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RE: **Public Comments on INTEC Tank Farm Soil and Groundwater Cleanup Plan, Operable Unit 3-14, Idaho National Laboratory, August 2006**

Department of Energy's (DOE) recent mailings to the public describing Idaho National Laboratory (INL) Idaho Nuclear Technology and Environmental Center (INTEC) cleanup plans are attractive from a public relations perspective, however, they lack crucial basic information the public needs in order to make an informed decision about the adequacy of the program's various cleanup alternatives. This persistent and deliberate trivialization of waste characterization leads the public to believe that there is no major problem - nothing to worry about.

DOE's deficiencies of full disclosure are rampant in DOE's June and August 2006 public mailing describing the cleanup plan for the INL high-level waste tank farm soils and groundwater located at the INTEC. DOE, Environmental Protection Agency, Idaho Department of Environmental Quality are complicities in this misinformation because they approved of this mailing. For instance, the public mailing only states that "strontium-90 contamination exceeds the Idaho groundwater quality standard" but fails to say how much it exceeds that standard, or when DOE claims CPP-15 only "released kerosene and condensate" but failed to state that the estimated 120 gallon release contained contaminated soils at 778,000 pico-curies per gram.

Environmental Defense Institute (EDI) review of DOE's Administrative Record documentation shows the total source term release of mixed hazardous and radioactive contaminates from major leaks in the INTEC tank farm states: 37,324.56 curies from more than 22,990 gallons of leaks. [1] This is an enormous amount of contamination that eventually will end up in the Idaho's sole source Snake River Aquifer under INL. Additionally, DOE public mailings fails to disclose the maximum soil contaminate levels and the crucial depth listed below. [2]

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[1] Cahn, L. S. et. al. 2006 , Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation -Baseline Risk Assessment, DOE/NE-ID-11227, USDOE, Table 5-2, page 5-4, hereinafter referred to DOE/NE-ID-11227.
[2] DOE/NE-ID-11227, Table 5-7, page 5-12.

INTEC Soil Sampling Summary (pico-curies per gram)

Maximum Contaminate Level	Cesium-137 pCi/g	Strontium-90 pCi/g	Plutonium-238 pCi/g	Plutonium-239/240 pCi/g	Europium-154 pCi/g	Amercium-241 pCi/g
	8,990,000	20,700,000	41,800	23,600	9,620	8,970
Depth in feet	18-20	22-24	18-20	34-36	18-20	18-20

[pico-curies, a unit of radiation measurement (one-trillionth of one curie) is used in EPA regulations because radiation exposure is so biologically hazardous to humans]

INTEC High-level Waste Tank Contribution to Soil Contamination Hazard

At INL, the primary facility for reprocessing irradiated nuclear reactor fuel is the INTEC formerly known as the Idaho Chemical Processing Plant (ICPP), although some reprocessing is ongoing at the formerly called Argonne National Laboratory-West that now is merged with INL. The INTEC underground high-level Tank Farm, consisting of eleven 300,000-gallon tanks with a current volume of about 1.4 million gallons, [3] is only part of a large complex of an additional 127 high-level waste tanks that are part of the INTEC high-level waste operations. EDI has listed these 127 tanks, their location and what process they are attached too, however the waste volume of their sediment contents is uncertain. [4] Some of these tanks are a significant criticality hazard due to the high concentration of fissile (uranium and plutonium) material content of the tanks. [5]

If DOE's new attempt to obfuscate the legal requirements and allow **permanent** disposal in these already leaking waste tank units is not stopped, more pollution will migrate to the aquifer, further putting the general public at risk. [6] DOE's own reports show radioactive groundwater contamination under INTEC greater than 60,000 times, and at nearby Reactor Technology Center (RTC) formerly called the Test Reactor Area 176,000 times, the EPA-regulated maximum radionuclide concentration level for drinking water. [7] Citing the RTC contamination is germane because of their close proximity and the fact that these contaminate sources must be considered collectively in making cleanup decisions that will impact the aquifer.

The hazard is intensified by the fact that the U.S. Geological Survey report shows that the top ground level of the INTEC high-level Tank Farm is within the Big Lost River 100-year flood plain, which means the bottom of the tanks are some 50 feet **below** the flood levels. [8] Flooding of these tanks and the related high-level waste processing buildings will flush pollutants into the aquifer and endanger the general public, since these radionuclides are toxic for tens of thousands of years.

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[3] Idaho High-Level Waste and Facilities Disposition Draft Environmental Impact Statement, December 1999, DOE/EIS-0287D, page C.9-10, herein after called HLW/EIS.

[4] Environmental Defense Institute Amicus Curiae Brief filed in federal court 8/2/02, Natural Resources Defense Council et al. vs. Department of Energy, Case No. 01-CV-413 (BLW).

[5] HLW/EIS, page 5-206.

[6] IEER, October 2001, page 54, citing Environmental Science Foundation, July 1997.

[7] INEEL Test Reactor Area Record of Decision, Perched Water Systems, December 1992, OU-2-12, page 14 - 16.

[8] 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

Recent INL contractor reports show significant groundwater intrusion into INTEC below grade operations. This data includes "sumps" that collect either leaks or other groundwater contributions to the waste accumulation outside of the "original" containment unit. These "sumps" are accumulating some 36,633 gallons per year. [9] This data (not disclosed by DOE or IDEQ) clearly indicates either serious leaks or an equally serious surface/groundwater contributor to INTEC contaminate dispersion into the underlying Snake River Aquifer.

1995 INTEC (ICPP) Well Sample Data [10] .

ICPP Well	Gross Alpha (pCi/l)	Gross Beta (pCi/l)	Strontium-90 (pCi/l)
CPP-55-06	7,290	191,000	65,600
MW-2	4,700	925,000	516,000
MW-5	520	211,000	110,000

[INEEL-95/0056@2-162] [INEEL-95/0056 @ 5-25]

2002 INTEC Perched Ground Water Sample Data [11]

Contaminate	Concentration pCi/L	Regulatory Std. pCi/L [12]	Number Times Over Standard
Gross Alpha	1,100	15	73.3
Gross Beta	590,000	4 millirem/yr	-*-
Tritium	40,400	20,000	2.02
Strontium-90	136,000	8	17,000
Plutonium-238	0.0501	7.02	< 1
Americium-241	0.0374	6.34	< 1
Iodine-129	3.0	1	3
Technetium-99	457	900	< 1
Uranium-233/234	15.3	13.8	1.02
Uranium-235/236	0.142	14.5	< 1
Uranium-238	6.94	14.6	< 1

* Beta particle/photon radioactivity shall not produce annual dose equivalent to the total body or internal organ greater than 4 millirem per year.

[9] Tripp, J.L. et al., INEEL Radioactive Liquid Waste Reduction Program, Presented to theWM'99 Conference, 2/29-3/4/99. http://www.wmsym.org/wm99/pqsta/43/43-6.pdf

[10] INEL-95/0056; Waste Area Group 3 Comprehensive Remedial Investigation/Feasibility Study Work Plan (final) Volume 1, August 1995, Lockheed Idaho Technologies Co.

[11] DOE/EIS-0287, page 4-52 and 4-57

[12] 40 CFR 140 and 141

DOE's Modeling is Flawed

DOE's computer modeling of contaminates fate and transport are fundamentally and deliberately flawed. DOE's own report states "The modeling results indicated that actions on Tank Farm Soil alone will not meet Snake River Plane Aquifer Remedial Action Objectives." [13] INTEC is in the Big Lost River flood plane and has been flooded numerous times in the recent past. Flood waters travel horizontally in the alluvial soils at INTEC and will generate "recharge" to flush INTEC soil contamination into the perched zones and ultimately to the aquifer.

DOE additionally fails to disclose how much of the INTEC high-level waste tank sediments will be left in the tanks, what specific contaminate concentrations are in the sediments, and how ineffective the "grouting" of these sediments permanently in place. DOE's own studies show that the grout cannot mix with the tank sediments and therefore cannot provide a waste disposal medium that meets regulatory compliance.

Again, DOE fails to offer groundwater contaminates levels and the corresponding Maximum Concentration Level limits in EPA's standards. This data is crucial for the public to fully understand the severity of the problem and draw their own conclusions on the appropriate cleanup.

The DOE's own internal INL documents indicates comments by INL officials that show grouting cannot be appropriately accomplished because (1) the tanks sit on a sand bed; (2) grouting under the tanks will be necessary, but the grouting of the non-RCRA compliant concrete tank vault containment structures will float the tanks and bend and distort the tank bottoms so that the grouting may bend or break the wastes grouted inside the tanks so that the waste will not be immobilized; and (3) there will not be any homogenous mixture formed within the tanks between the grout and the wastes; (4) the side panels and side walls and floors of the vaults are contaminated with radioactive and mixed (RCRA) wastes; (5) Vessel Off-gas Systems (VOG) problems are avoided as “outside the scope of this study”; (6) nine out of eleven tanks do not meet seismic criteria. The DOE report shows that mixing of the grout and the tank sediments will not occur. The displacement grout will simply “roll over” the solids, leaving potential High-Level Waste, Transuranic, and/or Greater than Class C Low Level Waste at the tank bottoms which is not immobilized. Comments indicate that adequate hydraulic studies have not been performed.

One DOE official comment states “since the new grout in the vault will not travel under the tanks and nine of them sit on sand, will this be a problem when the regulators see it or should we say right now that the sand will be contained by the grout and the old floor and therefore any waste or leakage will be contained, or something similar to this?" Another DOE commenter states, “The grout will roll over the solids.” Another commenter states, “The grout will not encase the solids, they will sandwich them between the grout and the bottom of the tank. Underneath the tank is sand. Under the sand is the existing tank vault. The vault has been proven to leak from the infiltration of rainwater.” The clear indication of these comments is that Idaho will not be protected by grouting from the High Level Waste contained in the tanks.

Numerous comments address problems which exist respecting how to “wash down” the tanks, i.e., removal of solids from the tanks by the use of a “mixing pump”. No backup plan exists for solids removals from the tanks in case the mixing pump plan doesn’t work. The mixing pump will not likely be sufficient to remove a significant fraction of the potential solids. There is no backup for solids removal from the tanks in case the mixing pump plan doesn’t work. The mixing pump will not likely be sufficient to remove a significant fraction of the potential solids and the mixing pump design has not been established. One commenter states in part, “This clean/wash/rinse activity will have little or no effect on the chemical composition of the solids since they are insoluble even in 2-3 molar nitric acids. This activity may or may not physically move the solids inside the tank or remove them from the tank. This clean/wash/rinse activity may also have little effect on the liquid SBW [Sodium Bearing Waste] held interstitially by the solids depending on the turbulence involved.”

The lack of a mixing pump design comment is resolved by stating that “Establishing the actual agitation and mixing effectiveness is beyond the scope of this study.”

[13] INTEC RI/FS, DOE/NE-ID-11227, page 4-1.

DOE commenter state that doubles containment should be required by IDEQ. The existing concrete vaults do not qualify with the double containment required by Resource Conservation Recovery Act. [5]

A reference in the document was deliberately deleted to avoid the problems about 30,000 gallon tanks which sit on a gravel bed. Any liquid that might accumulate on top of the grout is handled as "being beyond the scope of work for this study." None of the tanks initially passed a seismic analysis and analyses have not been performed. Corrosion rates may be well beyond design value for INTEC liquid waste storage tanks.

Comments in the document also disclose that the grout will not commingle/mix with the tank heels and therefore will not meet any of the EPA Land Disposal Regulations applicable to this waste even for deep geologic burial (i.e. Waste Isolation Pilot Project/Waste Acceptance Criteria).

The most egregious DOE action is trying to change the high-level tank waste classification to a lesser category it concocted called "incidental waste." The Natural Resources Defense Council together with tribal governments is currently litigating this arbitrary waste reclassification as a violation of Nuclear Waste Policy Act. This case has been the courts for a number of years and the outcome will affect how INL can proceed with closure of its high-level waste tanks.

Environmental Defense Institute Cleanup Recommendations

EDI recommends implementing a **MODIFICTION** of what DOE calls "Alternative 3a hot spot removal, capping, and monitoring that would be completed before interfering infrastructures are removed or while they are still in use." EDI believes that **ALL** INTEC contaminated soils must be removed (at minimum to the depth of the bottom of the high-level waste tanks) along with all the high-level waste tank service lines in conjunction with full cleanout of **ALL** of the tank sediments and vaults prior to grouting. Cleanup alternatives absolutely must be considered within the context of other INTEC and RTC contaminate sources that threaten the underlying aquifer and ultimately the public. DOE refuses to commit to these cleanup criteria so the public must demand that DOE implement a **NEW** credible cleanup of the INTEC that will minimize the ongoing contaminate migration into the Snake River Aquifer.

For more information on this issue see EDI's "Aquifer at Risk" report on our website. http://environmental-defense-institute.org

For more information from DOE see http://Idahocleanupproject.com and INL Administrative Record http://ar.inel.gov/

Respectfully Submitted,

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Chuck Broscious
President of the Board

Attachments

Attachment A

Plutonium Migration in Groundwater Reports

10/26/2006

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Study Shows Common Particles in Groundwater Help Plutonium Spread from Waste Sites

PULLMAN, Wash. – Efforts to design nuclear waste facilities should take into account the tendency of plutonium to attach itself to tiny particles called colloids that are suspended in the groundwater, according to a new study by an international research team that included Washington State University chemist Sue Clark and scientists from Moscow (Russia) State University, the University of Michigan and Cameca in France.

Working on samples from a highly-contaminated site in Russia, the researchers found that plutonium that leached into groundwater over the past 55 years can be detected more than a mile and a half from the site, and that at distances of a mile or more from the site, most of the plutonium was carried by colloids of iron oxides. Their report appears in the October 27 issue of Science magazine.

The finding that plutonium became attached to particles of iron oxides is significant, said Clark, because iron oxides are present in almost all soils worldwide. Since they are ubiquitous, their potential to help plutonium spread from containment sites should be addressed whenever new nuclear waste sites are being planned

“The impact of this research is that we must consider colloidal transport of plutonium as a potential mechanism for release, and then design the facility to address that sort of a transport mechanism,” said Clark, a professor in the WSU Department of Chemistry. Furthermore, she said, efforts to remediate existing contamination should consider the possibility of colloids, especially when dealing with groundwater in the “far field,” or outside the immediate vicinity of the waste site.

“In the case of the Russian site, you would want to remediate the far field groundwater based on that colloidal form. The plutonium there is not in the dissolved form. You could expend lots of resources trying to remediate the dissolved form and not actually fix the problem, because you didn’t address the colloids,” she said.

The study area in Russia’s southern Ural Mountains was the site of the Mayak Production Association, the former Soviet Union’s first facility devoted to converting spent nuclear fuel to weapons-grade plutonium. Starting in the 1950s, highly radioactive waste from the facility was discharged directly into Lake Karachai. From there, it seeped into the groundwater. The lake is currently undergoing remediation efforts.

The researchers drew water from test wells dug at distances up to 3.9 km (1.6 miles) from Lake Karachai. Each sample was tested for chemical characteristics such as its pH (acidity or alkalinity); the presence of substances commonly dissolved in groundwater, such as carbonates and phosphates; and the presence or absence of plutonium and other elements. The plutonium was further evaluated to determine whether it was simply dissolved in the water or was attached to colloids. Colloids are particles, hundreds of nanometers or smaller in diameter, that are suspended in the groundwater rather than being dissolved in it. They are solids that move with the natural flow of the groundwater.

The research team found that within about two and a quarter kilometers (1.4 miles) of Lake Karachai, nearly 30 percent of the plutonium present was dissolved in the water, and the rest was attached to colloidal particles; but at greater distances, less than 15 percent of the plutonium was dissolved in the water. The vast majority of it was attached to particles of iron oxides that were smaller than 15 nanometers in diameter. At the greatest distance tested, plutonium levels were still detectable but were about a thousand-fold lower than at the test well closest to the lake.

Clark said colloid-aided transport of plutonium could be reduced by changing the chemistry of a site to prevent plutonium from associating with colloids, or to prevent iron colloids from forming in the first place. Engineering barriers to prevent release of radioactive substances from a containment site is far preferable to trying to remediate after materials escape containment, she said.

Clark cautioned that containment plans for each nuclear waste site must be tailored for the site. In addition to differences in the type and amount of radioactive waste and how the material is contained, each site will have unique geology, chemistry, groundwater flow, and other physical characteristics that can affect how fast and how far plutonium and other contaminants will travel.

“It’s all very site-specific,” she said. “Where you have a problem that was created 40 years ago or more [as at Lake Karachai], you’re stuck with trying to do something to protect human populations from that environmental insult that happened a long time ago. And when you have planned repositories that are under construction, which Yucca Mountain is, you can then go ahead and plan on the front end to include consideration of colloids in the overall facility design, if there is reason to believe that the chemical conditions could lead to the formation of colloids.”

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Reports
Colloid Transport of Plutonium in the Far-Field of the Mayak Production Association, Russia

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Sorption of actinides, particularly plutonium, onto submicrometer-sized colloids increases their mobility, but these plutonium colloids are difficult to detect in the far-field. We identified actinides on colloids in the groundwater from the Mayak Production Association, Urals, Russia; at the source, the plutonium activity is ~1000 becquerels per liter. Plutonium activities are still 0.16 becquerels per liter at a distance of 3 kilometers, where 70 to 90 mole percent of the plutonium is sorbed onto colloids, confirming that colloids are responsible for the long-distance transport of plutonium. Nano–secondary ion mass spectrometry elemental maps reveal that amorphous iron oxide colloids adsorb Pu(IV) hydroxides or carbonates along with uranium carbonates.

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