Environmental Defense Institute
Troy, Idaho 83871-0220

November 13, 2006

Toni Hardesty, Director (sent via email)
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706-1255

Daryl Koch (sent via email)
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

RE: Revised Comments on Department of Energy, Idaho National Laboratory, Reactor Technology Center, Engineering Test Reactor Decommission/Decontamination and Waste Disposition at the INL CERCLA Disposal Facility.

The Environmental Defense Institute (EDI) offers the following revised comments on the disposition of the waste generated by the decommissioning/ decontamination (D&D) and cleanup of the Engineering Test Reactor (ETR) at the Reactor Technology Center (RTC), and disposal at the INL CERCLA Disposal Facility (ICDF).

DOE's Risk Assessment document shows the Engineering Test Reactor (ETR) core slated for disposal at the ICDF contains 59,228.1295 curies of radioactive contamination. [1] This is a huge quantity of extremely deadly radioactive waste to dump over-top the Snake River Aquifer and within the Big Lost River flood plain. See Attachment below.

DOE Risk Assessment document also states the ETR core mass at 22,276 kilograms (22,276,000 grams). [2] However, Engineering Design File uses ETR core mass of 74,535,000 grams for calculating the total transuranic content of the core and the beryllium reflector. [3] This is a significant discrepancy because it apparently radically understates the total nCi/g total applied to the ICDF Waste Acceptance Criteria limit of 10 nano-curie/gram limit. This discrepancy must be resolved due to the regulatory implications.

---

[11] Groundwater Pathway Risk Assessment for the Engineering Test Reactor Complex Closure, Engineering Design File , Doc. ID. EDF-5142, (EDF) page 28 through 30, effective date 10/31/06

[2] Engineering Design File (EDF) - 5152, page 21.

[3] Engineering Design File (EDF) - 7222, approved 9/11/06, page 14.

Additionally, "The [radioactive] transuranic activity in the [beryllium] reflector was determined to be 9.59 x 10^{7} nCi [95,900,000 nCi]. It was obtained by multiplying the average transuranic specific activity for the reflector, 177 nCi/g by the total beryllium mass, 5.424 x 10^{5} gram [542,400 gm]." [4] This also puts the beryllium reflector into the Nuclear Regulatory Commission (NRC) definition of Transuranic waste greater than 100 nCi/g that requires deep geologic disposal. [5] Dumping the beryllium reflector together with the ETR core violates both the ICDF WAC but also NRC regulations that require deep geological disposal of Transuranic waste.

According to Daryl Koch at Idaho Department of Environmental Quality (IDEQ) "ETR vessel characterization data can be reviewed in Engineering Design files EDF 6133 and 7222. These documents, as well as the Engineering Evaluation and Cost Evaluation EE/CA, DOE/ID-11272, are in the INL administrative record. [6] [T]he 'vessel' and attached 'internals', i.e. beryllium reflector, etc; would be disposed as a single item waste package. The radioactive data is presented in the aforementioned documents. There is no 'core' (fuel & associated items) remaining in the vessel. They were removed in 1981. GTCC [Greater-than-Class-C] waste is not expected to be generated from this particular decommissioning project. If it did, a Performance Assessment, as discussed in my e-mail of yesterday could be performed. If the waste still exceeded GTCC then it would have to be addressed by a facility other than the ICDF." [7]

The issue of Greater-than-Class-C (GTCC) waste is crucial here because of the Nuclear Regulatory Commission (NRC) definition of; "Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. In the absence of specific requirements in this part, such waste must be disposed of in a geologic repository as defined in part 60 or 63 of this chapter." [8]

Nuclides identified by NRC regulations for GTCC include C-14, Ni-59, Nb-94, Tc-99, I-129, Pu-241, Cm-242, H-3, Co-60, Ni-63, Sr-90, Cs-137. [9] All of these radionuclides are in the ETR vessel and reflector slated for near-surface disposal in significant quantities at the ICDF near-surface dump site. For instance, see the long-lived radionuclides; Cobalt-60 concentrations of 1,970 Ci; Ni-63 concentrations of 24,200 Ci. [10]

---

[4] EDF-7222, page 13.

[5] Transuranic waste also known as TRU waste, contains elements with atomic numbers greater than 92, the atomic number of uranium. TRU waste contains alpha-emitting transuranic radio-nuclides with half-lives greater than 20 years and total concentration greater than 100 nano-curies per gram. This is the U.S. Environmental Protection Agency definition. The U.S. Nuclear Regulatory Commission definition is slightly different and is part of a broader category called Greater-than-Class-C waste.

[6] http://ar.inel.gov/owa/select_current_2

[7] Daryl Koch email to Broscious 11/1/06

[8] 10 CFR 61.55

[9] 10 CFR 61.55

[10] EDF-5142, page 28 through 30.

Clearly, DOE's intent to intern the ETR reactor core and components as a single unit in the ICDF will violate the ICDF Waste Acceptance Criteria (WAC) of 10 nano-curies per gram [11] TRU disposal unit by significant amounts. [12]

EDI's preliminary review of the ETR components (including TRU and GTCC waste) slated for disposal at the ICDF also do not meet the ICDF Waste Acceptance Criteria (WAC).

EDI continues to challenge the long-term adequacy of the ICDF to effectively prevent the migration of waste contaminates and these concerns are presented again in the below Attachment that articulates these continuing concerns.

Respectfully Submitted

_____

Chuck Broscious
President of the Board of Directors
On behalf of the Environmental Defense Institute
P.O Box 220
Troy, Idaho 83871-0220
208-835-5407
edinst@cpcinternet.com

Attachment

[11] Nano Curie = 0.000000001 curie (10-9).
[12] ICDF Complex Waste Acceptance Criteria, October 2006, U.S. Department of Energy Idaho Operations Office, DOE/ID-10881, Revision 3, page 4-1.

Environmental Defense Institute
P.O. Box 220 Troy, Idaho 83871 Phone 208-835-5406

Comments on Idaho National Laboratory Siting of the INL CERCLA Disposal Facility

submitted on behalf
Environmental Defense Institute
by
Chuck Broscious
August 3, 2001

The Department of Energy (DOE) Idaho National Engineering and Environmental Laboratory (INEEL) issued a Record of Decision in October 1999 to, among other things, construct an on-site mixed hazardous and radioactive waste dump.[13] This decision was made within the Superfund (CERCLA) process with the concurrence of the State of Idaho and the U.S. Environmental Protection Agency (EPA). Initially, this was welcome news since the Environmental Defense Institute has for years criticized DOE's illegal waste "disposal" practices in dumps that would not even meet municipal garbage landfill regulations let alone radioactive and hazardous chemical waste. After detailed analysis of the Record of Decision, it is clear that DOE plans to repeat the mistakes of the past by siting the new dump (called the INL CERCLA Disposal Facility) (ICDF) not only in a flood zone, but over top of Idaho's sole source Snake River Aquifer which sustains more than 200,000 families. In short, the issue is not the construction of the new dump, but the issue is **where** it is to be built on the INEEL site. EDI's position is that there are credible alternative sites on the INEEL that are not over the aquifer or in a flood zone.

Additionally, DOE is violating other environmental laws by claiming that the CERCLA process waves the requirements of the National Environmental Policy Act (NEPA) among other laws. Attorneys conversant in the regulations say CERCLA only waive the permitting and

[13] Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unite 3-13, Idaho National Engineering and Environmental Laboratory, October 1999

NEPA requirements in the direct removal and remediation of a contaminated site. CERCLA does **not** in this case waive the RCRA permitting or NEPA requirements on a major $85 million ICDF dump project. Specifically, the equivalent requirements under NEPA would require DOE to evaluate, in an Environmental Impact Statement, the credible alternative siting locations for the ICDF. This was never done. Yes, DOE evaluated alternatives for on-site vers off-site disposal.....but not alternative on-site locations. Once again, the legal requirements are obfuscated not only by DOE but by the State of Idaho and the Environmental Protection Agency. Since this appears to be a "done deal" between DOE and the regulators, it appears the public's only recourse is litigation. Once again the public's rights have been trampled.

A review of the available US Geological Survey (USGS) reports related to INEEL flooding scenarios and flood control infrastructures, it is clear that DOE and the regulators ignored this information. Moreover, DOE ignored USGS recommendation that additional analyses are conducted prior to any final siting decisions are made for new waste internment and disposition of existing buried waste. Specifically, USGS recommended a two dimensional model to expand the 1998 USGS one dimension model to include the upper 95% confidence flow estimates of 11,600 cubic feet per second for the Big Lost River 100-year flood, and include modeling for the upper range limit of the 500-year estimated flow rate in the Big Lost River flood plain on the INEEL.

DOE is constructing the ICDF as a step toward meeting regulatory requirements in the Resource Conservation Recovery Act (RCRA) Subtitle-C hazardous waste disposal criteria. After 25 years of thumbing its nose at RCRA, DOE finally is making a gesture toward compliance after five decades of mismanagement of its waste streams that cause massive environmental contamination. Estimated cleanup costs of this INEEL debacle are in the range of $19 billion that will come out of our pockets as taxpayers. DOES' decision to finally comply with RCRA is marred by the wrongheaded choice of **location**, when other on-site locations would not pose the same risks to the aquifer that is already severely contaminated from INEEL waste.

DOE is constructing the ICDF immediately south of the Idaho Chemical Processing Plant (ICPP) also now called INTEC mainly for economic reasons. It is close to the ICPP where much of the waste will be generated and it is near/over existing waste water percolation ponds which are on the Superfund cleanup list, and it is over extensive soil contamination caused from ICPP stack releases. In other words, "kill three wasted birds with one stone."

The US Geological Survey released a 1998 report that modeled the **median** 100-year flow rates in the Big Lost River (that flows by the ICPP) down stream of the INEEL 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.[14] 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 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 INEEL site. The ICPP as a whole is about as flat as a table top with only a couple feet

[14] 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

change in elevation north to south.[15] 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.

An earlier USGS study in 1996 also estimated the flow range for the Big Lost River at the INEEL; "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." [16]

Since 1950, INEEL 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 INEEL facilities. USGS's 1998 report that modeled the mean (midrange) 100-year flow rate of 7,260 cf/s upstream of the INEEL 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 INEEL diversion dam. [17] "This peak flow was routed down stream [of the Big Lost River] as if the INEEL diversion dam did not exist. On the basis of a structural analysis of the INEEL diversion dam (U.S. Army Corps of 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."[18]

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 cfs 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 INEEL 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." [19]

---

[15] Topographic Map of Block 21, National Reactor Testing Station (now called INEEL) 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.

[16] 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.

[17] 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

[18] USGS 98-4065, page 8

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

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).[20] 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."[21] 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 INEEL 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 cfs."[22] Comparing these flow rates with the USGS estimate 100-year mean flow of 6,220 cfs 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.

DOE is relying extensively on the Big Lost River Diversion Dam (located at the western INEEL boundary) to shunt major flood waters away from INEEL 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

---

[20] 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

[21] 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

[22] USGS 98-4065, page 6

control structure on the diversion dam." [23] 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 INEEL 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."[24]

Failure of the diversion dam and/or the diversion channel dikes would also directly impact the Radioactive Waste Management Complex (RWMC) waste burial grounds. A 1976 USGS report notes, "The burial ground is within 2 miles (3.2 km) of the Big Lost River and the surface is approximately 40 feet (12 m) **lower than the present river channel**. Sediments in the burial ground contain grains and pebbles of limestone and quartzite, suggesting that in recent geologic past, flood waters of the Big Lost River flowed through the burial ground basin. Two eroded notches or 'wind-gaps' in the basalt ridge bordering the west of the burial ground also suggest past Big Lost River floods." "A large diversion system on the Big Lost River was constructed by the AEC to control flood waters by diverting water into ponding Areas A, B, C, and D. The nearest of these, Area B is less than a mile [south] from and about 30 feet (9m) **higher** in elevation than the burial ground." [25]

USGS *Arco Hills SE* and *Big Southern Butte* quadrangle topographic maps clearly show the RWMC flooding vulnerability as do other USGS reports that note, "If [diversion] dike 2 [at ponding Area B] fails, large flows will drain directly toward the solid radioactive waste burial grounds." [26] These vulnerabilities must be taken into consideration when DOE attempts to leave the buried transuranic waste at the RWMC and not exhume and relocate it to a safe permanent repository.

Building dams around the INEEL CERCLA Disposal Facility (ICDF) as was done at the RWMC is not an acceptable flood protection answer because lateral water migration will go under the dams and local precipitation will be held in exacerbating the leachate conditions. The liner of the ICDF will not be capable of maintaining integrity with the increased hydraulic pressure during a flood because liners are only capable of blocking what minimal surface water may leak past the cap and infiltrate the waste. There are good legitimate reasons why dumps (even municipal garbage dumps) are not allowed by statute in flood zones or above sole source aquifers. Dams by definition are only functional if there is regular maintenance which cannot be assumed once DOE ends institutional control of INEEL in a hundred years. Dumping the waste

---

[23] 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

[24] USGS 98-4065, page 9

[25] Hydrology of the Solid Waste Burial Ground, as Related to the Potential Migration of Radionuclides, Idaho National Engineering Laboratory, U.S. Geological Survey, Open File Report 76-471, J.Barraclough, August 1976, page 8

[26] Probability of Exceeding Capacity of Flood-Control System at the National Reactor Testing Station, Idaho, U.S. Geological Survey Water Resources Division, P.Carrigan, JR., 1972, page 4

on top of the ground and mounding the cover over it will result in the cap eroding over the long-term which again is unacceptable. Regulator's contention that there is a degree of efficiency in co-locating the ICDF with the ICPP percolation ponds that they must be remediated along with the "windblown" soil contamination area around the percolation ponds not only defies' common sense but is also illegal.

DOE must designate another location for the ICDF that is not near a flood plain and not over the aquifer. DOE's own study has identified at least two such sites (on the INEEL) where the Lemi Range meets the Snake River Plain. [27] **DOE has not seriously considered these alternative sites as would normally be required under the National Environmental Policy Act (NEPA), stating that the sites were eliminated from consideration due to increased seismic activity. There is no documented evidence of this alternative site analysis. No empirical risk assessment was conducted to compare the relative risk of a location over a sole source aquifer and in a flood plain (ICPP) as opposed to a site with a slightly higher seismic risk not over the aquifer or in a flood zone (Lemi Range terminus). Other credible options include purchasing land contiguous to the northern end of the INEEL site near the terminus of the Bitterroot Range that also would be off the aquifer and not in a flood zone and have more soil cover over the bedrock.**

Another misguided project outlined in DOE's October 1999 Record of Decision is the construction of new ICPP process waste percolation ponds midway between ICPP and Central Facilities Area to the south. For a detailed analysis of this project see the Environmental Defense Institute's *Ground Water Contamination at INEEL Report* available at http://home.earthlink.net/~edinst/

Nuclear Regulatory Commission restrictions prohibiting citing radioactive waste disposal dumps on 100 year flood plains must be observed. [NRC 10 CFR ss 61.50] The reason for these restrictions is because the flood water will leach the contaminates out of the waste and flush the pollution more rapidly into the aquifer. Since these wastes will remain toxic for tens of thousands of years, they must be disposed of responsibly in a safe permanent repository. These issues must be kept in mind also with respect to the ICPP high-level waste tanks that are some forty feet underground as well as the underground spent reactor fuel storage and calcine storage bins at the ICPP. Water acts as a moderator and if the underground spent fuel vaults are flooded, it could cause a criticality. All of these underground high-level waste sites are extremely vulnerable. Former ICPP workers recall stacking sandbags six feet high around the plant during a Spring flood about ten years ago. The added external hydrologic pressure on the high-level waste tank concrete vaults could collapse the vaults and the tanks inside, and thus release the contents. These risks must be considered when DOE decides to leave the high-level waste tank sediments permanently in place as a cost cutting measure.

The ICDF, siting, engineering design, and waste acceptance criteria (WAC) must be developed with public involvement through a free and open discussion. The legal requirements of the process are spelled out in the National Environmental Policy Act that requires Environmental Impact Statements and public hearings. Only un-containerized wastes that can be compacted during placement should be allowed so as to minimize subsidence caused by container decomposition. Biodegradable, VOC, collapsible, soluble, TRU, or Greater than Class

[27] Moriarty, T. P., Feasibility of Locating Dry Storage of Spent Nuclear Fuel on Idaho National Engineering Laboratory Land at a Site That Does Not Overlie the Snake River Aquifer, November 1995

C Low-level, and Alpha-low-level waste must also be excluded from the ICDF dump and sent off-site. Prior to completing the ICDF Title II Design, workshops should be convened for stakeholders to comment on the proposal in addition to the NEPA requirements. Waste Acceptance Criteria maximum contaminate concentration levels must be determined from waste sampling prior to being mixed with any stabilizing materials. In other words, "dilution is not the solution to pollution".

USGS reports identified factors favoring downward waste migration. "In order for waste isotopes to be carried downward by water, four basic requirements are needed: 1.) availability of water, 2.) contact of the water with the waste, 3.) solubility or suspendability of the waste in water, 4.) permeability in the geologic media to allow water flow downward." [28] This USGS report describes in detail how all four conditions are met at INEEL including the solubility factor where they note "Hagan and Miner (1970) leached five different categories of solid waste from Rocky Flats [the main source of plutonium in the RWMC] with ground water from the INEL and Rocky Flats and measured the plutonium concentrations and pH of the leachate. They found the highest Pu-239 concentration in leachates from the acidic-graphite wastes, 62,000 to 80,000 ug/l plutonium or (3.8×10^9 to 4.9×10^9 pCi/L)." [Ibid]

The most reliable indicators of contaminate migration are onsite sampling data. Cesium-137, plutonium-238,-239,-240 were all found at the 240 foot interbeds under the RWMC. [IDO-22056@74] Forty-one % of the samples from the 240 foot interbeds contained radionuclides. [Ibid.@87] Other literature confirmation of plutonium at 240 feet includes: "Radionuclides (including Pu-238.-239.-240, Am-241, Cs-137, Sr-90) have been detected in soils and in sedimentary interbeds to a depth of 240 feet beneath the RWMC, (Hodge et al, 1989)." "Positive values for Pu-238,-239,-240 were detected in samples obtained from the 240 foot interbed in bore hole DO2."[DOE/ID-10183@134-145][DOE/ID/12082(88) @14-16] Radionuclides are also confirmed in the aquifer under the RWMC. [EG&G-WTD-9438@25] USGS water sampling data at the 600 foot levels, expressed in pico curies per liter (pCi/l) show:

Groundwater Sampling Data at 600 Feet Under RWMC Nuclide	Concentration pCi/L	Drinking Water Std. pCi/L
Tritium	10,000.00	20,000.00
Cobalt-57	48.00	1,000.00
Cobalt-60	100.00	100.00
Cesium-137	400.00	119.00
Plutonium-238	9.00	7.02
Plutonium-239-240	0.14	62.10
Americium-241	15.00	6.34
Strontium-90	10.00	8.00

[IDO-22056 @66] * The drinking water standard for gross alpha (total of all alpha emitters) is 15 pCi/l.

[28] USGS 76-471 page 68-69

For more information on the contaminate migration from INEEL buried waste at the RWMC see EDI *Citizens Guide to INEEL* page 130 available on request.

Conclusion:

ICDF site selection is illegal under statutes Nuclear Regulatory Commission (NRC) rules that prohibit siting of radioactive waste dumps in 100 year flood plains (10 CFR 61.50) which the agencies are obliged to conform to if their commitment to Applicable or Relevant and Appropriate Requirement (ARAR) is genuine

This particular argument revolves around the fundamental definition of the 100-yr flood zone. USGS conducted an extensive study in 1998 that defined the upper and lower 95% confidence level on the flow rates for a 100-year flood.

1. The upper rate is estimated at 11,600 cfs and the lower rate is 3,150 cfs
2. USGS chose for some unknown reason (perhaps pressure from DOE) to plot only the mean flow rate (average between upper and lower) of 6,220 cfs
3. USGS assumptions base on previous Army Corps of Engineers and other EG&G studies that the Diversion Dam would fail with flows in excess of 6,000 cfs so the diversion dam was mostly discounted.
4. USGS ploting of the mean 100 year flow rate does **not define the flood zone.** It only shows where the likely areas that will be effected during an average flood. This mean plot should never be used for making major facility siting decisions.
5. The appropriate definition of the 100 year flood zone is to plot the upper bound 95% confidence level flow rate, which USGS attempted to convince DOE to fund, but were refused funding.
6. No credible empirical rationale can be presented to define the 100 year flood zone based on the plotting of the mean flow rate as DOE and the regulators are doing.
7. Given that the upper bound 95% confidence level flow rate is nearly twice what the mean flow rate .....this is a significant spread.

The apparent top of the ICDF berm is about 10 feet above the USGS plotted mean of the 100 year flood at INTEC. Absent a through USGS study that plots the upper level flow rate and the resultant flooding given the near level topography of the INTEC environs, there is a lot of uncertainty about whether the berm is high enough.

Additional uncertainty is the ability of the berm to survive the three feet per second rush of the flood and the erosion that would be expected to occur.

The ten foot berm would also be expected to erode over time from natural wind and precipitation which would eliminate that minimal flood barrier. Who is going to be around in 200 years to maintain that berm? If the berm was breached, is the liner adequate to maintain integrity with a hydriodic head of nearly 50 feet?

500 year flood MEAN is estimated at 9,600 cfs.....Claims of 1,000 year durability of ICDF mandates inclusion of the 500 year flood impact. Cascading event of Macky Dam.....++ 54,000 cfs

Cost benefit analysis did not take into account long term impact on the potential further contamination of the sole source Snake River Aquifer and how it would affect health and safety not to mention agriculture.