RWMC they acknowledge presence of, "Irradiated fuel element end boxes that were cut off of the fuel plates in the hot cells. The end boxes may contain some fuel, but generally only activation products". [EGG-WM-10903 @ 2-30] Independent characterization of this waste must be made before more is dumped at the RWMC.

The Environmental Protection Agency (EPA) found that INL violates the Resource Conservation and Recovery Act and "That the presence and/or release and potential release of hazardous waste from USDOE's facility may present a substantial hazard to human health and/or the environment ..." [EPA (a), 9/15/87] Substantive corrective action has yet to occur because EPA does not have the authority to shut down any INL facility. [57]

Conclusion

The above comments are an attempt to document the numerous deficiencies in DOE's Environmental Assessment and thus make a credible case for the need for a comprehensive Environmental Impact Statement that would cover the EA's gross short comings. The public demands that DOE fully disclose operations that have the potential to impact their sole source aquifer. Given the fact that even the Navy has issued a notice to conduct a full EIS on its operations, surely DOE can do the same.

In the interest of the public environmental health and safety, clearly, this highly radioactive remote-handled nuclear waste must be placed in INL on-site, above-ground interim road-ready temporary storage until a permanent geologic repository is established.

Respectfully submitted

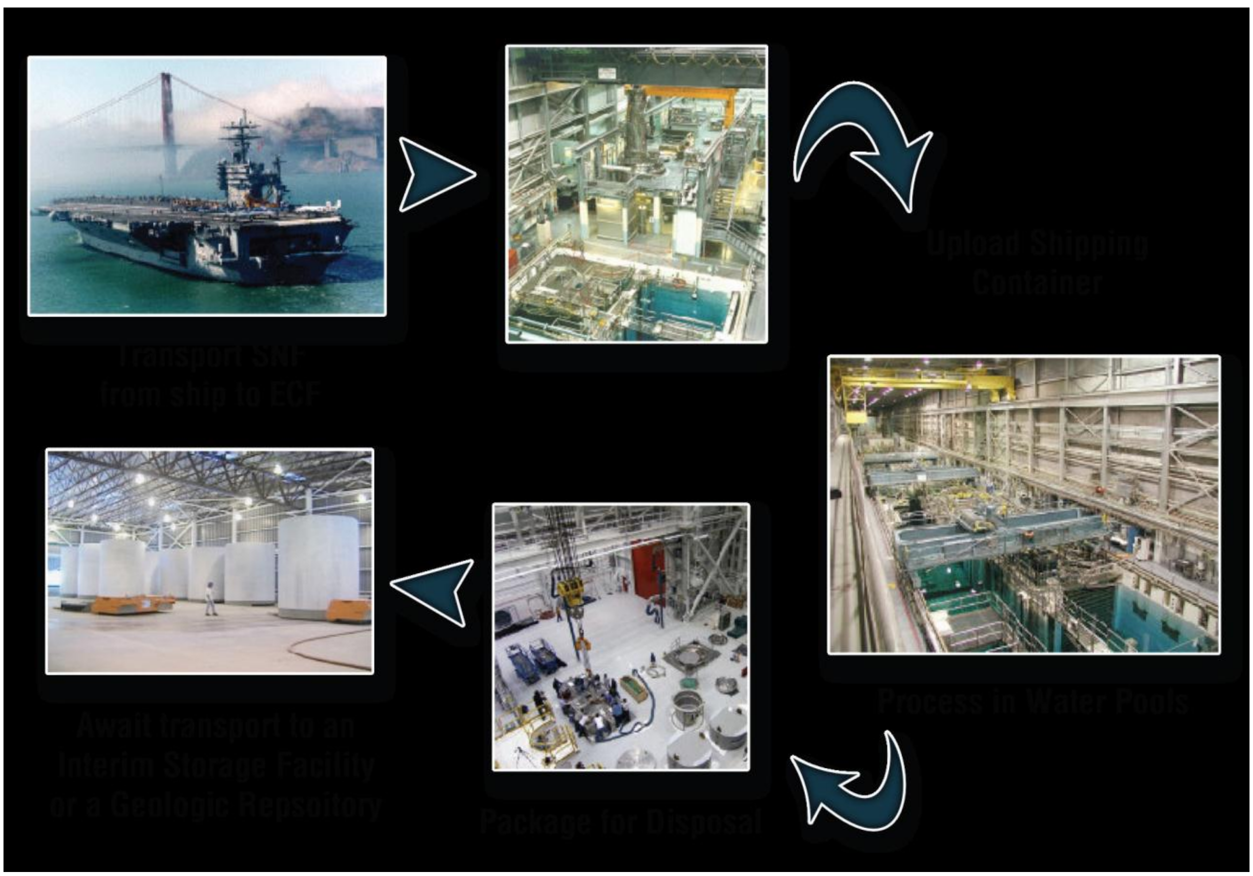
Chuck Broscious
President Environmental Defense Institute
PO Box 220, Troy Idaho 82871-0220
208-835-5407
edinst@tds.net
http:www.environmental-defense-institute.org

cc: via email

[57] *See Environmental Defense Institute's Citizens Guide to INL (pages 52 to 60) that offers additional reference citations available at http://environmental-defense-institute.org*

Toni Hardesty, IDEQ; toni.hardesty@deq.idaho.gov
Susan Burke, IDEQ, INL Oversight Program; Susan.Burke@deq.idaho.gov

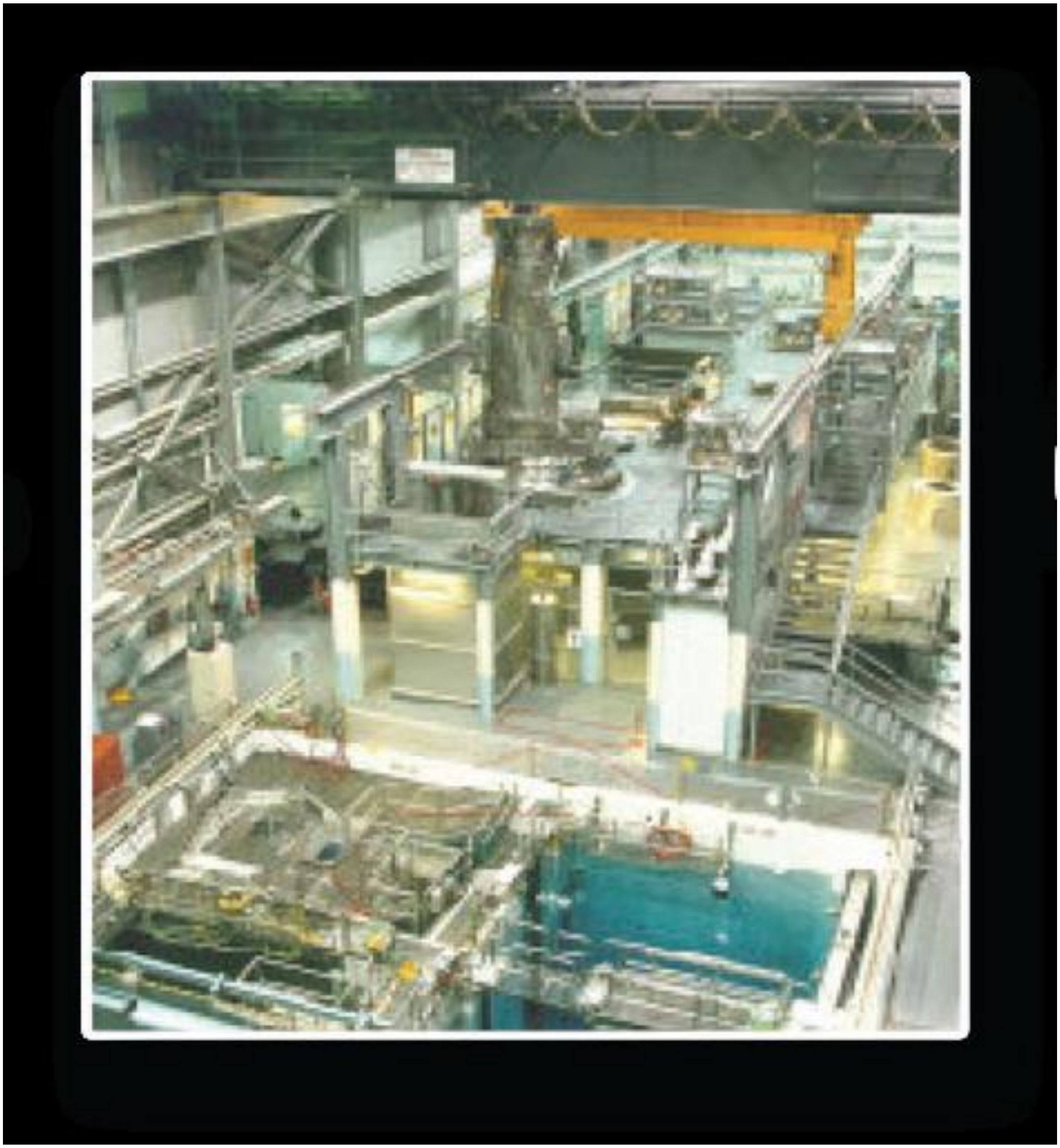
Naval Nuclear Propulsion Program Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel and Handling and Examination at the Idaho National Laboratory [58]



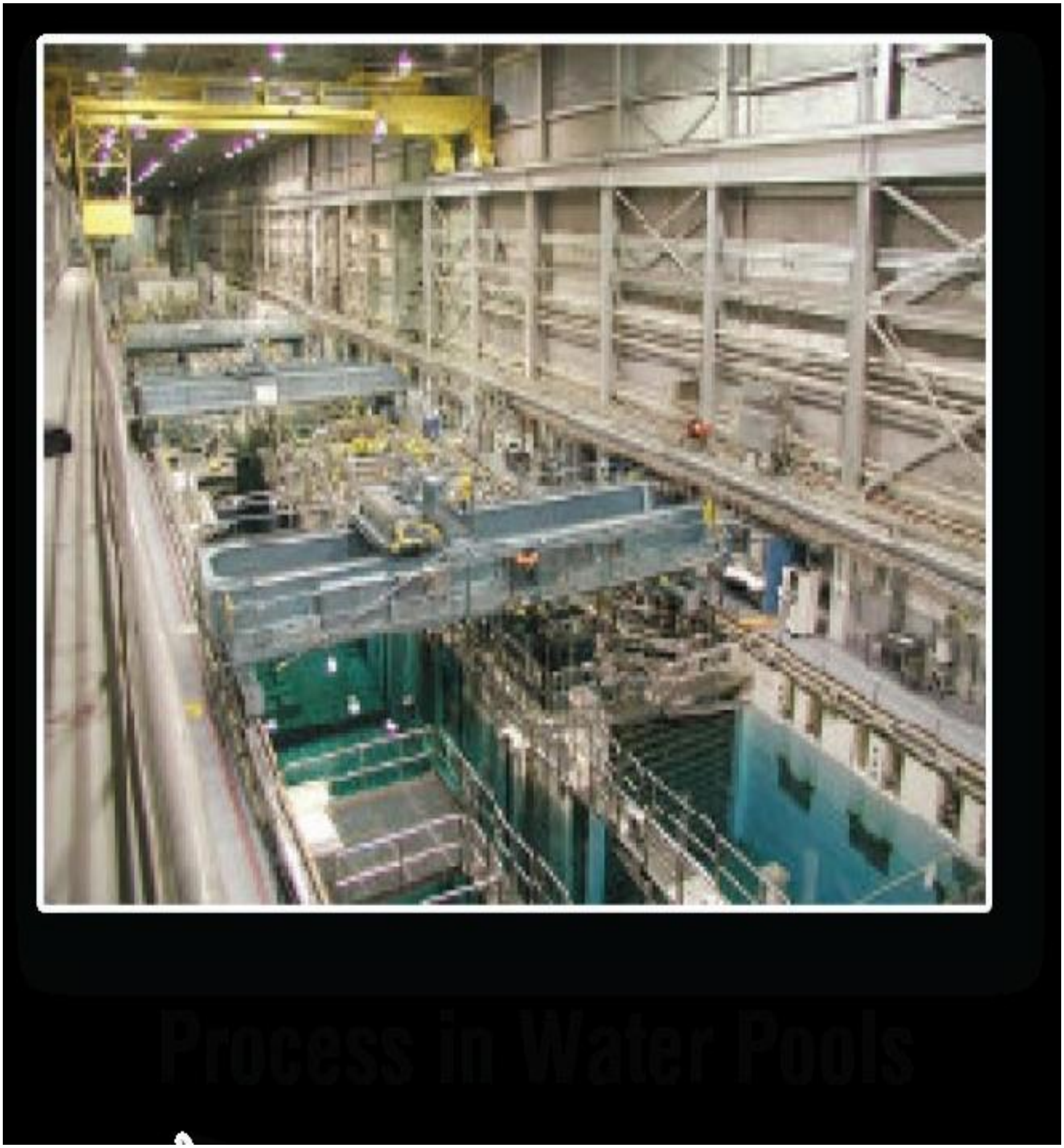
[58] Naval Nuclear Reactor Propulsion Program public handout, 12/11

Naval Reactors Facility at the Idaho National Laboratory

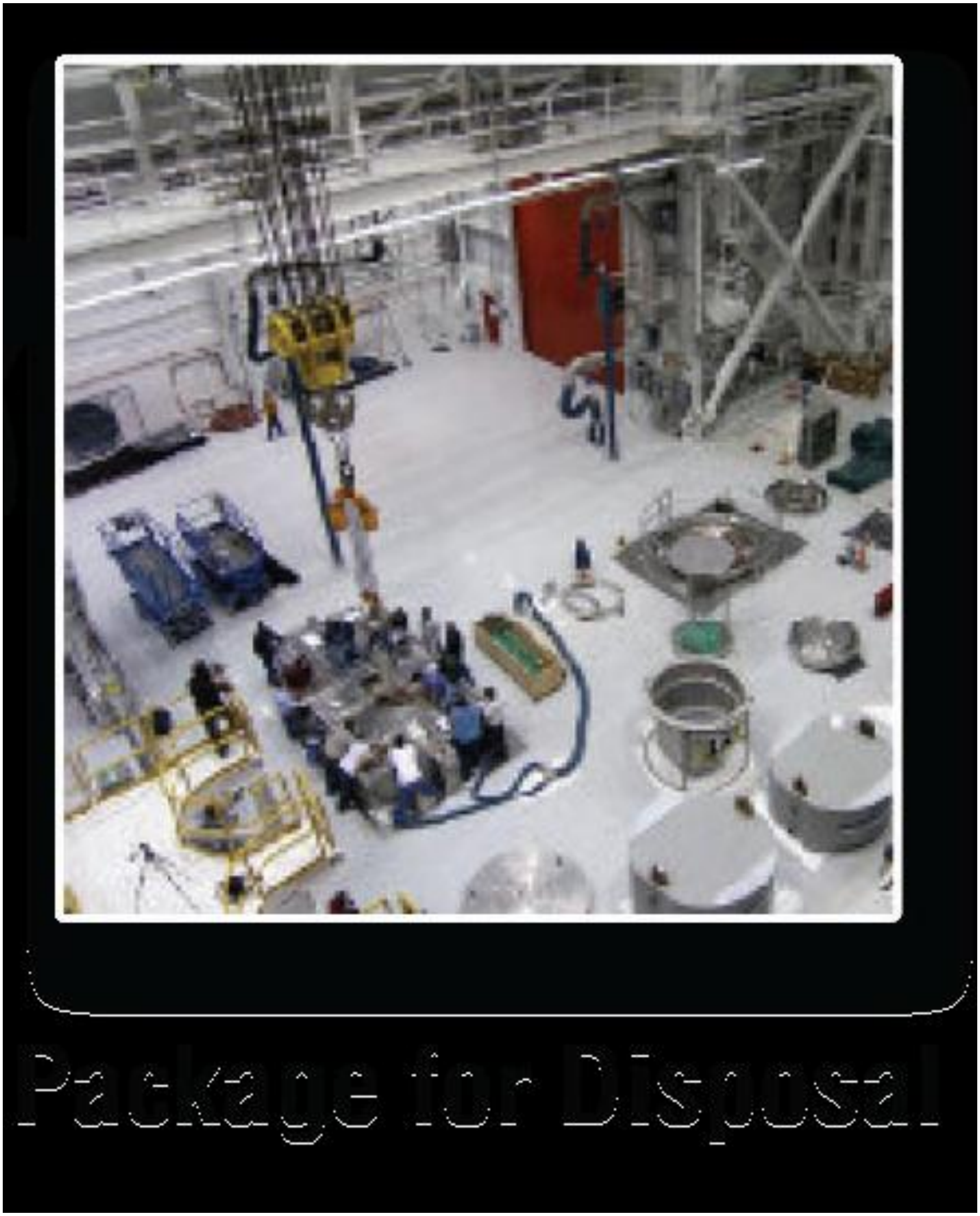
Visit www.ecfrecapitalization.us to learn more about the Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling and Examination at the Idaho National Laboratory.



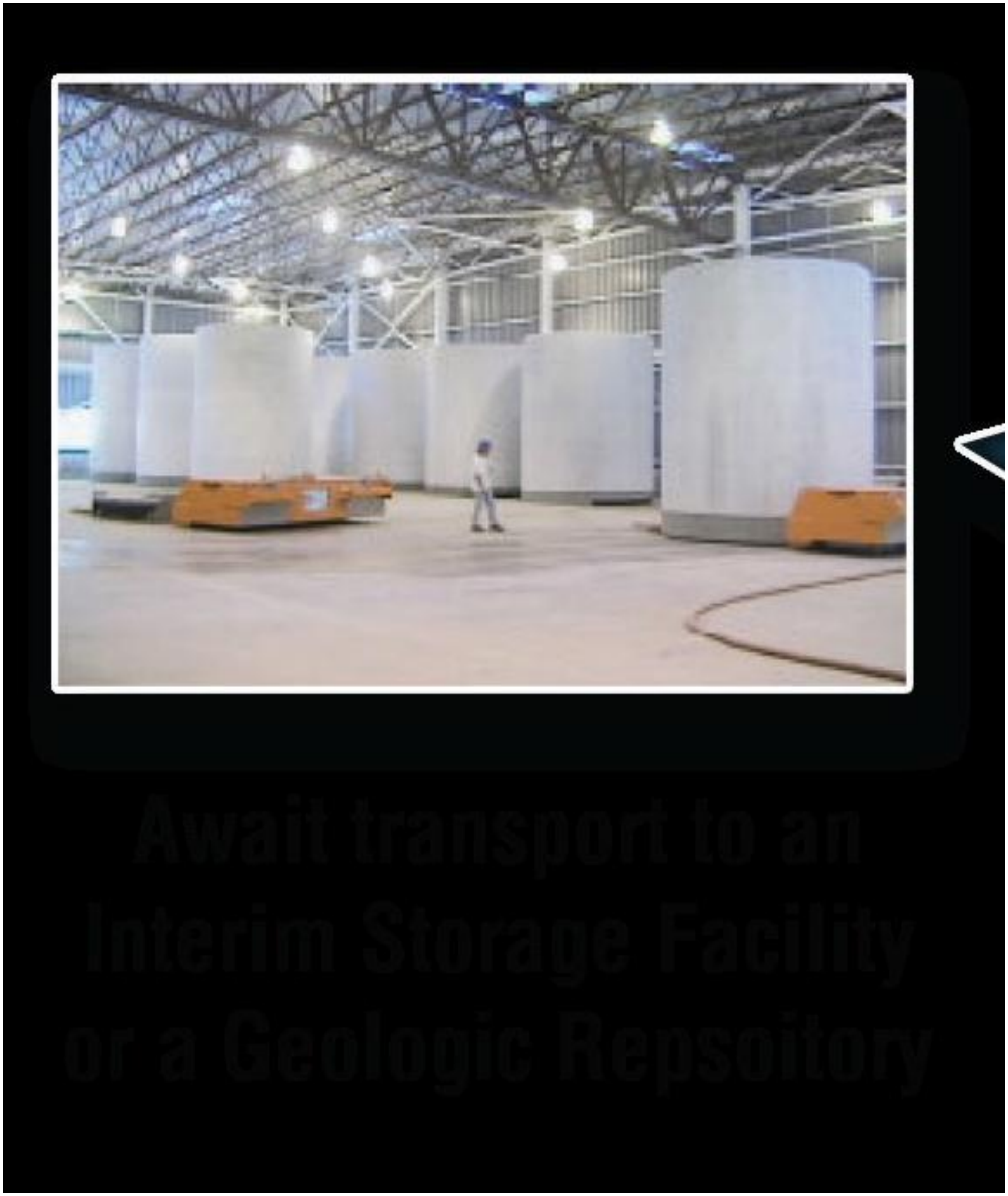
Uploading Waste Shipping Containers



Process in Water Pools



Radioactive Waste Package for Disposal



**Await Transport to an Interim Storage Facility
or a Geologic Repository**

Interim Storage of high-level radioactive waste in “road-ready” canisters in highly concrete shielded units operating at INL