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CRITICALITY HAZARD IN PIT-9

An internal DOE sampling report on radioactive waste buried in INEEL's Pit-9 showed problems previously not considered. In the July 2000 Pit-9 report, one probe hit a single buried barrel with up to 1000 grams of plutonium-239. (1) A plutonium level this high can create a criticality when any given barrel contains more than 267 grams of plutonium-239 or 400 grams enriched uranium-235. This criticality hazard is not being made public by the DOE. Regulatory agencies requested that eight additional probe samples be taken to determine the extent of the criticality hazard. If numerous barrels with up to 1000 grams of plutonium or uranium are co-located in the waste pit, one barrel going critical could set up cascading self-sustained criticalities in nearby barrels. Waste acceptance criteria sets the limit of plutonium per barrel at 200 grams.

Criticality is designed to occur in a nuclear reactor core, not in uncontrolled situations such as reactor fuel reprocessing or waste dumps. Criticality is not the same as a bomb exploding. An uncontrolled criticality will produce a thermal surge, fire, enormous radiation releases and serious radiation exposure to workers, but no explosion unless there are flammable solvents involved in the fire.

Despite these newly disclosed hazards posed by the buried waste at INEEL, DOE refuses to spend the $10 million promised during the Remedial Investigation/ Feasibility Study of the dumpsite completed in 1993. This funding was to be spent conducting core sampling of all pits and trenches suspected of having high concentrations of nuclear waste. Pits No. 4, 5, 6, 9, and 10 have all been identified as having high levels of waste, but it is nothing less than wishful thinking to believe that only these five Pits contain waste levels with a criticality hazard. Other DOE internal reports show 12 pits and 15 trenches and over a thousand soil vaults with plutonium/uranium waste. (2)

Prior to 1973, all waste shipped to INEEL for burial was simply dumped from the truck into an open pit or trench. Normally only one pit or trench was open at any given time; no sorting or assessment of what was in the barrels or boxes was made. Nuclear waste shippers like the Rocky Flats Plant (RFP) in Colorado knew there would be no assessment of what was listed on the shipping manifest so there was no incentive to do thorough characterization prior to shipment. [3] Although, DOE is not publicly acknowledging the fact, its internal reports show the buried waste contains 11,000,000 curies (3) of radioactivity including 1,455 kilograms of plutonium from

Rocky Flats alone. [(4)] The total buried plutonium (2,160 kg) from both Rocky Flats and other sources contains 700,400 curies of radioactivity.[(5)]

These totals are now known to be grossly understated due to recent revelations about Rocky Flats plutonium waste shipments to INEEL. The radioactivity in the INEEL buried waste cited above is still significantly understated because it relies on original generators' shipping manifest records that are completely unreliable. There were no checks at the INEEL dump to confirm the accuracy of the manifests because these were shipments between DOE facilities.

These discrepancies were revealed only in the last few years when DOE was forced to disclose where all its nuclear bomb material is located and give precise inventories. Rocky Flats Plant (largest plutonium waste shipper to INEEL) conducted a physical inventory of plutonium, compared it to the book inventory, and determined that 1,191.8 kg of plutonium was unaccounted for and 953 kg of that total was shipped as waste to INEEL.[(6)]

So how much plutonium is dumped in Idaho? If the unreported Rocky Flats plutonium shortfall shipped to INEEL (953 kg) is added to what DOE previously thought was in the INEEL dump (2,160 kg) from Rocky Flats and other sources, it adds up to 3,113 kg in the dump from all sources. A recent article in the Twin Falls Idaho *Times News* discussed how much trouble INEEL is having shipping out waste to New Mexico, due mainly to serious underestimates of the total plutonium in each drum. Forty-seven barrels of plutonium-contaminated waste could not be shipped because they contained too much plutonium. Because of the criticality risk, barrels cannot be stacked too close together. INEEL is trying to meet the 1995-mandated deadline which requires them to ship 108,500 cubic feet of waste by the end of 2002. In order to meet this deadline, INEEL is trying to send only full shipping containers with a maximum of 14 barrels of waste. These 47 barrels, however, contain more than 200 grams of plutonium EACH, and the allowable total is only 325 grams per shipping cask, resulting in what might be shipments of only one barrel per container.

INEEL has 85% of the national total of TRU waste. A new DOE report attributes INEEL with 36,800 cubic meters of transuranic buried waste with a reported 634,000 curies of radioactivity at the time it was dumped and a decayed curie content of 297,000 curies in the year 2006. [(7)] Decay correction is the amount by which the radioactivity of a substance must be reduced after a period of time to account for its radioactive decay during that time.

Environmental Defense Institute researchers consider these new estimates to still be grossly understated, inaccurate and inconsistent. DOE's report also fails to acknowledge more than 90 metric tons of irradiated reactor fuel dumped in the INEEL burial ground. Additionally, the report fails to acknowledge the fact that the INEEL dumpsite is in the flood plain of the Big Lost River and radionuclides and hazardous chemicals have already migrated to the underlying Snake River Aquifer.

1,254 BOXES OF DOCUMENTS DESTROYED AT INEEL

The Centers for Disease Control (CDC) contractor Risk Assessment Corp. (RAC), conducting document review for the INEEL Dose Reconstruction Health Study, recently revealed that document destruction related to the study is significantly higher than previously acknowledged. Dr. John Till, President of RAC completed the lengthy multi-year review of relevant information needed to quantify how much radiation was released over INEEL's operating history and submitted his findings to CDC.

The startling finding Till reports is that some 1,254 boxes of documents containing potentially some six million pages of information were destroyed before it could be used in CDC's INEEL health study. RAC assigned a ranking system (pertinence 1 through 9) to boxes of documents; pertinence 1 & 2 being the most important and pertinence 9 being not important. Some boxes were "recalled" which means the box was permanently recalled by someone at INEEL and it is no longer at the specified location. Some boxes RAC was "unable to locate" which means that after several tries, RAC have not been able to find the box. The breakdown is as follows:

Pertinence 1 & 2.....584 boxes

Pertinence 3.....500 boxes

Recalled.....72 boxes

Unable to locate……..98 boxes

Total.....1,254 boxes

This destruction of evidence that could document DOE's impact on the health and safety of workers and residents living downwind of INEEL represents a scandal of enormous proportions. DOE was told definitively in a 1990 Memorandum of Understanding with the US Department of Health and Human Services (CDC's parent department) that documents related to DOE site health studies are to be preserved.

RADIOACTIVE RELEASES AT INEEL

At the last Centers for Disease Control (CDC) INEEL Health Effects Subcommittee (IHES) meeting in June, CDC officials indicated that they were moving forward with an Idaho Chemical Processing Plant (ICPP) (now called INTEC) review and intend to utilize DOE's stack monitoring data to quantify the source terms or what contaminates were released, how much was released and when they were released. The focus as to be on the early ICPP period between 1950 and 1960

CDC made major mistakes in originally estimating Green Run releases from Hanford. Official estimates in the late 1980's were that 441,700 curies of Iodine-131 were released between 1944 and 1947. This estimate was based on DOE stack monitoring data. Few people outside DOE and CDC believed these estimates because they were based on questionable data. After many years

of obfuscation, CDC commissioned a physical reconstruction of the Green Runs and found that 685,000 curies of Iodine-131 were released. The difference was that CDC was forced to no longer rely on what DOE said went out the stack at Hanford.

Hanford Environmental Dose Reconstruction (HEDR) estimates Iodine-131 releases between 1944 and 1960 at approximately 738,700 curies which produced an 870 rad exposure to an infant born in Ringold, WA in 1943-44. (8)

While working on the Hanford Downwinders class-action lawsuit, Owen Hoffman, President of the SENES Oak Ridge Center for Risk Analysis, determined that approximately 900,000 curies of Iodine-131 were released by the Hanford plants between 1944 and 1957, a period including the Hanford "Green Runs." This amount is 150,000 curies more than the "official" CDC estimates.

Here in Idaho, CDC refuses to do a physical reconstruction of the INEEL early ICPP Runs as part of the INEEL Dose Reconstruction Health Study, instead opting for the use of discredited DOE stack monitoring data, data which led to the serious underestimation of Hanford's emissions. This is another deliberate attempt by CDC to understate the radiation release estimates in the hope that the government's liability exposure will be minimized. There are extremely important "lessons learned" from the Hanford studies that the public justifiably wants applied to the INEEL studies.

Both INEEL and Hanford were reprocessing green reactor fuel using sodium hydroxide as a "caustic" to dissolve the fuel and chemically separate the uranium and plutonium. In the case of the INEEL ICPP Runs, lanthanum-140 or its decay product barium-140 was the production focus. At both sites there were little or no emission control systems in place to filter out the fission products like I-131 released to the atmosphere, and at Hanford, plutonium was known to have traveled off-site. (9)

Because these other isotopes (besides I-131) contribute significantly to the dose, they must be included in the INEEL source terms at the Idaho Chemical Processing Plant (ICPP) now called INTEC. The lanthanum runs (known as the RaLa runs) must also **NOT** be the sole focus of ICPP source terms, but rather one of many separations campaigns. Therefore, the entire (1950-1970) ICPP throughput must be subjected to a full physical reconstruction. The high-level liquid waste Calciner incinerator and other high-level waste evaporators must also be included in the ICPP source terms. The first Waste Calcine Facility came on line in 1963 and ran through 1981 incinerating more than four million gallons of high-level waste. The New Waste Calcine Facility (NWCF) operated between 1982 and 2000 incinerating an additional four million gallons of high-level liquid waste.(10) Both Calciners never received the required RCRA hazardous waste permits because they could not meet emission standards.

Again, ICPP stack monitoring data is unreliable and must not be used in source term estimation. To further illustrate this point, Environmental Defense Institute, Keep Yellowstone Nuclear Free, and David McCoy have copies of internal INEEL reports gained through a Public Information Request that acknowledge as late as 1996 that the required ICPP stack monitors were either

nonexistent or turned off. This document further acknowledges that DOE is in violation of the Clean Air Act regulations. [(11)]

CDC is defending its resistance to a full ICPP physical reconstruction at INEEL by characterizing it as only a "screening" process to determine if the early ICPP releases deserve additional study. CDC, in the past, forgot that "screening reviews " were quick and dirty reviews and later called them credible source terms studies in the hopes that no one remembers the applied methodology. The public demands credible science from CDC, and the agency must understand that we will not suffer through the same fraudulent process demonstrated at Hanford.

INEEL Chosen to Produce Plutonium for NASA Pluto Trip

DOE Secretary Bill Richardson announced that INEEL's Advanced Test Reactor will produce the plutonium-238 that NASA needs to generate electricity and heat for the space craft slated to be sent to Pluto in 2020. Due to extensive public opposition in Washington State over the DOE favored Hanford Fast Flux Test Facility to produce the plutonium, the job went to INEEL.

The Final Programmatic Environmental Impact Statement (PEIS) [(12)] is due out this month. Once the Final PEIS is released, the public will have the opportunity to comment. Until DOE releases its final decision, however, it is uncertain which production facilities will be involved. Recent news stories note that only the INEEL Advanced Test Reactor will be used and that the reactor fuel reprocessing needed to extract the plutonium will be done at DOE's Oak Ridge National Laboratory in Tennessee. The reprocessing involves dissolving the reactor fuel in nitric acid in a three-phase process that separates the plutonium-238 from other unwanted fission products which then become high-level liquid waste.

If DOE chooses to keep all the plutonium production operations in Idaho and avoid shipping the material across the country several times, the INEEL Fluorinel Dissolution Process Facility (FDPF) or locally known as FAST CPP-666 will be used. Currently, none of the emission control or waste treatment operations connected with the FDPF have hazardous waste permits despite being in operation for more than fifteen years. The reason is none can meet current regulatory compliance under the Resource Conservation Recovery Act or the Clean Air Act. The State and EPA have allowed these operations to function under an illegal "interim status" that expired in 1992.

Specifically, the Process Equipment Waste, the Liquid Effluent Treatment and Disposal, and the High-level Liquid Waste Evaporator operations are "unpermittable" because they were built without the required safety systems. The Environmental Defense Institute, Keep Yellowstone Nuclear Free, and David McCoy are currently contesting these ongoing illegal operations.

DOE has yet to come up with a permanent treatment or disposal plan for about two million gallons of high-level liquid waste in the INEEL Tank Farm generated from ongoing operations and legacy waste from reactor fuel reprocessing material for military nuclear programs. The existing buried tanks are considered an extreme risk to the Snake River Aquifer because they are

decades past their design life and do not meet seismic or containment standards. Adding to an already untenable problem by dumping more waste into these unsafe tanks, this project must be challenged by everyone who is concerned about putting Idaho's sole source aquifer in additional jeopardy beyond the contamination already migrating from past and current unscrupulous dumping.

DOE is also not deterred by the fact that the Advanced Test Reactor (ATR), built in 1967, could not meet current Nuclear Regulatory Commission (NRC) standards imposed on commercial nuclear power plants. DOE's existing nuclear reactors are exempt from external NRC regulations because the federal government knows DOE's reactors would be forced to shutdown because of noncompliance with safety regulations. The ATR does not have the characteristic concrete containment structure required of commercial reactors, but is housed in a tin shed mainly to keep out the snow in the winter and dust in the summer.

DOE's own seismic analysis documents noncompliance with current seismic structural codes. The ATR reactor vessel "spacer bolt loads and support skirt radial bolt loads exceeded allowable values." (13) The ATR's Emergency Firewater Injection System (EFIS) would be inoperable during a design basis earthquake. The purpose of the EFIS is to inject firewater into the reactor core to prevent irradiated fuel elements from being uncovered in the event of a loss-of-coolant accident or a complete loss of coolant flow during reactor operation or shutdown.

The ATR was built to 1960s national building code standards applicable at that time, nor was it built to meet current earthquake standards. Because the EFIS does not meet current seismic codes and because of the potential firewater piping hanger failure, engineers declared the system technically inoperable. This means the system is functional but documentation does not support operability for the full range of intended safety functions (i.e., earthquakes). (14)

Since 1995, the ATR has experienced over twelve significant operating incidents ranging from reactor "scram" shutdowns to worker exposures. (15) Even the most pedestrian observer will shake their head with incredulous disbelief that this kind of government lunacy continues. Have not DOE officials heard from NASA that solar panels work just fine!

TCE Injected into Snake River Aquifer

DOE has implemented over many years an ineffectual groundwater treatment program at Test Area North to deal with massive amounts of radioactive and chemical waste injection directly into the Snake River Aquifer. DOE now admits to injecting some 35,000 gallons of trichloroethenene (TCE) directly into the aquifer. The contaminate plume extends over an area 9,000 feet by 3,000 feet and DOE **hopes** it will only expand another mile in the next twenty-seven years.

DOE along with the regulators focused solely on the chemical contaminates because they were migrating more rapidly and further away from the injection well source. An earlier pump and treat remediation was temporarily stopped when the Environmental Defense Institute exposed

the fact that "treatment" was only for volatile organics and not for radionuclides. "Treated" water with high levels of radionuclides, such as strontium 300 times regulatory limits, was being illegally dumped in old heavily contaminated unlined waste percolation ponds. This process increased the leaching of pond sediments and continued migration of contaminates down to the aquifer.

A new Remedial Action Plan released in November offers no substantial changes to the original plan, except that now DOE wants to re-inject the "treated" water back into the aquifer rather than dumping it in the old percolation ponds. "The proposed new remedy would not treat the radionuclides in the groundwater" even though "studies showed that while complete removal of the radionuclides is technically possible, **it would not be cost-effective**." [@12]

To add to the confusion the Plan states that: "The agencies do not **intend** to reinject radionuclides above MCLs [maximum concentration levels]." If intentions were gold, we'd all be rich. One wonders how DOE will accomplish this feat of no treatment yet no reinjection unless they intend to utilize the old reliable "dilution is the solution to pollution" treatment.

The ground water sampling data offered in this Plan is incomplete and lower than other DOE sampling data likely because the new numbers are from **"the vicinity of the TSF-05 Injection Well."** Apparently, offering data directly from the injection well where the highest concentration levels are, would have high shock value and are bad for public relations. Below is sampling data Environmental Defense Institute gleaned from DOE internal reports buried in the Administrative Record. [(16)]

Contaminate	**Concentration**	**EPA Standard**
TCE	35,000 ppb	5 ppb
PCE	170 ppb	5 ppb
DCE	9,300 ppb	70 ppb
Strontium-90	1,930 pCi/L	8.0 pCi/L
Tritium	43,200 pCi/L	20,000 pCi/L
Cesium-137	7,500 pCi/L	119 pCi/L
Cobalt-60	890 pCi/L	100 pCi/L
Americium-241	23.6 pCi/L	6.34 pCi/L

Public Comments on Test Area North can be sent to Kathleen Hain, USDOE/ID, PO Box 1625, Idaho Falls, ID 83415-3911. The deadline for written comments is December 26, 2000.

DOE Wants Hazardous Waste Permits for Currently Illegal Ops

Hearing Scheduled

Our public pressure over the last two years has forced DOE to shut down one proposed and two operating radioactive waste incinerators. These closures were forced on DOE because the incinerators could not meet operating and emission requirements under the Clean Air Act and the Resource Conservation Recovery Act (RCRA). In a mad rush to get other operations into compliance with the law, DOE is using a divide and conquer approach in an effort to cajole the State and EPA regulators into issuing hazardous waste permits for currently illegal operations.

DOE's creative approach to filing permit applications is to narrowly define an operation and leave out any related aspect of the plant that cannot meet the RCRA requirements. A resent example is the Process Equipment Waste Evaporator (PEWE) permit application which processes about 28,000 gallons per day of liquid high-level waste at the Idaho Chemical Processing Plant (ICPP). The PEWE application attempts to exclude related feed tanks, piping, off-gas treatment systems, and disposal tanks that are noncompliant under RCRA hazardous waste statutes.

State and EPA regulators are legally required by RCRA to evaluate hazardous waste operations "cradle to grave," and not segment operations in order to facilitate the operator's avoidance of the law. The fact that these regulators allowed the PEWE (and dozens of other units) to illegally operate for some fifteen years under a bogus "interim status" is indicative of how far the "good old boy wink and nod" can go in Idaho. The tragic fact is there are over 130 individual units at INEEL subject to RCRA are either not acknowledged at all or under perpetual "interim status."

The PEWE permit suffers from the same deficiencies as the Calciner incinerator (recently forced to close) due to fundamental inability to control and monitor what goes out the stack. All these high-level radioactive waste treatment operations (High-level Waste Evaporator, PEWE, and the Liquid Effluent Treatment &Disposal) are tied (literally by pipes and ducts) to the same problematic, noncompliant feed/storage tanks, emission control, and monitoring systems. Therefore, DOE must be forced to immediately shut down all noncompliant units and not be allowed to operate any unit that is connected to noncompliant units. In other words, abide by the law imposed on everyone else.

DOE is generating and processing the most deadly materials know to human kind, and yet has less regulatory oversight than the local gasolene service station. If history is any indication, and it usually is, DOE's habitual priority of cost savings over environmental health and safety has resulted in a $ 20 billion cleanup bill for INEEL alone not to mention the incalculable cost on the

health of surrounding communities. This bill is thrust back on the people for payment, not the officials responsible.

A hearing on the PEWE permit application is scheduled for December 13, 2000 at the Idaho Falls Public Library at 6:00 p.m..

The State also issued Notice of Intent to Approve a hazardous waste permit to DOE for the Sodium Components Maintenance Shop located at Argonne West on the INEEL site. The State will schedule a hearing on the permit application if it receives written requests from the public by January 12, 2001. Send requests and/or comments to Bob Bullock, Idaho Department of Environmental Quality, 1410 N. Hilton, Boise, ID 83706. For information call 1-800-232-4635.

Endnotes:

1. *Data Raises Concerns About Accidental Nuclear Reaction, Twin Falls Times News, 11/11/00 Quoting Wayne Pierre of EPA. Also see, Subsurface Treatability Study Report,* July 2000, INEEL/EXT-2000-0040-3. Also see EPA Region Ten May 3, 2000 White Paper.

2. EGG-WM-10903, page 2-7

3. A Comprehensive Inventory of Radiological and Non-radiological Contaminates in the Waste Buried in the Subsurface Disposal Area of the INEL RWMC During the Years 1952-1983, Volume 1, Idaho National Engineering Laboratory, EG&G Idaho, Inc., June 1994, page 6-25, herein after referred to as EGG-WM-10903.

4. EGG-WM-10903, page 2-76 and C-5 Table C-1.

5. EGG-WM-10903, page xxix, Table S-2.

6. Openness Press Conference Fact Sheets, February 6, 1996, U.S. Department of Energy, page 65. In 1996, then DOE Secretary O'Leary revealed that 1,191.8 kg of Plutonium could not be accounted for at Rocky Flats. An August 1994 internal Rocky Flats report called "A Discussion of Inventory Difference, Its Origin and Effect," by N. J. Roberts says 200 to 300 kg of the unaccounted Plutonium (Pu) may be in holdup (in piping, duct-work, equipment and the like). Roberts thought Pu contained in waste sent to INEEL may have been understated by 600 to 800 kg. On Feb 21, 1996, then Rocky Flats DOE manager Mark Silverman said that up to 80% of the total unaccounted for Rocky Flats Pu -- that is, up to 953 kg-- went to INEEL.

7. *Buried Transuranic - Contaminated Waste Information for US Department of Energy Facilities* , June 2000

8. Newsletter of the Hanford Health Information Network, Vol. 2, No. 2 Spring 1996 [Connections(a)]

9. Hanford Health Information Network, *The Release of Radioactive Materials from Hanford: 1944- 1972,* April 1993

10. Idaho High-Level Waste and Facilities Disposition Draft Environmental Impact Statement December 1999, Vol. 4, C.9-11.

11. DOE Notegram, July 25, 1996, to C. L. Tellez, from M. E. Feldman and T. A. Solle, Subject "Air " Legacy Issues

12. - Draft Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the U.S. Including the Role of the Fast Flux Test Facility, DOE/EIS-0310

13. Davidson, R.F., ATR Reactor Vessel Seismic analysis, EG&G Engineering Analysis Division. Loads on the support skirt bolts were calculated at 76 kips and the yield load of the bolts was 43 kips. [RE-A-78-038 @ 16&18]

14. OE-95-35; Operating Experience Weekly Summary, Operating Experience Program Office of Nuclear

and Facility Safety, U.S. Department of Energy, August 25 -August 31, 1995

15. DOE Operating Experience Reports listed in Citizens Guide to INEEL published by the Environmental Defense Institute

16. TAN ROD; Record of Decision, Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23), Operable Unit 1-07A, Waste Area Group 1, Idaho National Engineering Laboratory, September 1992. also see...EGG-ER-10643; Remedial Investigation Final Report with Addenda for the Test Area North Groundwater Operable Unit 1-07B at Idaho National Engineering Laboratory, J. Kaminsky, EG&G Idaho, January 1994

EGG-ER-10802; Feasibility Study Report for Test Area North Groundwater Operable Unit 1-07B at Idaho National Engineering Laboratory, F. Dunnivant, EG&G Idaho, January 1994