Section I.G. INL Stack Emissions Hazard

Seven incinerators, Waste Experimental Reduction Facility (WERF), the Process Experimental Pilot Plant (PREPP), ICPP De-nitration Facility (CPP-602), ICPP's solvent burner ,Waste Calcining Facility (WCF), the New Waste Calcining Facility (NWCF), and the Idaho Waste Processing Facility (IWPF) previously operated at INL as part of DOE's national nuclear waste volume reduction program. Additionally, several high-level high-temperature waste "evaporators" (Process Evaporator [PEW], Liquid Effluent Treatment and Disposal [LET&D], High-level Liquid Waste Evaporator (HLLWE) and the Integrated Waste Treatment Unit [IWTU] were added at INTEC in recent years to reduce the volume of high-level liquid waste in the tank farm.

Stack emissions from these INL facilities should be considered in evaluations of health risk assessments due to their radioactive and toxic nature and lack of independent monitoring. Between 1952 and 1989, an estimated 18,564,868 Curies (Ci) were released from INL facilities. [ID-10054-81 @13][ID-10087-85&7 @6][DOE/ID-12119]

The WERF and PREPP incinerators operated at INL without an Environmental Impact Statements being filed. Resource Conservation Recovery Act (RCRA) interim permits were grand-fathered in, and final permits were never reviewed before being forced to shut down. [1] None of the INL incinerators/waste process plants have had "trial burns" that is currently required to demonstrate that emissions meet RCRA regulatory requirements.

Waste Experimental Reduction Facility; After considerable public pressure on the regulators, DOE finally, after decades of operating WERF, conducted a trial burn May of 1997. On May 12 DOE reported that the May 8 trial burn resulted in exceeding regulatory limits for chlorine emissions (hydrogen chloride). WERF operators ignored the monitoring instruments and failed to shut the incinerator down. In March 1997, a 14 inch crack was discovered in the transition area between the primary combustion chamber and the ash ram that allowed waste to run out onto the floor. The crack was a failure to an earlier weld repair. The chlorine emissions resulted in a violation of state regulations. Only non-radioactive emissions are regulated since radioactive materials are not considered a hazardous material under RCRA. But, when hazardous materials are commingled, RCRA covers it as "mixed waste". Radionuclides are virtually always in INL's waste streams. The State of Idaho is currently enforcing RCRA for EPA but is not monitoring for radioactive emissions. RCRA is up for reauthorization and a concerted effort is being made to have Congress include radionuclides as a listed RCRA controlled hazardous waste.

Process Experimental Pilot Plant ; "The primary objective of the PREPP [incinerator] is to process select Transuranic-contaminated waste [radioactive elements heavier than uranium] that were generated in national defense programs. The process is designed to convert the waste into a form acceptable for disposal at the Waste Isolation Pilot Plant (WIPP). During the initial years of operation, the principal PREPP activity was the incineration of mixed radioactive and hazardous waste. Although the facility had the potential to release toxic air pollutants, its application for the IDHW air permit does not specify hazardous waste incineration." [DOE/EH/OEV-22-P,p.3-13]

PREPP completed TRU waste test burns in 1992 and was closed due to public pressure over inadequate radioactive emission controls, to be replaced by a newer incinerator called the Idaho Waste Processing Facility (IWPF) located in the Auxiliary Reactor Area.

The High-Level Liquid Waste Evaporator (HLLWE): Construction for the High-Level Liquid Waste Evaporator (HLLWE) at the Idaho National Engineering and Environmental Laboratory (INEEL) was initiated in 1993 and operation of the HLLWE as a new facility began in 1996. The HLLWE has processed over 4 million gallons of high level radioactive liquid and mixed hazardous wastes without a RCRA permit. DOE is required but has failed to submit an application for a RCRA permit for the HLLWE. The HLLWE has operated at all times without a RCRA permit and without interim status.

[1] EDI filed Notices of Intent to Sue DOE for operating these incinerators without required permits in 2000. The WERF, PREPP and both WCF & NWCF Calciners were subsequently shutdown.

The whole purpose of obtaining state and federal permits for a new facility in advance of construction and operation is to protect the public and environment from the operations of facilities which have not received proper scientific and regulatory scrutiny. The HLLWE has failed to comply with the RCRA requirements for new facilities. DOE failed to obtain a prerequisite RCRA permit 180 days before beginning construction.

Moreover, DOE has never complied with the statutory requirements to have obtained interim status for the HLLWE because the HLLWE was not "in existence" by July 3, 1986, i.e., under construction, in operation, or with unavoidable contractual commitments. Interim status is granted only by statutory compliance. Interim status cannot be conferred by a permitting agency, consent order or by merely listing a facility on the Part A application as DOE did for the HLLWE. [2]

The public has been denied opportunity for notice and meaningful hearings for the HLLWE and LET&D, prior to their construction and operation as new facilities, including the right to review plans, comment, receive written responses, review a draft permit and challenge the draft.

DOE failed to provide proper notice in the Federal Register for the HLLWE, the LET&D and the PEWE, required because they are actions within the floodplain. 10 CFR 1022 et seq. Floodplain requirements mandate an environmental impact statement and consideration of alternatives to constructing hazardous waste treatment, storage and disposal facilities in the floodplain above the Snake River Plain aquifer.

Public notice requirements of RCRA (40 CFR 124 et seq.), the CWA, the CAA, the Administrative Procedures Act (APA) and U.S. Constitution have been openly flaunted by the DOE. DOE conducts secret meetings with the Idaho Department of Environmental Quality in violation of state and federal Open Meetings Act. (5 U.S.C.§ 552b; Idaho Code 67-2341 et seq.).

Numerous protections provided for in 40 CFR Subparts 264 and 265 were denied the public, including but not limited to, characterization of wastes, testing, monitoring, reporting and other technical requirements **prior to** operation of the HLLWE, LET&D and other cited INTEC facilities. Numerous INTEC facilities operate with no RCRA permit.

The Denitration Facility (CPP-602) is where liquid uranium solutions from nuclear fuel chemical extraction processes were converted to a solid in a heated, fluidized bed. The granular product was packaged and stored in an adjacent vault pending shipment to the Un-irradiated Storage Facility. CPP-602's last campaign was in 1994. The Denitration Facility's (ICPP-602) heated fluidized bed burns off the unwanted liquid from dissolved fuel solutions leaving granular uranium trioxide. "Off-gases, after preliminary treatment within the Denitration system, pass through the atmospheric protection system (APS) and are then released to the atmosphere through the ICPP plant stack."... "Gaseous wastes such as process off-gas NOx and ventilation flows are filtered to remove radioactive particles before being handled by the ICPP atmospheric protection system." [EA @ 12]

Incineration of mixed radioactive and hazardous waste has been utilized by DOE for decades as a means of avoiding RCRA regulation. Lax state and EPA enforcement have allowed DOE, through incineration, to separate RCRA listed materials from radioactive materials. The process of incineration burns off the volatile hazardous constituents. The radioactive ash then falls into a non-regulated category and can be buried in shallow trenches at RWMC as "low-level" waste.

In January 1988, the White House issued Executive Order #12580 which blocked the EPA and affected states from having the authority to determine pollution abatement projects for federal agencies under the Superfund Reauthorization Act of 1986. Under intense pressure from these states Congress

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[2] On July 9, 2002 EDI filed a 60 Day Notice of Intent to Sue Over DOE's Failure to Comply with the Resource Recovery and Conservation Act, (42 U.S.C. § 6901 et seq); the Clean Water Act (33 U.S.C. § 1251 et seq.); the Clean Air Act (42 U.S.C. § 7401 et seq.); Safe Drinking Water Act (42 U.S.C. 300 F, et seq.); the National Environmental Policy Act (42 U.S.C. § 4332 et seq.); the floodplain/wetlands requirements of 10 CFR 1021 et seq.; DOE Orders 5400.1, 5400.5; Plaintiffs' rights to Due Process under the U.S. Constitution and the Administrative Procedures Act, 5 U.S.C. §§ 701-706 (APA) in operation of facilities at the Idaho National Engineering and Environmental Laboratory (INEEL) including the High Level Liquid Waste Evaporator.

passed, in 1991, the Federal Facilities Compliance Act (FFCA). This bill removes the federal government's sovereign immunity from compliance with state and federal environmental laws, and gives more state and EPA oversight authority to enforce laws at federal facilities.

As part of the compliance with the FFCA, DOE awarded in December 1996 one of the largest privatization contracts to British Nuclear Fuels (BNFL) Inc. to incinerate waste at the INL RWMC. This $1.18 billion facility would have incinerated mixed transuranic (TRU) waste had it been built. A law suit bought by EDI and KYNF et.al., forced DOE to cancel the incinerator part of the BNFL contract. [3]

DOE claimed it "shifts the operational liability and risk to the contractor through a fixed-priced contract and only makes payment for waste actually treated."... "Privatization of waste treatment is cheaper than the government making a large investment in owning and operating its own treatment facilities." [DOE This Month 1/97] One need go no further than the INL RWMC Pit-9 privatization project to see how the original contract has already been vacated and now DOE is faced with a new contract for twice the original amount. As for shifting liability, the Pit-9 process shows clearly that regardless what they try to call it, the DOE still pays the full costs and ultimately is left holding the bag.

INTEC (ICPP) Emissions; The broad variety of operations at INL result in a proportional variety of radioactive emissions from these plants. Few are benign - otherwise they would have been built in urban areas close to research centers. Normally radioactive gasses are released to the atmosphere via the Main Stack of the Idaho Chemical Processing Plant (ICPP). Between 1952 and 1981, ICPP released 7,512,000 Curies (Ci) of radioactivity to the atmosphere. [ID-10054-81@13] Also see Guide section I.E INTEC for more details.

"Until 1975 all ventilation from process areas was discharged to the stack without treatment."... "Twenty-two individual stacks at ICPP that release radionuclides do not go through the filter system." [ERDA-1536@II-67&70]

Between 1957 and 1977 acknowledged ICPP airborne releases averaged 150,000 Ci/yr. which included 85,000 Ci of Krypton-85 and 2,600 Ci tritium. [ERDA-1536,p.I-2] In later years these gas emissions ran 2,000 curies/day krypton [IDO-14532,p.46], tritium, cesium, strontium-90 and other transuranic. [DOE/EH/OEV-22-P,p.3-20] For krypton alone, the 0.3 micro curie/L at the stack is 100 times maximum permissible level for air. In 1974 ICPP main stack released 259,955 curies that included 8 curies of cesium, 6,036 curies of tritium, and 0.0071 curies of plutonium. [ERDA-1536@II-64] As previously discussed, these figures are believed to be understated.

ICPP's solvent burner off-gases containing plutonium are not filtered. [IDO-14532.p.26] This incinerator burns solvents with plutonium concentrations of 5.7 ugPu/gal [5.7 micro grams Plutonium/gallon] or [1,540,540 Pico grams/liter]. "When solvent is burned at 15 liters per hour the stack gas at stack top is only 3 times maximum air tolerance ..." [IDO-14532,p.46]

Background readings outside the ICPP perimeter fence "generally do not exceed 1 mR/hr." [IDO-14532,p.61] Depending on how long the burner runs, the 1 mRem/hr could add up to a considerable dose (24 mRem/day)(480 mRem/mo) to workers at the ICPP. Later ICPP reports put the plutonium concentration in the solvent burner feed at 150 micrograms per liter. "A program was developed to sample the burner off-gas for plutonium and to burn the solvent during appropriate intervals when atmospheric diffusion conditions were suitable and when there were no personnel working in the adjacent construction area." [IDO-14509 @18]

Integrated Waste Treatment Unit (IWTU) is under construction to incinerate the remaining ~1 million gallons of sodium-bearing high-level waste in the INTEC tank farm produced from reprocessing used spent nuclear fuel to extract highly-enriched uranium for DOE's nuclear weapons program. The plan has been for decades to convert this liquid waste into a form that can be shipped to a permanent geologic repository. The legal driver is a 1995 Federal Court ordered settlement agreement between Idaho and DOE to treat and remove the waste by a date certain. The problem is DOE can't get the IWTU to work. See Section I.E.2 for more details on IWTU.

[3] U.S. District Court for Wyoming, Case No. 99 CV 1042 J.

Fuel Element Cutting Facility Partially filtered air from the ICPP's 603 Fuel Element Cutting Facility (FECF) were released through a 50-foot stack and travels only a short distance before falling to the ground. "Thus, air-born particulate material from the FECF would not travel past the site boundary, and most probably would not spread beyond the immediate area of the FECF."[IDO-14532,p.47]

This admission that radioactive particulates are escaping does not preclude re-suspension every time the wind kicks up the dust. A FECF HEPA filter failure released 1,200 curies of long-lived fission products causing 131,302 square feet area around CPP-603 to be contaminated in 1958 and causing excessive background readings around the Fuel Element Cutting Facility. [IDO-14532,p.61][INL-95/0056,p.2-129]

Failures of CPP-601 Vessel off-gas (VOG) filter, the dissolver off-gas (DOG), and the hydrocarbon solvent burner system were found by Site Survey Branch during the second and third quarter of 1958. [IDO-14471,p.13] The ICPP was evacuated on April 2, 1992 because of radioactive particulate releases. [Daily Operations Brief , 4/3/92]

Idaho Department of Environmental Quality is aware that the INL is burning material contaminated with radioactive isotopes but is reluctant to take a stand and regulate radioactive emissions under Resource Conservation Recovery Act (RCRA). "We have no regulatory authority over high-level waste. No one in the state has looked at it in the past." [Times-News(c)]

Emissions from these incinerators pose a serious health hazard and deserve independent monitoring for radioactive emissions by State and EPA regulators.

"Identified radionuclides that will be released during incineration of transuranic waste include plutonium-239, 240, 241, and 242; americium-241; curium 241; and uranium-233." [DOE/EH/OEV-22-P,p.3-13] Of particular public concern is the effectiveness of the high efficiency particulate arresters (HEPA) filters which are the final stage of INL's three incinerators, Fluorinel and Fuel Storage Facility (FAST), Fuel Processing Facility (FPF), and other ICPP emissions control system. [ENI-217,p.33] The effectiveness of the HEPA filters to control toxic emissions to the environment has been challenged by independent researchers. [Goldfield,p.1] Failure of these filters to actually provide the emission control claimed by DOE would result in additional unplanned toxic releases to the environment. DOE acknowledges, in accident scenarios, that failure of these HEPA filters are the most serious potential release of radioactivity to the general public. [ERDA-1536,p.I-5]

"A radioisotope of antimony, Sb-125, was determined to be escaping ICPP's Fluorinel and Fuel Storage Facility (FAST) ventilation exhaust particulate filters, due to its presence as a stilbene (SbH_3) gas. Stilbene gas is unstable and rapidly undergoes chemical decomposition into a particulate form (Sb_2O_3) in an oxidizing environment."... "Antimony-125 was detected in air at both on-site and off-site monitoring stations in the fourth quarter of 1986 and continues to be detected in 1987. Unlike previous years, in which the isotopes of the noble gases comprised the majority of hypothetical dose to an off-site person from INL, 78% of the calculated dose (0.11 mRem) to a maximally exposed individual in 1986 from routine operations was due to Sb-125." [1986:DOE/INL-12082(86),NTIS] Approximately one curie of Sb-125 was released in 1986, and the annual 1987 release was expected to be at least 10 times higher. [DOE/ID-12111@37]

Two successful law suits against DOE incinerators forced the closure of Rocky Flats and Lawrence Livermore facilities for radioactive and chemical emissions violations. A third lawsuit was been filed April 2, 1996 against DOE's Los Alamos site for radioactive emissions violating the Clean Air Act.[CCNS v. USDOE]

Exhaustive and highly credible scientific reviews have independently cast light on the hazard of DOE's HEPA filter control systems at these other sites. Institute for Energy and Environmental Research's (IEER) Radioactive and Mixed Waste Incineration report cites the findings of Lawrence Livermore National Laboratory internal review panel recommendations against a proposed mixed waste incinerator in California.

The Institute for Energy and Environmental Research report notes: "We have never been comfortable with the EPA's position that incineration of mixed waste to eliminate its chemical toxicity should be the first procedural step and burial of its radioactive residuals the second step. This approach

commits to the volatilization of important radionuclides, including tritium, carbon-14, and several isotopes of iodine. Furthermore, the incineration of non-volatile nuclides, including those of uranium and plutonium, leads to a finite, although exceedingly small, probability of radioactivity is emitted from the incinerator's stack. We view incineration as a violation of the cardinal principle of radioactive waste management; namely, containing radioactivity rather than spreading it." [IEER(b) @1]

IEER's report also cites an EPA study of DOE mixed waste incinerators that showed that exposure of the public to tritium and plutonium-239 from this incinerator's emissions could exceed the federal standards for off-site radiation doses, in the latter case by more than 10 times. [IEER(b)]

"The most difficult elements to contain are the highly volatile radioactive elements, namely tritium, carbon-14, and several isotopes of iodine. Pollution control systems typical of most incinerators have no effect on these radionuclides, allowing the total input to the incinerator to exit out the stack, unless special filters are employed."... "The vast majority of less volatile radionuclides such as plutonium and cesium-137, which tend to condense onto particles that remain in the ash or filters following combustion. Radioactive particles that do escape filters, however, are small in diameter and can be carried by winds over long distances. Due to their small size, fine particles (radioactive or otherwise) can more easily be inhaled and lodge in the sensitive inner lining of the lungs than larger particles. Since incineration can disperse radioactive elements, especially those not amenable t filtering it can increase near-term population doses compared to securely storing the wastes." [IEER(b) @21]

Nitrogen Oxides Abatement Facility; DOE's FY-92 budget request for INL included a $40,600,000 Nitrogen Oxides Abatement Facility for the ICPP. This money has been appropriated yet questions remain whether this off-gas system does meet RCRA standards. "At the ICPP, the major source of alpha activity is the solvent burner, which burns the exhausted tri-butyl phosphate and dilute used to extract uranium from spent nuclear fuel elements. This solvent is contaminated with small amounts of plutonium, uranium and mixed fission product nuclide. The off-gas from this combustion process is not cleaned before emission to the atmosphere via the stack." [ENICO-1054 @ 1] Off-gas sampling during solvent burner operation revealed Pu-238 concentrations as high as 27 pCi/cu meter. [Ibid. @ 30] The 40 hr. occupational limit is 2 pCi/cu meter. [Ibid. @ 32] This represents a significant plutonium emission to the atmosphere of nearly 15 fold.

Waste Calcine Facility (WCF) at the ICPP and its replacement, the **New Waste Calcine Facility** (NWCF) were also incinerators that use a fluidized-bed to burn off liquid and combustible solids from reactor fuel reprocessing high-level waste. ICPP reports acknowledge WCF off-gas system was “found to be 83% efficient for the removal of entrained particulates.” [IDO-14430@69]

The incineration process releases numerous radionuclides in gaseous and liquid aerosol forms. Major gaseous components of the ICPP off-gas stream include Carbon-14, Krypton-85, Tritium, Iodine-129, Ruthenium-106, Antimony-125, and Tin-119. [ICPP-1187 @ 1] Monitoring at the WCF found Ru-106 in vegetation as far as 16,000 meters from the stack, with a maximum of 2.2 x 10 E-03 uCi/g (2,200 pCi/g) at 1600 meters. [IDO-14661@48] ICPP off-gas sampling results of the Waste Calcine Facility to determine the effectiveness of the filtration systems resulted in the following conclusions:

a. "The total removal efficiency of the silica gel absorbers, High Efficiency Particulate Arresters (HEPA), and the Atmospheric Protection System (APS) for Iodine-129 is less than 30%;"

b. "The low efficiency of the HEPA's and analysis of the sample pre-filter indicate I-129 emitted is predominately gaseous;"

c. "Less than 31% of the I-129 charged to the Calciner vessel as blended feed is emitted to the atmosphere; and 40-60% of the I-129 charged to the vessel is recycled in the scrub solution." [ICPP-1187 @ 19]

Another ICPP off-gas sampling conducted three years later by another contractor produced the same results with the additional conclusion that increased concentrations of I-129 in recycled scrub solutions explain the increased release rate to the atmosphere as a Calciner run progresses. [ENICO-1108@21]

A third analysis of the Calciner emission system found that, “during the shake-down run of the

large Calciner the off-gas system was evaluated and found to be 83% percent efficient for the removal of entrained particulates." [IDO-14430 @ 69] At this stage of evaluation (1958), the Calciner off-gas system consisted of: 1) a scalp cyclone, 2) venturi scrubber and knock-out cyclone, 3) condenser, and 4) and AEC positive filter in series. The Calciner off-gas efficiency "lower limit is reached when atomization is excessive and a large volume of fine particles escapes through the off-gas system." [IDO-14430 @ 64&62]

These 1958 Calciner scrubber efficiencies are less than September 18, 1957 data collected that showed 84.8 % efficiency. [IDO-14422 @ 122] The reason for focusing on this efficiency data is because the publicly acknowledged radioactive releases to the environment are based on emission control efficiencies that are not supported by their own internal sampling data. Therefore, it is believed that the radioactive releases are grossly understated.

Intermediate Level Waste Evaporator "Iodine-129 is one of the most environmentally significant radioisotopes emitted from nuclear fuel reprocessing and waste solidification facilities, and all facilities subject to EPA regulations must isolate at least 99.75% of the I-129 in the spent fuel from the environment. The results of an I-129 process distribution study at the ICPP indicated that a significant fraction of the I-129, not volatilized during fuel dissolution, eventually reached the Intermediate Level Waste Evaporator." [WINCO-1001 @ 1] Unfortunately, the evaporator does not have the control mechanism to retain the I-129 [Ibid] nor do the filtration systems have the ability to filter out the I-129. Clearly, this facility is not meeting EPA's 99.75% standard. Other species of iodine which have been volatilized into gaseous aerosols would also likely be escaping at the same rates.

"The discharge of radioiodine to the environment from nuclear fuel reprocessing plants is of particular interest due to the ability of iodine to enter the food chain and subsequently concentrate in the human thyroid. Iodine-129 is the isotope of interest during fuel dissolution and waste solidification since its 17-million-yr half-life makes I-129 a permanent contaminant of the environment."... "Stack monitoring at the ICPP has not detected significant I-129 releases during fuel dissolution, but detectable amounts were released during waste solidification." [ICPP-1187 @16]

Test Area North's Support Facility (TSF) Hot Shop has "no provisions for either the removal of radioactive Iodine or for monitoring of gaseous wastes (e.g. xenon, krypton, and argon)." [ERDA-1536@II-106] TAN's waste evaporator coils leaked and allowed contaminates to get sucked into the steam system. This leak reportedly was never fixed. The Aircraft Nuclear Propulsion (ANP) and the Initial Engine Test at TAN released over 4,635,724 Ci. during its 59 tests. [DOE/ID-12119@A-55][ERDA-1536] Also see Section I(C)(1). The Loss of Fluid Tests (LOFT) Reactors at TAN released up to the year 1977, over 940,225 Ci/yr to the atmosphere and sent 27,100 Ci/yr solid radioactive waste to RWMC. [ERDA-1536@II-118 &II-124]

The Advanced Test Reactor Complex formerly called Test Reactor Area (TRA) previously contained the Materials Test Reactor (MTR), Engineering Test Reactor (ETR), and currently Advanced Test Reactor (ATR) ranks second behind the ICPP for radioactive atmospheric releases. Between 1952 and 1981 TRA released 5,400,000 Ci to the atmosphere. [ID-10054-81@13] Test Reactor Area (TRA) also had a hot cell facility for handling very radioactive materials. Fuel element end sections that are cut off in the hot cell and filter element resins containing 500 Ci/cf are sent to RWMC for burial. [ERDA-1536 @ III-76]

Aerial survey of INL exposure rates in the below 1976 survey table for Cobalt-60 and Cesium-137 were calculated to be 22,118.4 and 10,444.8 uR/hr respectively. [ERDA-1536 @ III-15 to 34] Also this Aerial Survey listing clearly identifies Test Area North and the Auxiliary Reactor Area as the highest radiation emitters. The survey does not state whether the ICPP was processing fuel or whether the ICPP Calciner was operating at the time of the survey, so it is possible that they were temporarily not releasing much radiation. Also, it should be noted that the Central Facilities Area emissions were mainly due to the laundry that washes contaminated (10 mR/hr) worker clothing and respirators. [ERDA-1536@II-161] The second highest reading for the Health Physics Lab is particularly curious. One might expect this lab to be the most conscientious about its emissions.

Aerial Surveys for Gamma radiation were conducted in 1976 to determine radioactive concentrations around INL facilities and are presented below.

None of the TRA reactors have the Nuclear Regulatory Commission (NRC) full containment buildings required for commercial reactors - in fact they are just industrial sheds. No INL reactors are permitted or regulated by the NRC or any other non-DOE entity. Only a federal facility, insulated from the normal regulatory oversight, could get away with such practices. This puts the public at the mercy of an unaccountable agency the manages the most hazardous nuclear operations in the world.

Mismanagement of the Advanced Test Reactor by the previous operation contractor, EG&G, was cited in an quasi-independent DOE safety review released 12/93. The report cited a January 5 automatic reactor shutdown occurred when operators conducted experiment steps out of order; a January 29 planned shutdown for maintenance was extended by two days because workers discovered some pumps had been incorrectly mounted; a June 13 mishap closed the reactor for four days -workers had displaced a safety rod accidentally while removing a tool and subsequently reinstalled it incorrectly; and in September workers found smashed flashlight parts that were dropped by a worker - more parts showed up in later inspections.

INL 1976 Aerial Surveys for Gamma radiation

Facility	Concentration in uR/hr	
Test Reactor Area	5,000	
ICPP	2,500	
ERB-I Reactor	90	
Borax Reactor	200	
ERB-II	150	
OMRE/EORC	3,000	
Test Area North / TSF	150	
Auxiliary Reactor Area	5,000	
Central Facilities Area	1,000	
CFA Drain Field	800	
Radioactive Waste Management Complex	3,000	
Health Physics Laboratory	3,000	
Naval Reactors Facility	1,800	[ERDA-1536 @ III-15 to 34]

CDC INL Annual Releases from Test Reactor Area (Curies)

Releases of Radionuclides from TRA (Ci)

	1952	1953	1954	1955	1956	1957	1958	1959
TOTAL ACTIVITY	**1.68E+05**	**3.70E+05**	**2.72E+05**	**4.04E+05**	**1.98E+05**	**7.64E+04**	**1.04E+05**	**1.69E+05**
Radionuclides								
Ar-41	7.53E+04	1.66E+05	1.22E+05	1.81E+05	8.89E+04	3.42E+04	4.65E+04	7.58E+04
Ba-139	8.41E+01	1.85E+02	1.36E+02	2.02E+02	9.92E+01	3.82E+01	5.19E+01	8.46E+01
Ba-140	2.89E-02	6.36E-02	4.67E-02	6.95E-02	3.41E-02	1.31E-02	1.78E-02	2.91E-02
Ce-141	1.84E-03	4.04E-03	2.97E-03	4.42E-03	2.17E-03	8.35E-04	1.13E-03	1.85E-03
Co-60	2.12E-01	4.66E-01	3.42E-01	5.09E-01	2.50E-01	9.62E-02	1.31E-01	2.13E-01
Cr-51	2.79E-02	6.13E-02	4.50E-02	6.70E-02	3.29E-02	1.27E-02	1.72E-02	2.80E-02
Cs-134	1.51E-01	3.32E-01	2.44E-01	3.63E-01	1.78E-01	6.86E-02	9.31E-02	1.52E-01
Cs-137	3.75E-01	8.25E-01	6.06E-01	9.02E-01	4.42E-01	1.70E-01	2.31E-01	3.77E-01
Cs-138	8.90E+02	1.96E+03	1.44E+03	2.14E+03	1.05E+03	4.04E+02	5.49E+02	8.95E+02
Hf-175								
Hf-181								
Hg-203	3.15E+00	6.93E+00	5.09E+00	7.58E+00	3.20E+00	1.43E+00	1.94E+00	3.17E+00
I-129								
I-131	4.09E-01	8.99E-01	6.61E-01	9.83E-01	4.82E-01	1.86E-01	2.52E-01	4.11E-01
I-132								
I-133	3.26E-01	7.16E-01	5.26E-01	7.83E-01	3.84E-01	1.48E-01	2.01E-01	3.27E-01
I-134								
I-135								
Ir-192								
Kr-85	3.60E+02	7.92E+02	5.82E+02	8.66E+02	4.25E+02	1.64E+02	2.22E+02	3.62E+02
Kr-85m	3.40E+03	7.49E+03	5.50E+03	8.19E+03	4.02E+03	1.55E+03	2.10E+03	3.42E+03
Kr-87	1.23E+04	2.71E+04	1.99E+04	2.96E+04	1.45E+04	5.59E+03	7.59E+03	1.24E+04
Kr-88	1.21E+04	2.65E+04	1.95E+04	2.90E+04	1.42E+04	5.48E+03	7.44E+03	1.21E+04
Kr-89								
La-140	4.74E-02	1.04E-01	7.66E-02	1.14E-01	5.59E-02	2.15E-02	2.92E-02	4.76E-02
Mn-54								
Mo-99								
Na-24	8.05E+00	1.77E+01	1.30E+01	1.93E+01	9.49E+00	3.66E+00	4.96E+00	8.09E+00
Nb-95								
Os-191								
Pu-239	2.06E-04	4.53E-04	3.33E-04	4.95E-04	2.43E-04	9.36E-05	1.27E-04	2.07E-04
Rb-88	6.25E+02	1.38E+03	1.01E+03	1.50E+03	7.38E+02	2.84E+02	3.86E+02	6.29E+02
Rb-89	9.86E+02	2.17E+03	1.59E+03	2.37E+03	1.16E+03	4.48E+02	6.08E+02	9.91E+02
Re-188								
Sb-125								
Sr-90	1.57E+00	3.45E+00	2.54E+00	3.78E+00	1.85E+00	7.14E-01	9.68E-01	1.58E+00
Tc-99m	2.45E+00	5.40E+00	3.96E+00	5.90E+00	2.89E+00	1.10E+01	1.51E+00	2.47E+00
Xe-133	1.31E+03	2.89E+03	2.12E+03	3.16E+03	1.55E+03	5.97E+02	8.11E+02	1.32E+03
Xe-135	1.30E+03	2.87E+04	2.11E+04	3.14E+04	1.54E+04	5.93E+03	8.05E+03	1.31E+04
Xe-135m	7.19E+03	1.58E+04	1.16E+04	1.73E+04	8.49E+03	3.27E+03	4.44E+03	7.23E+03
Xe-138	4.04E+04	8.88E+04	6.52E+04	9.71E+04	4.76E+04	1.83E+04	2.49E+04	4.06E+04
Y-91m	1.10E+00	2.42E+00	1.78E+00	2.65E+00	1.30E+00	5.01E-01	6.79E-01	1.11E+00

CDC INL Annual Releases from Test Reactor Area (Curies) Continued

	1960	1961	1962	1963	1964	1965	1966	1967	1968
Totals	**2.3E+05**	**3.4E+05**	**3.5E+05**	**6.0E+05**	**5.7E+05**	**5.2E+05**	**3.3E+05**	**2.0E+05**	**1.3E+05**
Ar-41	1.04E+05	1.50E+05	1.57E+05	2.69E+05	2.55E+05	2.34E+05	1.50E+05	8.89E+04	5.66E+04
Ba-139	1.16E+02	1.68E+02	1.75E+02	3.00E+02	2.85E+02	2.61E+02	1.67E+02	9.92E+01	6.31E+01
	4.00E-02	5.77E-02	6.01E-02	1.30E-01	9.79E-02	8.96E-02	5.75E-02	3.40E-02	2.17E-02
	2.54E-03	3.67E-03	3.82E-03	6.55E-03	6.23E-03	5.70E-03	3.66E-03	2.17E-03	1.38E-03
	2.93E-01	4.23E-01	4.40E-01	7.45E-01	7.17E-01	6.56E-01	4.21E-01	2.49E-01	1.59E-01
	3.86E-02	5.56E-02	5.79E-02	9.93E-02	9.44E-02	8.63E-02	5.54E-02	3.28E-02	2.09E-02
	2.09E-01	3.02E-01	3.14E-01	5.38E-01	5.12E-01	4.68E-01	3.00E-01	1.78E-01	1.13E-01
	5.19E-01	7.49E-01	7.79E-01	1.34E+00	1.27E+00	1.16E+00	7.46E-01	4.41E-01	2.82E-01
Cs-138	1.23E+03	1.78E+03	1.85E+03	3.17E+03	3.01E+03	2.76E+03	1.77E+03	1.04E+03	6.68E+02
	4.36E+00	6.29E+00	6.55E+00	1.12E+01	1.06E+01	9.76E+00	6.27E+00	3.71E+00	2.37E+00
	5.66E-01	8.16E-01	8.50E-01	1.46E+00	1.39E+00	1.27E+00	8.13E-01	4.83E-01	3.07E-01
	4.50E-01	6.50E-01	6.76E-01	1.16E+00	1.10E+00	1.01E+00	6.47E-01	3.84E-01	2.44E-01
Kr-85	4.98E+02	7.19E+02	7.49E+02	1.28E+03	1.22E+03	1.12E+03	7.16E+02	4.26E+02	2.70E+02
Kr-85m	4.71E+03	6.80E+03	7.07E+03	1.21E+04	1.15E+04	1.05E+04	6.77E+03	3.99E+03	2.56E+03
Kr-87	1.70E+04	2.46E+04	2.56E+04	4.39E+04	4.16E+04	3.81E+04	2.45E+04	1.45E+04	9.25E+03
Kr-88	1.67E+04	2.41E+04	2.51E+04	4.30E+04	4.08E+04	3.74E+04	2.40E+04	1.42E+04	9.06E+03
Kr-89									
La-140	6.56E-02	9.46E-02	9.85E-02	1.69E-01	1.61E-01	1.47E-01	9.43E-02	5.59E-02	3.56E-02
	1.11E+01	1.61E+01	1.67E+01	2.87E+01	2.72E+01	2.49E+01	1.60E+01	9.46E+00	6.04E+00
Pu-239	2.85E-04	4.11E-04	4.28E-04	7.34E-04	6.98E-04	6.38E-04	4.10E-04	2.42E-04	1.55E-04
Rb-88	8.66E+02	1.25E+03	1.30E+03	2.23E+03	2.12E+03	1.94E+03	1.24E+03	7.37E+02	4.68E+02
Rb-89	1.36E+03	1.97E+03	2.05E+03	3.51E+03	3.34E+03	3.06E+03	1.96E+03	1.16E+03	7.40E+02
Sr-90	2.17E+00	3.13E+00	3.26E+00	5.60E+00	5.32E+00	4.87E+00	3.12E+00	1.85E+00	1.18E+00
Tc-9m	3.34E+00	4.90E+00	5.10E+00	8.74E+00	8.31E+00	7.60E+00	4.88E+00	2.89E+00	1.84E+00
Xe-133	1.82E+03	2.62E+03	2.73E+03	4.69E+03	4.44E+03	4.07E+03	2.62E+03	1.55E+03	9.89E+02
Xe-135	1.81E+04	2.60E+04	2.71E+04	4.65E+04	4.41E+04	4.04E+04	2.60E+04	1.53E+04	9.82E+03
Xe-135m	9.96E+03	1.44E+04	1.50E+04	2.56E+04	2.43E+04	2.23E+04	1.43E+04	8.47E+03	5.40E+03
Xe-138	5.59E+04	8.06E+04	8.39E+04	1.44E+05	1.36E+05	1.25E+05	8.03E+04	4.75E+04	3.03E+04
Y-91	1.52E+00	2.20E+00	2.29E+00	3.93E+00	3.73E+00	3.41E+00	2.19E+00	1.30E+00	8.27E-01

Total CDC above tables TRA Radioactive Air Releases 1952 to 1968 = 4,981,400 Curies
[Source: CDC INEL Dose Reconstruction, Reported Annual releases estimates from the TRA in curies.]

Oil Chemical & Atomic Workers (OCAW) Union additionally charged EG&G with 10 safety violations during this period that put workers at risk. [AP(h), 12/14/93] Unfortunately none of these reviews carry any enforceable authority and are summarily ignored by DOE.

Radiological Monitoring Data in INL Region [ERDA-1552-D @E-3 to 13]

Monitor Site	Date	Concentration	Isotope
ID Falls	2/65	24 pCi/L	Sr-90
Butte, MT	7/66	15 "	Sr-90
Butte, MT	3/65	125 "	Cs-137
ID Falls	3/66	45 "	Cs-137
Preston, ID	8/65	88 "	Gross Beta
Preston, ID	7/66	6 "	Gross Alpha
La Barge, WY	10/71	5 "	Gross Alpha
ID Falls	5/65	29 pCi/Kgm	Sr-90
ID Falls	2/65	140 pCi/Kgm	Cs-137

As a part of DOE's INL monitoring activities, milk samples were taken and tested primarily for Iodine-131. The current MCL for I-131 is 3 pCi/L, Sr-90 is 8 pCi/L, Cs-137 is 200 pCi/L. Milk sampling around INL in 1958 notes that the I-131 activity was below the, then, permissible level of I-131 in water which was 3×10^{-5} uc/ml (30,000 pCi/L). [IDO-12082(58)@76]

Compared to current standards, the preceding milk iodine concentrations represent extremely high numbers. The following are acknowledged contamination concentrations in milk sampled from dairies and farms around the INL region. [DOE/ID-12119@E-34-48]

Iodine-131 Milk Samples in INL Region

Year	Month	Amount pCi/L	Month	Amount	pCi/L
1958	Feb.	980	Mar.	2,250	
	May	1,780	Oct.	5,600	
1959		1,500			
1960	Jan.	1,400	Aug.	188	
	Mar.	700	Oct.	400	
1961	Jan.	200			
1962	Sept.	200	Oct.	140	
	Nov.	320	Dec.	200	

[DOE/ID-12119@E-34-48]

Monitoring Data on Food Stuffs in INL Region

Year	Food Stuff	Concentration
1960	Milk I-131	2 x 10^{-6} uCi/ml [2,000 pCi/L]
1961	Milk I-131	1 x 10^{-7} uCi/ml [100 pCi/L]
1963	Milk Sr-90	230 uuCi/L [230 pCi/L]
1963	Wheat Sr-90	170 uuCi/Kgm [170 pCi/Kgm]
1963	Wheat Cs-137	800 uuCi/Kgm [800 pCi/Kgm]
1963	Wheat Manganese-54	560 uuCi/Kgm [560 pCi/Kgm]

[Monitoring Reports 9,10,11,12 and 13; Environmental Monitoring Data Annual Guides][Cited by Blain @ 22 to 25]

I.G.1 Incomplete Summary of INL Episodic Radioactive Releases to Atmosphere as of 1998

Facility	Date	Curies Released	Source
Naval Reactor Facility*	6/18/55	305	A @ A-203
ICPP*	10/58	1,200	B @ C-3
ICPP*	10/16/59	367,717	A @ A-99
ICPP*	1/25/61	5,200	B @ C-5
SL-1*	1/3/61	1,128	A @ A-196
BORAX-1*	7/22/54	714	A @ A-203
Test Reactor Area	1952-1968	4,981,400	C
Aircraft Nuclear Propulsion*	1956-66	4,635,724	see ANP table Section I.C.1
Other INL Operational Release	1952-89	13,552,880	A @ A-189
Total Episodic Air Incomplete Release	1952-98	~18,910,544	

Sources: (A) DOE/ID-12119; (B) ERDA-1536; (C) CDC INEL Dose Reconstruction, Reported Annual releases estimates from the TRA in curies.]

* Significant episodic releases not included in general INL operational releases to the atmosphere. Curie releases less than 0.1 were not added in this summary and are considered understated due to lack of information.

For Test Reactor Area See CDC table above; Total TRA Radioactive Air Releases 1952 to 1968 = 5.47 E + 06 = 4,981,400 Curies

See Section I.C.9 for more details on INL atmospheric releases