

**Environmental Defense Institute
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Unacceptable Risk

at the

Idaho National Laboratory

Advanced Test Reactor

—

**The
Case for Closure**

Volume I

By

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This Volume I is only the first of the three Volumes that incorporate the complete report. Volumes II and III present additional essential documentation on the operating history of the Advanced Test Reactor. Copies of Volumes II and III are available separately at EDI on request.

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Introduction

The intent of this section is to provide an update to the first 2006 Environmental Defense Institute (EDI) report and subsequent revisions of this report with new information from court documents and DOE reports gleaned from recent Freedom of Information Act releases to the EDI.

Japan's ongoing Fukushima Daiichi reactor meltdowns are again raising public concerns about the enormous long-term impacts of nuclear disasters in the post-Chernobyl-Three Mile Island era. Coupled with recent Nuclear Regulatory Commission revelations of U.S. commercial nuclear power reactor vulnerabilities of older reactors, are forcing countries like Germany to begin shutting down all power reactors.¹ The Fukushima accident has justifiably forced an expanded understanding of spent nuclear fuel (SNF) hazards at all nuclear reactors that can be significantly greater than the reactor meltdown itself due to the huge inventory in equally vulnerable storage pools.² SNF storage pools universally have no radiation containment that reactors have – thus the increased accident vulnerabilities.

The Department of Energy (DOE) Idaho National Laboratory (INL) Advanced Test Reactor (ATR) is the subject of this report because it poses a significant – but avoidable – public hazard. This 43+ year-old reactor is long past its original 20 year design life and is kept operating because there is no external regulatory oversight equivalent to that imposed on commercial nuclear power reactors. Despite the fact that the Nuclear Navy is the principal “user-client” of the ATR; Congressional statute exempts the Navy from oversight – that includes the exemption from Defense Nuclear Facility Safety Board oversight review. DOE's own internal reports gained by EDI through the Freedom of Information Act tell a sobering story about potential ATR accidents that puts it into the Chernobyl/Fukushima accident disaster category.

DOE's Final Programmatic Environmental Impact Statement, Evaluation of Human Health Effects from Facility Accidents, includes ATR Design Basis Accident, Severe Reactor Accident, states:³

"The large-break loss-of-coolant accident postulated for the ATR is a severe reactor accident. This event would result in a decrease in the primary coolant inventory of ATR. As treated in the ATR 'Upgraded Final Safety Analysis Report' the large-break loss-of-coolant accident compared with other initiating events because 100 percent core damage is estimated to occur. The radiological analysis of the large-break loss-of-coolant accident shows that an ATR core inventory of 1.11 giga-curies [**1.11 billion curies**] at reactor scram conditions releases an available source term of 175 mega-curies [175 million curies]."

"The emergency fire water injection system is assumed to pump water through the break into confinement, until shutoff level is reached, about 33 hours after the break. Within that period, about 65% of the available source term or 113 mega-curies [113 million curies] will have been released as the early release source term. Following the termination of emergency fire water injection system flow at 33 hours, the confinement leak rate is assumed to drop to the design value of 10 percent per day, resulting in a release of the remaining 62 mega-curies as the late-release source term, ending about 85 hours after the loss-of-coolant accident."⁴

The above potential radiation releases do NOT include an ATR canal drain accident; “Many of the 600-700 irradiated spent nuclear fuel assemblies stored in the canal have decay times short enough that natural air convection cooling alone may not be sufficient to remove decay heat without melting. An estimate of the consequences for the severe accident canal drain may consider more realistic decay heat removal in order to

¹ Earthquake threat to U.S. Nuclear Reactors far Higher than Realized, D. Cappiello, J. Donn, Associated Press, 11/11.

² Robert Alvarez, Improving Spent Nuclear Fuel Storage at U.S. Commercial Nuclear Reactors, 1/12, available on EDI website.

³ Final Programmatic EIS, 12/00, Appendix I Evaluation of Human Health Effects from Facility Accidents, includes ATR (Section I.1.1.1) Design Basis Accident; Table I-4 ATR Large-Break Loss-of-Coolant Accident Source Term; DOE/EIS-0310, Appendix I, pgs. I-5 to I-8.

⁴ Ibid.

minimize the number of fuel elements predicted to experience melt.”⁵ DOE predicts “Canal drain accident” radioactive release fractions (amount released) is 1.0 or complete release.⁶ An ATR canal meltdown would release magnitudes more radioactivity than the ATR itself due to the 600-700 fuel assemblies in the canal as opposed to ATR core of ~40 fuel assemblies. “On average ATR has 7 refueling outages per-year”.⁷ Consequently, the spent nuclear fuel in the ATR storage canal will have a relatively high concentration of short-lived – highly radioactive - inventory along with the other long-lived radioisotopes. This is the reason “fresh” SNF is put directly into deep water pools so the intense short-lived isotopes can “safely” decay in circulated coolant water to remove the highly radioactive decay heat.

Explosion Hazard

“The postulated mechanism for the vapor explosion is that the rapid power rise in the fuel plates causes melting and high temperatures in the fuel core of the plates, which results in jets of high temperature molten material being ejected through the weakened cladding into cold coolant channels. The high temperature material breaks up into small droplets in the coolant, and the resulting large surface area provides for a very rapid generation of steam known as a steam explosion. The normal pressure limiting mechanisms such as ESF’s, relief valves or other means of transferring water out of the reactor vessel are unable to respond fast enough to accommodate the rapid steam generation and therefore, very high transient pressures may result in reactor vessel damage.”

“The analyses calculated that the consequences of this very low probability event are a very rapid positive ramp insertion [power spike] of reactivity which results in a peak transient power of about 900 MW in 62 ms [mili-seconds].”⁸ Normal ATR power level is 250 MW or 3.6 times the power capacity and more rapidly than automatic/manual control mechanisms could mitigate.

Summary of ATR Shutdowns

Based on the cited reports below, there were at least the following unscheduled shutdowns, scrams, and/or reactor power level curtailed at the Advanced Test Reactor due to safety system failures. Scrams are emergency reactor shutdowns; un-scheduled manual shutdowns are more controlled shutdowns; reactor power level restrictions are when some safety system indicates that the reactor integrity would be compromised at that power level. Experts can debate the relative importance of safety system failures, but what cannot be disputed is when ATR operators scram the reactor or force an unscheduled shutdown – there is a real problem.

Year	Shutdown/ Scrams	Power Restricted	Total Shutdowns & Power Restrictions
2007	2	1	3
2008	11	2	13
2009	10	2	12
2010	7	3	10
2012*	2	3	5
Totals	32	11	43

*Through 3/27/12; See Attachment B below for complete listing/references 1973 to 2012 .⁹

⁵ Ibid., page 15.12-11.

⁶ Ibid., page 15.12-23.

⁷ DOE PEIS-0310, pg. I-5.

⁸ Chapter 15.12 – Severe Accident Analysis – Upgraded Final Safety Analysis Report for the Advanced Test Reactor, 8/3/10, pg. 15.12-9.

⁹ “Advanced Test Reactor Unplanned Shutdowns, Slow Setbacks, Power Reductions for FY-2009 and FY-2010”

The 2007 to 2012 period represents a radical increase (411%) in shutdowns per year that is legitimately attributable to ATR's 47 year aging problem – acknowledged by DOE's own ATR Programs Nuclear Safety Oversight Committee report 5/17/10 that states: "There continue to be important operational events experienced at the ATR Complex due to issues with conduct of operations, maintenance and work planning. These issues are exacerbated and made more complex by latent plant conditions including material condition deficiencies and equipment functional failures that were subject of our 1/18/10 letter to you." ¹⁰

Experts can debate the relative importance of safety system failures but there can be NO debate when ATR operators initiate scrams/shutdowns as to the major safety issues that pose immediate and significant public safety hazards that continued ATR operations pose. No commercial nuclear power reactor in the world would be allowed to operate with ATR's safety system failures.

It is crucial in the picture below to recognize the fact that the ATR and co-located spent nuclear fuel storage are housed in a typical steel sheathed industrial building – not a current US commercial nuclear power reactor that has a sealed reinforced concrete containment dome that prevents the release of radiation in the event of an accident.



Volume I

Section 1: Background

In 2007, Keep Yellowstone Nuclear Free, Environmental Defense Institute, Mary Woollen, John Peavey and Debra Stansell (“Plaintiffs”) filed a lawsuit against the Department of Energy (DOE) for violations of the National Environmental Policy Act (NEPA) for failure to conduct an Environmental Impact Statement for the continued operation of the Idaho National Laboratory’s Advanced Test Reactor (ATR). Plaintiffs asked Idaho Federal District Court Judge Winmill to consider the following:

“That DOE meet the requirements of the National Environmental Policy Act with respect to the Advanced Test Reactor Life Extension Program (the “LEP”) by immediately commencing the preparation of an Environmental Impact Statement for the LEP.” This \$200 million program is extending the forty-four-year-old ATR an additional 10 years long past its 20-year design life. Judge Winmill subsequently ruled in favor of DOE, however, the ATR vulnerabilities articulated in Plaintiff’s lawsuit remain prescient in view of the recent DOE disclosure of numerous ATR shutdowns due to “seismic concerns” and other safety system failures.

Plaintiff’s attorney Mark Sullivan states in the above lawsuit Complaint that according to DOE technical consultant’s ARES report: “Concrete wall lacks reinforcement; a very large concrete block shielding wall (8 feet tall and 73 feet long) is inadequately braced, and would fail in the event of a major earthquake, crushing the [Advanced Test Reactor] ATR’s adjacent primary coolant system lines. The ARES Report plainly states that ‘Failure of this wall could result in a loss of primary coolant.’ The report notes that the wall is vulnerable to damage ‘at relatively low seismic impact levels’ and ‘will behave as two rigid bodies pivoting about the top and bottom supports.’ The report recommends further evaluation and addition bracing for the wall. To Plaintiff’s knowledge, although more than a year has passed, nothing has been done to correct this serious concern.”

Plaintiff’s Complaint continues; “Other concrete block walls unreinforced and vulnerable; the shielding wall above is by no means the only vulnerable structure in the Test Reactor Area. The ARES Corporation reviewed the construction drawings for a number of buildings in and around the ATR to determine whether numerous concrete block walls are reinforced. In many cases, the safety of these walls could not be determined because construction drawings were missing or inadequately detailed, or because it could not be determined if the plans had been followed. In other cases, it was concluded that the walls were not reinforced. As the ARES Report states ‘the drawing review indicates that the concrete block structures are only lightly reinforced at best.’ This includes walls for the deep well pump-houses which would be relied on to supply cooling water to the ATR in the event of the disruption of commercial power, as well as numerous walls through which the Emergency Firewater Injection System piping passes. The buildings do not meet the current building code or DOE standards. The report recommends strengthening or replacing the walls. Although more than a year has passed, KYNF is not aware of any action by the DOE to secure these vulnerable structures.”

According to Department of Energy (DOE) Idaho National Laboratory spokesperson John Walsh’s Operations Summary issued November 2008: “The Advanced Test Reactor [ATR] was shut down and a review undertaken after an investigation identified potential seismic concerns with a cinder block wall in the facility. Compensatory actions were taken to ensure the wall would not damage required utility systems in a seismic event, and the reactor was restarted.”¹¹

Plaintiff’s overriding concern is a Loss-of Coolant-Accident at the Advanced Test Reactor (ATR). Unlike current power reactors that have sealed concrete containment domes, the ATR, in the event of a major accident, dampers release steam/radiation directly to the atmosphere that prevent pressure buildup.¹² This forty-five-

¹¹ DOE-ID Bi-Weekly Summary, citing 11/03/08 occurrence; (NE-ID-BEA-ATR-2008-0028). Also see 2003 ATR shutdown order “Use of incomplete fuel element data, used to perform physics analysis of fuel element plate restriction, resulted in an incorrect CSAP. Use of the incomplete data is determined to be the direct cause of this event.” Occurrence Report, Doc. No. NE-ID-BBW-ATR-2003-0002.

¹² Occurrence Report, Final, Operability Requirements for ATR Confinement Isolation Dampers Results in Potential Inadequacy in the Safety

year-old reactor (designed in the 1950s that began operation in 1967) poses an immediate threat to populations living in southeastern Idaho and western Wyoming because radiation released during a major accident that would be nearly half that released from Chernobyl and Fukushima meltdowns. This imminent (but preventable) threat warrants investigation by state and federal regulatory agencies.

Plaintiff's Complaint also states; "According to DOE's own related programmatic environmental impact documents, in the event of a serious accident, the ATR could release as much as 175,000,000 curies of radiation (includes 4,256,000 curies of radioactive Iodine), which would contaminate a vast area and rank second only to Chernobyl in terms of radiation release."^{13 14}

The above potential radiation releases do NOT include an ATR canal drain accident; "Many of the 600-700 irradiated fuel assemblies stored in the canal have decay times short enough that natural air convection cooling alone may not be sufficient to remove decay heat without melting. An estimate of the consequences for the severe accident canal drain may consider more realistic decay heat removal in order to minimize the number of fuel elements predicted to experience melt."¹⁵ DOE predicts "Canal drain accident" radioactive release fractions (amount released) is 1.0 or complete release.¹⁶ An ATR canal meltdown would release magnitudes more radioactivity than the ATR itself due to the 600-700 fuel assemblies in the canal.

Based on DOE's continued multi-year delays on Freedom of Information requests on ATR's operating history¹⁷ it is our contention that the DOE which operates the ATR at the Idaho National Laboratory (INL) is currently hiding, ignoring and discounting information regarding ongoing serious safety issues in the operation of the ATR. As shown below documents, DOE's FOIA document dribbling releases show major ATR safety problems.

In April 2008, the Environmental Defense Institute (EDI) and Keep Yellowstone Nuclear Free (KYNF) filed a Freedom of Information Act (FOIA) request with the Department of Energy (DOE) for documents related to the Advanced Test Reactor (ATR) located at the Idaho National Laboratory (INL).

DOE eventually released **some** of the requested ATR safety reports needed to document ATR's extended operation hazard to the public. A June 2008 declassified DOE report gained by EDI through FOIA acknowledges ATR problems and imposed high-power level limitations. "This limitation results from the evaluation of the frequency of a Direct Damage Loss-of-Coolant Accident (beyond design basis) and the application of the consequence-limiting protective margin criterion for certain Condition 4 Loss-of-Coolant Accidents."

Despite these safety problems, DOE allows parts of the ATR reactor core power level to increase between 362 and 379 mega-watts (MW) which is significantly higher (~44% and 51% respectively) than the 250 MW overall reactor power limit. DOE also admits that these increased power levels were not factored in the ATR "Safety Analysis Report Reflector Aging [that] did not analyze for a failure of the reflector block during a seismic [loss-of-coolant-accident] LOCA."¹⁸

Analysis (PISA), NE-ID-BEA-ATR-2007-0023. Also see footnote # 12. See Section 5-C below for details on ATR steam explosion potential.

¹² Occurrence Report, Final, Operability Requirements for ATR Confinement Isolation Dampers Results in Potential Inadequacy in the Safety Analysis (PISA), NE-ID-BEA-ATR-2007-0023.

¹³ U.S. District Court for the District of Idaho Eastern Division Complaint, Case No. 07-36. Citing ARES Report pages 9-11. See EDI website publications for the full text of this Complaint. <http://environmental-defense-institute.org>

¹⁴ Safety Analysis Report -153, 8/3/10, pg.15.12-23.

¹⁵ Ibid., page 15.12-11.

¹⁶ Ibid., page 15.12-23.

¹⁷ U.S. District Court, District of Wyoming, Keep Yellowstone Nuclear Free, et al, v. U.S. DOE, Case No. 06-CV-205-D, pending Freedom of Information Act request; Also incomplete Environmental Defense Institute FOIA request to DOE/Idaho 1/06.

¹⁸ Idaho National Laboratory, Doc. No. CCN-214175, June 30, 2008, Advanced Test Reactor Cycle 142B-1 Core Safety Assurance Package, pages 8, 9 and 14.

An April 2008 declassified ATR report puts the “Effective Point Power Limit” at 428 MW, which is 71% over the 250 MW operational power limit.¹⁹ This wide variation in effective power levels within different sections of the ATR core can result in “hot-spots” and exacerbate an already deficient reactor coolant system during an accident. Two 2008 ATR shutdowns (“scrams”) are attributed to “a sharp increase in dedicated center lobe power” and coolant system “degradation.”²⁰ Two other ATR scrams were reported in 2006 and 2007.²¹ Between 2000 and 2008, ATR emergency or unscheduled scrams totaled 12. (see page 12)

Crucial to effective ATR scram is the insertion of reactor safety control rods that have a history of degradation and failure.²² Despite the hazard, DOE views “The unique capability of the ATR to provide either constant or variable neutron flux during a reactor operating cycle makes irradiations in this reactor very desirable.”²³

During startup of the Advanced Test Reactor on March 8, 2009, it was determined that a primary coolant check valve was not seating properly. Startup preparations were stopped, the primary coolant system was depressurized and the reactor was defueled so the check valve could be replaced. (NE-ID-BEA-ATR-2009-0003). [see Attachment A below]

EDI’s review of the 2007-2008 FOIA documents show the following additional revelations;²⁴

1. “Finding: Some potential accidents and accident phenomena have not been adequately analyzed and documented to provide assurance that the ATR safety systems are capable of mitigating loss-of-coolant accidents in accordance with the ATR updated final safety analysis report (UFSAR).
2. “Safety Analysis Report over-states [**exaggerates**] the capability of the confinement to withstand an over-pressure event to establish a barrier against the uncontrolled release of radioactivity to the environment and to assure that the confinement design conditions important to safety are not exceeded for as long as postulated accident conditions require. There are no test data supporting the conclusion that the confinement leak integrity will be maintained after an elevated pressure transient.”²⁵ [emphasis added]
3. “The Remote Monitoring System (RMS-2) function for confinement over-pressure protection was eliminated in 1998 **without** adequate evaluation. The RMA-2 feature provided this function by initiating a trip of the ventilation supply while the exhaust was still operating [venting directly to the atmosphere during a seismic, fuel and coolant failure accident]. An over-pressure protection feature has **not** been installed and eliminated without adequate evaluation.
4. “While the ATR confinement structural integrity should be maintained at up to 9.0 inches of water [unit of pressure], the design basis leak [to the environment] rate integrity probably would not be maintained at this elevated pressure. Some seal materials would be expected to **fail** at 7.5 inches of water (RLRO-07-88).
5. “Confinement [reactor leaks to the environment] performance data has been extrapolated **far beyond** the range of measured data. The Safety Analysis Review (SAR) does **not** adequately account for potential confinement heat sources. ‘Evaluation of confinement pressure transient capability results in potential **inadequacy** in the Safety Analysis. The ATR Design Basis Reconstruction Project [also] identified [these] five issues with the ATR safety basis evaluation of potential confinement over-pressurized and confinement under-

¹⁹ Idaho National Laboratory, Doc. No. CCN-213422, April 22, 2008, Advanced Test Reactor Cycle 142A-1 Core Safety Assurance Package, page 20. Also see ATR power at 428 MW, January 31, 2008, CCN-212539, page 20.

²⁰ Occurrence Report, NE-ID-BEA-ATR-2008-0001, ATR N-16 System Degradation Results in Manual Shutdown.

²¹ Occurrence Report, NE-ID-BEA-ATR-2006-0019 and Occurrence Report, NE-ID-BEA-ATR-2007-0021.

²² Occurrence Report, NE-ID-BEA-ATR-2006-0009, #3 Safety Rod Actuator Controller Failure. Also see Occurrence Report, NE-ID-BEA-ATR-2007-0001.

²³ Frances M. Marshall Advanced Test Reactor Capabilities and Future Operating Plans, September 2005, INL/CON-05-00549, Idaho National Laboratory.

²⁴ Occurrence Report, NE-ID-BEA-ATR-2007-0022

²⁵ The ATR confinement structure is an industrial sheet metal sided building unlike the commercial nuclear power reactors that have a sealed concrete dome to contain any radioactivity released during an accident.

pressure has not been evaluated.”²⁶ [emphasis added]

EDI emphasizes that the above extremely critical revelations are contained in DOE’s own current internal reports not easily available to the general public.

After DOE refused to release another FOIA request related to the ATR Life Extension Program operations, KYNF and EDI filed a separate lawsuit in Wyoming Federal District Court in 2006. DOE claimed release of the documents would compromise national security. Judge Downes agreed in December 2007 to review the documents “in camera” and determine if DOE’s claims of national security secrecy are justified. As of this writing more than a year later, Judge Downs has not ruled on his review of DOE documents in this case.²⁷

The bottom line is we the public are blocked from knowing the full risk the ATR poses. EDI cannot claim that all the relevant ATR documents are being released by DOE, however, these released internal reports under FOIA document critical ATR safety problems that could have enormous impact on residents in Idaho and Wyoming in the event of a nuclear accident.

Since April 2008, DOE Idaho Operations Office (DOE/ID) has dribbled out documents requested under FOIA. DOE recently released **some more** of the requested ATR safety reports needed by the public to document ATR’s extended operation hazard to the residents living in the shadow of the ATR. Many of these documents have been censored (redacted). DOE again claims that release of these documents will compromise “national security.”

DOE states; “Specifically, some of the documents requested are internal, and their disclosure would significantly risk installations and projects that safeguard nuclear materials and facilities, and thus are not releasable under [FOIA] Exemption 2. Exemption 2’s anti-circumvention protection is applicable in this case because some of the requested documents identify vulnerabilities to sabotage events, system configurations/capabilities that may be exploited and internal procedures for operating the reactor that are inherently internal.”

The “anti-circumvention” exemption claimed by DOE only protects documents such as agency law enforcement manuals and procedures from public disclosure so that individuals may not use them to circumvent the law or law enforcement measures. The only security threat in jeopardy here is DOE’s credibility to safely operate the antiquated Advanced Test Reactor.

DOE/ID additionally states in its FOIA “exemption” claim; “Those documents in which material is so inextricably intertwined as to make redaction impossible or reduce the document to worthlessness have also been withheld.”²⁸ It is impossible to assess the veracity of this claim when DOE/ID refuses to specifically identify which documents have been completely withheld and under what grounds they are withheld.

The Environmental Defense Institute (EDI) and Keep Yellowstone Nuclear Free (KYNF) filed an Appeal (2/12/09) to DOE’s Office of Hearings and Appeals challenging DOE/ID’s censorship of requested FOIA documents.²⁹ As the Statute shows, FOIA provides the public a right, enforceable in federal court to access government documents and information. FOIA is to be broadly construed in favor of disclosure, and its exceptions narrowly construed. Furthermore, the federal agency that is resisting disclosure bears the burden of proving that the withholding is authorized by the statute. It’s tragically ironic that national security is indeed at risk because DOE refuses to acknowledge that the 45-year old Advanced Test Reactor’s continued operation poses a significant hazard to the residents of Idaho and Wyoming.

Belatedly, DOE Office of Hearings and Appeals issued another Decision and Order related to EDI FOIA

²⁶ DOE Occurrence Report, NE-ID-BEA-ATR-2007-0022

²⁷ U.S. District Court for Wyoming, Case No. 06CV205-D

²⁸ Clayton Ogilvie, DOE/ID FOIA Officer 12/16/08 letter, Partial

²⁹ Environmental Defense Institute and Keep Yellowstone Nuclear Free Appeal to DOE Office of Hearings and Appeals, 2/12/09, Concerning USDOE Idaho Operations Office Partial Response to Freedom of Information Request (FOIA-08-018). The full text of this Appeal is available at <http://environmental-defense-institute.org/publications>.

Appeal (3/14/11) “regarding the ‘Upgraded Final Safety Analysis Report for the Advanced Test Reactor, Revision 19, effective date 8/3/10....As the enclosed Decision and Order indicates, the DOE has determined that your submission be granted in part and denied in part. The document has been remanded to the DOE’s Idaho Operations Office (Idaho) for release of a version from which all Unclassified Controlled Nuclear Information (UCNI) has been deleted or for a new determination if Idaho determines to withhold information in addition that which has been properly identified as UCNI.”³⁰ As of this writing, DOE/ID has not responded to OHA’s ruling.

Moreover, as the information released by DOE below document, the NEPA lawsuit was prescient for identifying the ATR as a major public hazard deserving a full EIS so the general public could comment on its continued operation. Currently, the public only gets DOE’s public relations statements touting the ATR as the “world’s premier test reactor.”³¹

“**Why is this problem?**” DOE document states; “The Advanced Test Reactor (ATR) was designed and constructed in the 1950s and 1960s according to the design and safety standards in place at the time.”³² [emphasis in original] This reactor is suffering chronic “aging” of its primary operating systems. “The ATR Primary Coolant System (PCS) and the original six loops at the ATR were designed and constructed in the early 1960’s using the criteria of [American National Standards Institute] **ANSI 1955 standards.**”³³ [emphasis added]

The ATR is already 45+ years old and well beyond its 20-yr. design life expectancy. Nonetheless, DOE intends to extend its operation to 2040 and beyond. Due to neglect, antiquated equipment, poor design, and many years of what DOE has termed “budget austerity,” the ATR poses a threat to public health and safety.³⁴

DOE’s internal documents acknowledge the hazards to the public. “The ATR is a Category A [the highest] reactor with an operating power level of up to 250 MW, **with potential for significant offsite radiological consequences.** The ATR is classified as a Hazard Category 1 [the highest] nuclear facility in accordance with Department of Energy standards for hazard classifications of nuclear facilities.”³⁵ [emphasis added]

DOE is extending the operating life of the ATR for decades into the future that poses a major threat to public safety. The ATR has no adequate containment structure (sealed concrete dome required by the Nuclear Regulatory Commission for commercial nuclear power reactors) that would protect the public and the environment in the event of a severe accident. ATR is housed in a thin sheet metal-walled industrial building.

DOE documents state; “Building Confinement; Review of the recent annual building leak-rate data indicate that the leakage was above the 125% acceptance line. In addition all of the primary dampers that are required to close during the leak-rate showed signs of seal leakage. BDM-1-5A continues to fail to open in cold weather.”³⁶

According to DOE, a severe ATR loss of coolant accident would release a “source term” of 175,000,000 curies of radiation.³⁷ Such an accident, according to the DOE, would result in a lethal dose of radiation for

³⁰ Marmolejos, Poli, Director Office of Hearings and Appeals; 12/20/12 letter to Chuck Broschious, Environmental Defense Institute; OHA Case No. TFC-0009; Idaho Case No. 10-032D-(OM-PA-11-002).

³¹ <http://www.id.doe.gov/insideNEID/>

³² Deficiency Reports, ICARE No. 3518 and 3519

³³ ATR In-service Inspection Plan Fourth Inspection Interval February 2006 to January 2015; Doc. ID: PLN-859, 12/18/06. Response to Request No. 4. Appendix C-1.

³⁴ KYNF v. DOE, Idaho Federal District Court, Civ. No. 07-36-E- BLW, Complaint, page 2.

³⁵ Advanced Test Reactor (ATR) Reflector Safety Analysis, T.A.Tomberlin, Internal Technical Report, PG-T-89-018, July 1989, Response to Request No. 4 n. Page 25.

³⁶ Interoffice Memorandum, INL, March 29, 2005, Plant Systems Engineering Review for Facility Certification No.29, From D.J. Schooner. Page 4. [Request No. 4c]

³⁷ KYNF v. DOE, Idaho Federal District Court, Civ. No. 07-36-E-BLW, Administrative Record 006517. “Source Term” is defined by DOE as “The quantity of radioactive material released by an accident or operation that causes exposure after transmission or deposition. Specifically, it is that fraction of respirable material at risk that is released to the atmosphere from a specific location. The source term defines the initial condition for subsequent dispersion and consequence evaluations.” DOE/EIS-0287D, pg D-33

anyone within 19.4 kilometers of the facility and would require the evacuation of areas within 105 kilometers of the facility. This is an evacuation radius that would include all of Idaho Falls, Rexburg, and Pocatello as well, an area with a population well in excess of 100,000. This potential accident at the ATR would be second only to Chernobyl and Japan's Fukushima's in severity.

Even a one percent ATR meltdown accident would have significant radioactive emissions. Internal DOE reports state: "Consequences of [ATR] Fission Product Release to Primary Coolant System; [A] release to the primary coolant system (PCS) of one percent of the core fission products has been considered and indicate that a release of 1% of the inventory would be approximately 2.4×10^6 curies of solids (Cs, Rb, Ba, Te), 1.0×10^6 curies of halogens (I, Br), and 1.0×10^6 curies of noble gases (Xe, Kr) **[total 4,400,000 curies]. Release of 1% of the [reactor] core fission products into the PCS could result in significant releases from the ATR stack.** Efforts would be made, upon experiencing a fission break, to control the immediate stack release rate to less than 400 Ci/day." ³⁸ [Emphasis added] This ATR accident scenario would be significantly worse than the Three Mile Island commercial power reactor meltdown in Pennsylvania.

Deterioration of the ATR beryllium reactor core reflector is a problem DOE has been aware of for decades. "Cracks in the reflector could lead to pieces of beryllium being washed out of the reflector and into the primary coolant system (PCS). The possibility of damage to reactor or PCS components by these free pieces of beryllium has been assessed. **Components for which the assessment was made include the heat exchangers, primary coolant pumps, primary coolant pump check valves, safety rods, neck shim rods, outer shim control cylinders, and fuel elements.**" [Emphasis added] [Ibid. pg. 43] Failure of anyone or all of these primary ATR systems in a cascading (one failure causing others) could be disastrous especially if the Safety Control Rods were unable to shutdown the reactor.

Major problems with the Safety/Regulating Control Rods essential for reactor shutdown have a long history at the ATR. "Regulating Rod [Reg Rod]; During removal of the reg rods one of the followers detached and fell into the tank...due to heavy corrosion. The new reg rod followers, however, are chrome plated and can be expected to experience the same failure mechanism. The metallurgical evaluation suggests that within two to three years the reg rod followers should be replaced with a different metal such as zircaloy." ³⁹

"Spare Safety Rod Drive; There is currently no spare safety rod drive. In addition there are two other new safety rod drives that have deficiencies that prevent them from being used. Regulator Rod; The reg rod drives were not included in this upgrade." [Ibid. pg.11]

DOE Safety Rod Failure report states: "This attempt to manually withdraw and insert the [Safety Rod] SR proved that the problem was in-tank. The problem was likely debris of some kind caught in between the safety rod and the inner or outer snubber tube and/or possibly debris on the safety rod rack tube. Problems of this nature have been experienced in the past with the safety rods." ⁴⁰

Reactor safety rods also called control rods are crucial to safe shutdown of ATR reactor in an accident (scram) and therefore pose an ongoing safety issue. There is no indication that this problem has been adequately corrected. Also, this is a systematic problem with ATR's "serpentine" fuel/control/safety rod configuration unlike conventional commercial reactors that use straight configuration of fuel/control rods.

"The ATR PCS/SCS heat exchangers are operating beyond 200% of their 20-year design life. To date, the only failure has been a single case of pitting corrosion in the heat exchange shell of 670-M-85." ⁴¹

"Core Internals Chang-out [CIC] VI; The C/2 N-16 tube has historically failed two to four years following

³⁸ Advanced Test Reactor (ATR) Reflector Safety Analysis, T.A.Tomberlin, Internal Technical Report, PG-T-89-018, July 1989, Response to Request No. 4 n. Page 25.

³⁹ Interoffice Memorandum, INL, March 29, 2005, Plant Systems Engineering Review for Facility Certification No.29, From D.J. Schooner. Page 5, [Request No. 4c]

⁴⁰ Southeast Safety Rod Failure, INL, Interoffice Memorandum, 2/17/05, from D.G. Robinson, Response to Request No. 4i.

⁴¹ Interoffice Memorandum, INL, March 29, 2005, Plant Systems Engineering Review for Facility Certification No.29, From D.J. Schooner. Page 4. [Request No. 4c]

the CIC. The apparent design flaw with the C/2 N-16 tube **has not been investigated & corrected so it can be expected to fail two to four years from now.**” [Emphasis added][Ibid. pg. 3]

“Electrical Distribution; Although the electrical utility upgrade project updated a significant amount of the switchgear there is a fair amount of switchgear that is well beyond its design life. This includes the 50 year-old switch gear in building 609 and the 40 year old E-3 switch gear in the ATR.” [Ibid. pg.6]

DOE’s own previous Environmental Impact Statements (EIS) state the ATR released 1,802 curies in 2000 and 1,180 curies in 2003 to the atmosphere.⁴² On average that is about 1,491 curies/year; so over a nine year period 2000 through 2011 about 16,401 curies are released to the air. These high emissions from ATR suggest liquid waste is first sent to the ATR cooling towers w/o treatment and the precipitates are then pumped to INTEC evaporators or the percolation ponds. This represents a significant hazard to INL workers and the downwind public.

The Original ATR Design Specifications Indicate a 20-year Design Life For Key Reactor Components

Design specifications for four critical components of the ATR are part of the Administrative Record. Those specifications were prepared prior to construction of the ATR in the early 1960s for Ebasco Services Corporation, the company that designed and built the ATR for the DOE’s predecessor, the Atomic Energy Commission. They are: (1) ATR Specification for Primary Heat Exchangers; (2) ATR Specification for Reactor Vessel; (3) ATR Specification for Outlet Flow Pipe Assemblies; and (4) ATR Specification for Safety Rod Drive Mechanisms (the “Ebasco Design Specifications”). Three of the four Ebasco Design Specifications state that the component has a 20 year “design life.” The fourth gives a 10 year design life.

Since April 2008, DOE has dribbled out documents requested under FOIA. DOE recently released **some more** of the requested ATR safety reports needed by the public to evaluate ATR’s extended operation hazard to the residents living in the shadow of the ATR built in the 1960s.

Many of these FOIA documents have been censored (redacted). This last batch of documents DOE sent to EDI in February 2008 had over 24 pages redacted. This is in addition to over 152 pages redacted in DOE’s earlier December 2008 FOIA partial shipment or a running total of 176 pages redacted.⁴³ DOE claims that release of these redacted documents will compromise “national security.”

EDI’s preliminary review of the 2008 FOIA reports document the following problems at the Advanced Test Reactor (ATR);

* In 1989 the ATR Aging and Life Extension Program identified **seven** critical reactor vessel internal components that provide support for the core and direct primary coolant water flow were problematic due to aging because of inadequate materials that are not accounted for in design calculations on both the residual life of the component and the overall ATR’s Life Extension;⁴⁴

* Two of the above **seven** critical reactor vessel internal components were **not** originally constructed of ASME Code III approved materials; One of which is the aluminum alloy Reflector Support Tank that is highly stressed with a relatively **low fatigue life** utilizing just normal operating loads; and the second is the sand-casted aluminum Core Reflector Tank’s top edge stresses due to the gear box support beams;⁴⁵

* Failure to identify and document an equipment deficiency associated with the ATR stack effluent Real Time Monitor;⁴⁶

⁴² DOE/EIS-0287 pg. 4-30; DOE/DEIS-0373D, pg. 3-26.

⁴³ Chuck Broscius, Notes on Advanced Test Reactor FOIA Documents, Environmental Defense Institute, 2/16/09.

⁴⁴ ATR Reactor Vessel Internals Lifetime Scoping Analysis, D. K. Morton, Applied Mechanics, May 1989, GT-T-89-011.

⁴⁵ Ibid, pgs. 5 and 12. ASME = American Society of Mechanical Engineers Code, Section III, Subsection NG – “Core Support Structures.”

⁴⁶ DOE-ID MAR Dec. 2006 # ISS-OM-1/10/2007-68042, Price-Anderson Amendments Act Nuclear Safety Non-Compliance Determination, 1/23/07.

- * Inadequate procedures for ATR reactor primary coolant pressuring system maintenance; ⁴⁷
- * Failure to recognize that the emergency primary coolant pump M-6 Diesel generator would **not** start automatically; [Ibid]
- * During commercial power outage causing a ATR emergency shutdown “scram” the M-6 backup power generator “failed to start automatically, nor would it start upon subsequent manual commands”; ⁴⁸
- * The risk of an early ATR Complete Loss of Reactor Coolant Flow Accident analysis recognized that it could happen as the result of operational malfunctions “transients” in addition to Loss-of-Coolant-Accident events designed to shutoff running primary coolant reactor pumps; ⁴⁹
- * The ATR safety basis does not include analysis of a complete loss of coolant flow accident with Primary Coolant System leakage; ⁵⁰
- * Total operating time during a year with only one operating primary coolant diesel-generator but no operable standby diesel-generator: 48 days; ⁵¹
- * The ATR reactor fuel storage canal bulkheads were not shown to be adequate for the site-specific probabilistic safe shutdown earthquake; ⁵²
- * ATR’s structural components will require major modification to satisfy current PC-4 seismic criteria; ⁵³
- * Extensive corrosion of ATR reactor vessel internal parts can result in coolant system failure; ⁵⁴
- * DOE’s radiological analysis of a ATR meltdown of only 30% of the core fuel and only operating at a reduced 203 MW during a Loss-of Coolant-Accident predicts 67 grams of radioactive iodine will be released from the reactor fuel that melts; ⁵⁵ resulting in a potentially lethal thyroid dose of 369 rems; ⁵⁶
- * The results of the above ATR accident scenario analytical basis were **not** adjusted upward for the stated Safety Analysis Review-153 assumption of 100% reactor core melt nor full power of 250 MW. [Ibid]
- * ATR building confinement performance in keeping radiation from leaking to the atmosphere is [Kleenex-sneeze] rated at 0.03 psi; ⁵⁷
- * Seismically-induced loss-of-coolant accidents and new site-specific seismic design criteria for soil for the ATR identified several areas of concern with the ATR seismic safety basis deterioration; ⁵⁸
- * The ATR safety basis does **not** include analysis of a complete loss-of-flow accident with Primary Coolant System leakage; ⁵⁹
- * The status of Seismic Probabilistic Risk Assessment studies for the ATR does not adequately support the safety basis; ⁶⁰

⁴⁷ Ibid.

⁴⁸ Recovery from 674-M-6 Diesel Generator and TRA-609 Breaker Failures, 2/1/02/02, Interoffice Memorandum, 2/18/02; and Occurrence Report, Reactor Scram Due to Loss of Commercial Power Followed by M-6 Quick-Start Diesel Generator Failure to Start, ID-BBWI-ATR-2002-0008.

⁴⁹ Early Complete Loss of Flow Accident Re-evaluation for Loss of Diesel Power Events with the Loss of Coolant Accident Engineering Safety Feature, EDF No. TRA-ATR-161 and 1615, 8/12/98.

⁵⁰ Impact of Potential PSC Leakage and Fuel Element Thermal-Hydraulic Conditions, Potential Inadequacy in the Safety Analysis, RTC-USQ-2005-173.

⁵¹ Standby Diesel-Gen Outage Time, Internal Department Communications to, J.Jacpbo, Lockheed Martin Idaho Technologies, 3/4/99. Also ATR Operation Data Appendix A, ATR Equipment in use in Calendar Years 1995-2000.

⁵² Seismic Evaluation of ATR Canal, Engineering Calculations and Analysis Report, 9/23/08.

⁵³ Structural Evaluation of the ATR TRA-670 Superstructure, Engineering Design File No. 7210, 1/30/03, pg. 27.

⁵⁴ ATR Center Flux Trap Baffle Status, September 2008, “It appears that the aluminum and the stainless steel form a galvanic couple which is responsible for the corrosion of the aluminum tube and the eventual failure.” Pg.5.

⁵⁵ Inconsistencies in the Maximum Hypothetical Accident Analysis, Advanced Test Reactor, Potential Inadequacy in the Safety Analysis, RTC-USQ-2006-655, 10/11/05.

⁵⁶ ATR Reactor Building Confinement Performance, Engineering Design File, EDF-TRA-ATR-1328, Rev.2, 2/18/98.

⁵⁷ ATR Reactor Building Confinement Performance, Engineering Design File, EDF-TRA-ATR-1327, Rev.1, 2/18/98

⁵⁸ Summary of Resolution of Advanced Test Reactor Un-reviewed Safety Questions, Engineering Design File No. 4334, 1/30/03

⁵⁹ Ibid.

⁶⁰ ATR Seismic Safety Basis Deterioration, TRA-USQ-2004-214.

* The Seismic Assessment categorized the ATR equipment and were judged to have **insufficient** capacity to satisfy current PC-4 seismic design and evaluation criteria into those that do not meet the current ATR safety basis, and those that meet current safety basis to a more stringent PC-4 criteria;⁶¹

* Inadequate information is available for the twelve reactor vessel instrument thimble tubes; these tubes are part of the ATR primary pressure boundary and thus require stress, embrittlement and fracture analyses as part of a design basis break size loss of coolant determination.⁶²

* Procedures for the pre-criticality have not been revised to require investigation and mitigation of any observed high vibration levels in components or piping to preclude high cycle fatigue degradation.⁶³

EDI acknowledges that for reporting accuracy, the above ATR operating safety problems are presented using DOE's own technical jargon. The bottom line is these FOIA documents show that the ATR has serious deficiencies that the public needs to know! **DOE offers no credible "national interest" for continued ATR operations that vaguely compares to the enormous risk to the public of an ATR accident.** Moreover, DOE's refusal, despite our legal challenge, to conduct a comprehensive ATR Environmental Impact Statement denies the broader general public's legal right to review and comment on these significant environment-health and safety issues.

Apparently the Department of Energy (DOE) did not get President Obama's message on his first day in office directive that "starting today, every agency and department should know that this administration stands on the side not of those who seek to withhold information but those who seek to make it known."

In a 3/25/09 certified letter from the DOE Office of Hearings and Appeals (OHA), "The Decision and Order indicates the DOE has determined that: "The information redacted from the eight documents was properly withheld under Exemption 2. However, Idaho did not provide an adequate determination with respect to Exemption 4. Therefore, we will grant the Appeal in part and remand the matter to Idaho for a further determination on the Exemption 4 withholding."⁶⁴

Basically, OHA only approved release of some relatively unimportant "trade secrets or confidential", drawings while maintaining censorship of the more important documents sought by Environmental Defense Institute and Keep Yellowstone Nuclear Free in our Freedom of Information Act (FOIA) request that also included a copy of the current Advanced Test Reactor Safety Analysis.

In a April 9, 2009 DOE/ID Operations Summary: "It was determined that an existing Safety Analysis of the Advanced Test Reactor does not fully address the possibility that emergency cooling pumps at the reactor could be submerged before they are able to fulfill their safety function following a reactor shutdown in a particular accident scenario."

This means despite DOE's own internal reports that acknowledge Advanced Test Reactor (ATR) Safety Analysis Review deficiencies, DOE still censors the release of these reports to the public under FOIA. DOE contends that: "Release of the information at issue in the present case could allow terrorists or other malefactors to identify vulnerabilities of the ATR and to understand how to sabotage it. Accordingly, disclosure of the information at issue risks circumvention of DOE's efforts to comply with its statutory mandate to provide secure and safe stewardship of nuclear and other dangerous materials." This statement is uniquely ludicrous when (as documented above) the ATR Safety Analysis Review is deficient and yet the public is denied access to the information needed to characterize the hazards this 40-year old nuclear reactor poses to the entire region

⁶¹ Experience-Based Seismic Qualification of ATR Seismic Category 1 Equipment (ARES Corp. Report) Responsibility Determination/ Potential Inadequacy in the Safety Analysis, ATR Complex-USQ-2008-805, September 2008.

⁶² Leak-Before-Break Evaluations for the Advanced Test Reactor Primary Coolant System, MPR Associates Engineering, prepared for Battelle Energy Alliance, LLC, MPR-3088, December 2007.

⁶³ Ibid. page 2-1.

⁶⁴ Poli A. Marmolejos, Director Office of Hearings and Appeals, 3/25/09 letter to Chuck Broscious, RE: Case No. TFA-0298.

during an accident.

Also on March 19, 2009: “An operator at the Advanced Test Reactor discovered that an inflatable seal on the canal bulkhead at a [reactor] fuel storage facility was no longer maintaining required pressure because of an air leak. Spent fuel cask movements in the canal area affected by the failed seal were prohibited until the failed seal is repaired or modifications completed.” Loss of coolant water (that also acts as a nuclear criticality moderator) in reactor fuel storage canal could result in a spontaneous criticality fire that is extremely difficult to extinguish especially it occurs during an earthquake or other reactor malfunction requiring limited water to other safety systems.

On April 28, 2009 DOE/ID released under FOIA, documents related to the ATR “Safety Rod Drive clutch plates that are part of the Safety Rod System, a reactivity [sic] control mechanism:” the primary reactor shutdown control mechanism. DOE Documents state; “The revision to this CGI [Commercial Grade Item] is to **eliminate** the ‘performance characteristic’ item of the CGI dedication plan as requirement for staging clutch plates in the warehouse. Initially this material was for direct installation. Now, material is to be staged in the warehouse for future use without providing proof of ‘performance characteristics’, however, proof of ‘performance characteristics’ will be provided upon installation of any new clutch plates.”⁶⁵ [emphasis added]

In essence, DOE has suspended its previous “commercial grade” requirement for the most crucial mechanism for emergency shutdown of the ATR. Given the long history⁶⁶ of ATR safety rod drive malfunctions, are we, the public, to believe that if the ATR has an emergency scram (shutdown), and the safety rod drives (primary mechanism for shutdown) fail, that operators will take the time to conduct time consuming “performance characteristics” testing or will they just grab what is on the warehouse shelf to get the ATR shutdown hoping the clutches work mitigating a melt-down. Additionally, we do not know at this time how many other ATR replacement parts are also non-compliant. There is no credible reason for this dangerous cost-cutting action given the enormous consequences of a major ATR accident.

As previously emphasized, the only “security threat” in jeopardy here is DOE’s credibility to safely operate the antiquated 40 year-old Advanced Test Reactor that is still operating long after its original 20-year design life. We do not want another Three-Mile-Island or Japan’s Fukushima-Daichi accident here in Idaho.

This is tragically ironic when DOE is currently denying EDI’s Freedom of Information Act requests for documents related to ATR’s deteriorating crucial safety systems due to aging of this 40-year old reactor. DOE also fought and won EDI/KYNF’s legal effort to force DOE to conduct an Environmental Impact Statement on extending the ATR’s operations to 2014.

Litigation efforts under the National Environmental Policy Act and the Freedom of Information Act in US Federal Courts in Idaho and Wyoming⁶⁷ related to the Advanced Test Reactor by Keep Yellowstone Nuclear Free and the Environmental Defense Institute et al. are accessible at <http://environmental-defense-institute.org/publications>. These court filings offer additional credible challenges to the continued operation of the Advanced Test Reactor at the U.S. Department of Energy’s Idaho National Laboratory.

Recent disasters such as Hurricane Katrina and the recent Sago Mine explosion in West Virginia reveal a clear lack of federal response before and after such disasters to prevent and mitigate these disasters. Taking

⁶⁵ Commercial Grade Item Dedication Plan, CGI-303 Revision 1, 2/28/05.

⁶⁶ Interoffice Memorandum, INL, March 29, 2005, Plant Systems Engineering Review for Facility Certification No.29, From D.J. Schooner. [Request No. 4c] Regulating Rod (Reg Rod); “During removal of the reg rods one of the followers detached and fell into the tank...due to heavy corrosion. The new reg rod followers, however, are chrome plated and can be expected to experience the same failure mechanism. The metallurgical evaluation suggests that within two to three years the reg rod followers should be replaced with a different metal such as zircaloy.” [pg.5]

⁶⁷ United States District Court for the District of Idaho; Case CV-07-36-BLW; ATR National Environmental Policy Act (NEPA) suit filed 1/27/07. United States District Court for the District of Wyoming; Case No. 06CV205-D; ATR Freedom of Information Act (FOIA) suit filed 8/8/06.

note of concerns and information which existed prior to these disasters was a key ingredient missing in the timely preparation for or prevention of calamitous results from such catastrophic incidents.

It is our contention that the Department of Energy (DOE) which operates the Advanced Test Reactor (ATR) at the Idaho National Laboratory (INL) is currently hiding, ignoring and discounting information regarding serious safety issues in the operation of the ATR. The DOE plans to use the ATR for the ultra-hazardous project of Plutonium 238 production. Plutonium 238 is a carcinogenic, mutagenic substance of enormous toxicity which has contaminated the workers and public in every community in which DOE has produced Plutonium 238.

A 2006 DOE ATR Life Extension Program report states: "The ATR was designed in the late 1950s and started full power operations with inpile [sic] experiments in 1969 and is now being evaluated for extending its role in materials testing through the year 2040. This extended operation will result in a 71-year operating lifetime for the ATR." These DOE plans to extend the ATR's operating life past its original 20 year design life exponentially increases the accident hazard and is unacceptable by any independent standards.

Additionally, DOE plans to test the next Generation IV reactor fuel at the ATR, test transmutation of spent nuclear fuel, and produce cesium-131. These new ATR missions pose the same hazards and risks to the public in the event of an accident.

The ATR has an enormous inventory of releasable radioactive material, equal to nearly half that of the Chernobyl reactor, which can be released during an accident.

The ATR has no containment dome that would protect the public and environment from the release of radiation during a catastrophic accident. Containment domes such as that which existed at Three Mile Island Nuclear Reactor are standard protective devices at all commercially operating nuclear reactors in the United States. Lack of containment for the ATR is so basic to public and environmental safety that the public can only view DOE as operating a deliberate menace to the community and environment.

The ATR has not been seismically qualified to operate in a region that is regarded as seismically active as San Francisco. The ATR was only designed to the Building Code that existed in 1961. The DOE refuses to provide the seismic soil spectra report of year 2000 for the ATR claiming national security exemption.

The ATR has seismic support anchor bolts that DOE knows cannot reach through their anchor plates to be anchored in the concrete under the supports.

The ATR lacks an Emergency Core Cooling System that could reliably perform during an earthquake. The ECCS piping is linked to a fire suppression system, the Emergency Fire Injection System, which passes through seismically unqualified masonry buildings, any one of which could collapse during a seismic event and truncate the piping and water supply for the ECCS.

The Emergency Firewater Injection System, that is the backup for the ATR Primary Coolant System, is a half-century old system and has yet to be upgraded.

The water supply for the emergency firewater system relies on an antiquated pumping system that has repeatedly failed sequential testing. The water holding tanks for the ATR built in the 1950s are not seismically qualified by current standards.

Only one emergency backup diesel power generator exists for the water pumps and the ATR reactor shutdown system. This pump is not adequately secured for seismic events. The electrical connections of the diesel generator are not seismically protected.

Failure of the ECCS could result in a hydrogen or steam explosion which would spread 175 million curies of radiation to the environment. This is an amount of radiation equal to nearly half the Chernobyl release which contaminated thousands of square miles and spread a cloud of radiation around the earth.

The ATR operations have resulted in ongoing contamination of the air, water and soil at INL in an area which overlies the sole source aquifer of the Snake River System. The contamination includes radioactive noble gasses, multiple species of radioactive iodine, heavy metals and radioactive products. The releases of the ATR lie within the flood plain of the Big Lost River.

DOE has no Clean Water Act National Pollution Discharge Elimination System permit for the INL. DOE has a INL Title V air permit as required by the Clean Air Act; however, it is inadequate because it does not account for all hazardous air pollutants from each of the INL operations that exceed emission standards.

The ATR facility and other facilities which support it in the Test Reactor Area (TRA) now called the Reactor Technology Complex (RTC) area produce mixed hazardous/radioactive wastes which are of the type and quantity of hazardous wastes required to be regulated under the Resource Conservation and Recovery Act (RCRA). For example, DOE contaminated the soil at INL with six beryllium reflector blocks from the ATR. The blocks contained a total of 293,000 Curies of tritiated hydrogen gas and approximately 20 Curies of carbon-14. Both radionuclides form mobile compounds and represent a threat to the Snake River aquifer over the next three hundred years. The beryllium reflectors sustain considerable radiation deterioration, so at each reactor fuel change-out, the damaged blocks are replaced. Beryllium is a RCRA waste. Yet the ATR and facilities of the TRA\RTC do not have the Part A and Part B permits which are mandated for such facilities by RCRA. Thus the ATR and facilities of the TRA\RTC are illegally operating federal facilities. DOE has assiduously avoided addressing the RCRA issues which exist for the ATR and TRA\RTC facilities.

DOE violates its own internal safety orders in operation of the ATR. DOE is the fox watching the nuclear henhouse and has no duty enforceable by the public to obey its safety orders.

DOE has deliberately attempted to conceal the problems of the ATR from the public by delaying release of documents, redacting large portions of documents and fails to provide full safety reports without requiring full blown FOIA requests. FOIA exemptions are used by DOE as a tool of delay and interference with the public right to know about dangerous facilities operating in our community. Reports with Un-reviewed Safety Questions are kept from the public.

The ATR safety culture of the DOE at the ATR has been to silence or terminate critics or whistleblowers from their jobs and conceal facts from the public rather than to address long standing problems and resolve those problems in a timely manner. The deficient safety culture at the ATR is underscored by the decade old existence of systemic problems which although repeatedly cited in occasional independent safety reports are not corrected year after year. Seismic concerns for ATR date back numerous decades but have not been corrected.

The DOE published a draft Environmental Impact Statement for Plutonium Consolidation which failed to tell the public about any of the safety concerns for the ATR documented by numerous studies. DOE misinforms by omitting to the public by withholding information and also by not furnishing or addressing negative information which it holds. The DOE has offered a sham Environmental Impact Statement to the public.

The ARES November 29, 2004 "letter report" to DOE documents that all of the major systems for seismic protection of the ATR are vulnerable to seismic stress. The inadequate systems include primary and secondary cooling systems and the emergency firewater injection system.

The Facility Certification Report No. 29 by Battelle Energy Alliance catalogues equipment failures and malfunctions due to age of the ATR and unavailability of replacement parts. The 2004 Reactor Technology Complex Natural Phenomena Hazards Assessment Plan which assessed seismic hazards at RTC never was implemented.

On December 21, 2007, DOE's expert Robert Boston filed an "Errata" declaration to the court stating; "The Plaintiffs have correctly pointed out that I made a mathematical error in my prior declaration ...". Boston goes on to state; "Such issues and measures to change operations to extend the operating life have no relevance to ATR, which identifies **that neither the AELEX Program or the Life Extension Program (LEP) have identified any significant aging related issues that require upgrading to the ATR.**"¹ [emphasis added]

The ATR went into service in 1969 (~40 years ago) and long past its original design life of 20 years.² DOE's Life Extension Program is extending ATR operations for another 35 years. Aging/degradation of crucial ATR safety systems are well documented by Plaintiffs briefs to the Court, and in DOE's own reports.

For instance, DOE's ATR Facility Certification Report shows:

- * Emergency reactor shutdowns due to control rod failure and Emergency Fire Water System failures;
 - * "Existing hardware has had frequent failures and repair is uncertain with each failure, as there is no current supplier of spare parts;"
 - * DOE admits an "extensive NEPA evaluation is required;"
 - * "High Level Radiation Monitoring System is not working;"
 - * Primary reactor coolant heat exchangers leak; Secondary heat exchangers are seriously corroded and "should be replaced" because both "are operating beyond 200% of their 20-year design life;"
 - * Not all safety equipment qualified to current seismic criteria;
 - * Emergency water coolant pump failure;
 - * ATR non-compliant metal building radiation confinement leaks "above the 125% acceptance line;"
 - * On-site raw emergency reactor coolant water supplies are not sufficient in ongoing commercial power outages;
 - * ATR Vessel Vent Valves releases radiation directly to the atmosphere during loss-of-coolant event;
 - * ATR power level reduced from 250 MW to 150 MW due to core safety assurance problems;
 - * Beryllium transuranic waste has "no path to disposal" as required in regulations;
 - * Liquid waste evaporator pond liners are leaking;
- Reactor Core Integral Change-outs "failed two to four years after change-outs and are expected to fail two to four years from now;"
 - During commercial power failure, emergency diesel power generators failed to start;
 - Required National Fire Protection inspection failed because fire dampers "were not made for inspection and some dampers were installed backwards;"³

Freedom of Information Requests, statements by ATR safety analysts, ATR engineers, and independent reviews by the Defense Nuclear Facilities Safety Board and DOE Office of Inspection and Performance Assurance (OA). Our concerns flow from information which has been obtained from the DOE itself through dependent Oversight and Performance Assurance (OA).

Despite an enormous inventory of radiation that could be released in a design basis accident, the DOE apparently believes that the safety of ATR operations in Idaho deserve no more care than one of the minimally regulated research reactors in a university.

Equally egregious, is Congressional passage of the Price Anderson Act "Indemnification and Limitation of Liability" of DOE and its contractors operating nuclear reactors that sustain an accident impacting surrounding populations.⁶⁸

This revision of EDI's initial ATR report dated February 2007 contains new and crucial information that EDI has gained since April 2006.

It is our contention that the continued operation of the ATR has the potential to result in a catastrophic accident for which there exists inadequate protection for the workers, public and environment. We submit that the appropriate course of action to prevent a catastrophic accident at the ATR is to cease operations of the ATR and to shutdown and decommission this inherently unsafe nuclear reactor. DOE, on the other hand, is touting the ATR as the "world's premier test reactor."⁶⁹

DOE Secrecy to Hide Safety Concerns about the ATR

The Environmental Defense Institute (EDI), Keep Yellowstone Nuclear Free and attorney David McCoy filed four Freedom of Information Act (FOIA) requests to the Department of Energy (DOE)

⁶⁸ U.S.C. 42 ss 2210 Chapter 23, Division A Subpart XIII.

⁶⁹ <http://www.id.doe.gov/InsideNEID/PDF/tra-fsheet.pdf> p.1

related to accident analysis reports on the fifty-four-year-old nuclear reactor that has produced and is slated for new plutonium-238 production. Major new "Generation IV" reactor fuel testing program⁷⁰ and new spent nuclear fuel transmutation experiments⁷¹ and Cesium-131 production⁷² loom at Advanced Test Reactor located at the Idaho National Laboratory (INL).⁷³

DOE's response was to censor crucial parts of EDI's FOIA requests related to the Advanced Test Reactor (ATR) built in the mid-1960s. DOE's unsubstantiated justification for censoring these documents was that it could "compromise national security." ATR documents sought under FOIA are related to safety problems, environmental regulatory compliance, and are in no way related to "national security." Keep Yellowstone Nuclear Free joined this FOIA effort and is now leading our collective Appeal to DOE's Office of Hearings and Appeals for unjustified censorship.⁷⁴ Also see Section 5-M below.

A 1995 Defense Nuclear Facility Safety Board report states: "The ATR was designed in the early 1960s when reactor safety criteria were in a formative stage. Modest fuel melting, especially in test reactors, was recognized as possible during limiting accident conditions. The ATR began operations in 1969 based on design criteria that allowed the onset of clad melting during limiting accidents. Current criteria as used in the draft SRA [Safety Review Analysis] require that the fuel plates remain in a coolable [sic] geometry even for accidents which are unlikely."⁷⁵

In plain language, the ATR deliberately exposes reactor fuel test prototypes to extreme levels of radiation that causes cladding failure in order to establish the test sample operational parameters.⁷⁶ However, with each reactor fuel cladding breach (i.e. meltdown), hazardous fission products are released to the atmosphere via the ATR main stack and coolant water cooling towers due to leaks between the primary and secondary coolant heat exchangers.⁷⁷ Below is a detailed discussion of how DOE has failed to upgrade the ATR to statutory and regulatory standards.

DOE ignores 1995 Defense Nuclear Facility Safety Board ATR Report.

Despite warnings from the Defense Nuclear Facility Safety Board (DNFSB) related to major safety ATR safety problems over a decade ago, DOE currently refuses to correct these major safety

⁷⁰ <http://hanaro2005.kaeri.re.kr/data/proceeding/IR-O-05.pdf> Proceedings of the International Symposium on Research Reactor and Neutron Science. Also see <http://anes2002.hcet.fiu.edu/ProceedingCD/s8Fur.pdf>

⁷¹ Hardening neutron spectrum for advanced actinide transmutation in the ATR, G.S. Chang and R.G. Ambrosek, INL, published in the Oxford University Press, 2005.

⁷² IsoRay Begins Production of Cesium-131 Isotope through Agreement with INL at Advanced Test Reactor, 7/6/06.

⁷³ Environmental Defense Institute and David McCoy filed four Freedom of Information Act (FOIA) requests dated July 7, 2005, September 21, 2005, August 26, 2005; and September 14, 2005. Specifically, DOE censored "Advanced Test Reactor Upgraded Final Safety Analysis Reports (herein after called SAR-153) Chapters 1 through 4 and Chapters 15 and 16 related to ATR Safety Analysis, SAR-153; and USDOE/ID Technical Safety Requirements, Technical Safety Requirements for the Advanced Test Reactor, ID: TSR-186, effective date 4/7/05 Section 3 and 4.

⁷⁴ See DOE Office of Hearings and Appeals Case No. TFA-0128

⁷⁵ Defense Nuclear Facilities Safety Board, June 23, 1995, letter to Dr. Terry Lash, DOE Office of Nuclear Energy, with report dated 5/23/95.

⁷⁶ Advanced Test Reactor Capabilities and Future Plans, Frances M. Marshall, INL, USDOE, page 5.

⁷⁷ "The M-85 [primary coolant system] PCS heat exchanger developed a leak in the shell side. Further investigation utilizing non-destructive examination indicated pitting corrosion occurring in all the PSC heat exchangers... **The ATR PCS/Secondary Coolant System (SCS heat exchangers are operating beyond 200% of their 20-year design life.**"

problems. The table below compares 1995 DNFSB findings with current DOE and other agency reports that document no substantive ATR safety system upgrades.

DNFSB 1995 Review	2005 ATR Agency Safety Reports
<ul style="list-style-type: none"> • "The ATR was designed in the early 1960s when reactor safety criteria were in a formative stage. • The primary coolant system integrity is of concern as fuel melting could occur in loss of coolant accidents with pipe breaks greater than 3 inches. • The thermal performance of the core is also of concern. • The ATR began operations in 1969 based on design criteria that allowed the onset of clad melting during limiting accidents. Current criteria as used in the draft SAR require that the fuel plates remain in a coolable geometry even for accidents, which is unlikely. • Primary Coolant System Integrity: The ATR primary coolant system is of particular concern since the design basis accident (DBA) is limited to a three-inch equivalent diameter pipe break. • Primary System Coolant Flow: In 1978, the primary system coolant flow rate was reduced about 12% by going from three pump operation to two pump operation. This change was implemented to reduce the cost of electricity. • Reactivity Coefficients: These kinetics parameters include the void coefficient of reactivity and moderator temperature coefficients of the reactivity... Currently, no uncertainty is applied to these calculated parameters when they are used in the transient analysis."⁷⁸ 	<ul style="list-style-type: none"> • General Accounting Office report states lax DOE enforcement program at its nuclear facilities. • DOE ATR Safety Analysis Report acknowledges major problems in the primary coolant system. Problems with emergency coolant and supporting structures, systems, and components were shown to be worse than originally believed. • DOE Office of Facility Safety 2005 report states that "There is a potentially inadequate ATR safety analysis." • ATR Loss of coolant accident caused by either a seismic or other safety system failure has not been corrected by substantive system upgrades. • Cladding melting generates fission product releases to the atmosphere. In 2003 the ATR released 1,180 curies to the atmosphere. • DOE ATR Safety Analysis Report still only reviews a 3 inch break in the primary coolant system as the boundary. • The reliability of the two primary coolant pumps, (i.e. M-11 pump) has an "uncertain" flow- rate. DOE reports, "challenge the basis for reliable on-site long-term water inventory for the Emergency Firewater Injection System following a seismic event. On-site raw water supplies however are not sufficient to last until commercial power could be reasonably assumed to be restored. So, uninterrupted EFIA delivery to the ATR vessel was not ensured following a seismically induced Loss-of-Coolant Accident."

DOE's Advanced Test Reactor Life Extension Program Plan Puts the Public at Risk

The ATR facility and other facilities which support it in the Test Reactor Area (TRA) now called the Reactor Technology Complex (RTC) area produce mixed hazardous/radioactive wastes which are of the type and quantity of hazardous wastes required to be regulated under the Resource Conservation and Recovery Act (RCRA). For example, DOE contaminated the soil at INL with six beryllium reflector blocks from the ATR. The blocks contained a total of 293,000 Curies of tritiated hydrogen gas and approximately 20 Curies of carbon-14. Both radionuclides form mobile compounds and represent a threat to the Snake River aquifer over the next three hundred years. The beryllium

⁷⁸ Defense Nuclear Facility Board 6/23/95 letter to Dr. Terry Lash, DOE Office of Nuclear Energy, WDC, and attached ATR site report dated 5/23/95.

reflectors sustain considerable radiation deterioration, so at each reactor fuel change-out, the damaged blocks are replaced. Beryllium is a RCRA waste. Yet the ATR and facilities of the TRA\RTC do not have the Part A and Part B permits which are mandated for such facilities by RCRA. Thus the ATR and facilities of the TRA\RTC are illegally operating federal facilities. DOE has assiduously avoided addressing the RCRA issues which exist for the ATR and TRA\RTC facilities.

Current revelations contain the same safety issues as well as additional safety issues which were stated 10 years prior by the DNFSB.

DOE managers expressed major concerns about the continued operation of the antiquated Advanced Test Reactor (ATR) at the DOE sponsored National Institute of Standards and Technology meeting on Safety of Reactor and Nuclear Operations, March 1-3, 2005 for Senior Department of Energy Headquarters managers, field representatives, and contractor managers to discuss safety performance, good practices, and lessons, learned from recent events to improve safety performance at Office of Nuclear Energy, Science and Technology (NE) managed reactors and nuclear facilities before air binding becomes an issue.

"John Dwight [Battelle Energy Alliance current operations contractor for the ATR] stated: Seismic design standards/issues for the [Advanced Test Reactor] ATR were presented. The Seismic Category I Structures, Systems, and Components for the ATR are not fully qualified. The ATR seismic qualification is needed per the latest DOE Safety Evaluation Report (SER) but the analysis is incomplete and has not been fully funded (DOE/ID) believes this is needed.) However, the SER approved ATR operations. The ATR is in the process of completing a Design Basis Reconstruction (DBR) Program. **Problems with emergency coolant and supporting Structures, Systems, and Components were shown to be worse than originally believed.** [emphasis added]

"ATR plant personnel have developed a questioning attitude relative to the safety basis assumptions. A number of seismic related issues have been identified and inadequacies in the Safety Analysis have been declared. There is currently no systematic approach at ATR for evaluating and correcting seismic qualification issues. **There is a crisis-mode approach resulting in band-aid fixes rather than systematically evaluating the problems together and developing long term corrective action strategy to correct the noted deficiencies. Mission impacts are becoming more severe. A full seismic evaluation should be undertaken and judgments/fixes on the identified problems should be delayed (unless there is an imminent danger) until the evaluation is completed and all seismic problems are understood.** This approach would require an agreement with DOE/HQ. Approximate funding for the seismic evaluation at ATR is about \$2M. It is understood that the current fire water system will probably require additional upgrades to survive the evaluation. ATR staff will require some external assistance to help with the evaluation. [emphasis added]

"DOE/Environment, Safety, Health position – How the site deals with an identified [inadequacies in safety analysis/un-reviewed safety question PISA/USQ is a line management function. However, as an **immediate hazard is identified**, it needs to be evaluated and engineering judgment made to see if an immediate shutdown may be required. **However, the site could be below an established threshold based on engineering judgment and DOE/HQ approval, and may be able to continue operations. However, if these types of hazards become too numerous, shutdown may be required, Don't ignore problems.** The line must make an operability decision after evaluation. The question needs to be asked on **how the risk profile may be altered.** Need to make decision on how the fix gets made. The promptness of the corrective action is a question. There is no timeline established

by DOE Order or guidance for how quickly an identified problem is resolved. It needs discussion with DOE on when a fix is required." [emphasis added]

Rather than fix this huge hazard DOE wants to "alter the risk profile" or "lower the bar" so it appears that the ATR is safe to operate. In fact, major ATR safety problems were identified over a decade ago, yet no corrective action has been taken. In August 1995, a DOE report stated "**The Advanced Test Reactor Emergency Fire Water Injection System would be rendered inoperable during a design basis earthquake.** The purpose of the injection system is to pump water 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 an earthquake." [emphasis added]

"Idaho Operations Office Manager Beth Sellers stated in a letter on the issue "**DOE/ID does not want to treat everything as a shutdown.**" This is a clear a statement of DOE's priorities which put continued ATR operation above the safety of everyone living downwind of INL. [emphasis added]

"Rick McCracken (BEA) added: The two pilot systems review resulted in 62 gaps between physical, safety, and design systems. Out of the 62 gaps there were 15 [inadequacies in safety analysis] PISA assessments which resulted in 8 positive PISA assessments and 6 positive Un-reviewed Safety Questions (USQs.) The information is provided to the safety specialists/engineers and incorporated into action plans and annual SAR updates.

"Brooks Clements (ATR) discussed the first scram [emergency reactor shutdown] event attributable to operator error since October 1993, and discussed the ensuing review process." ⁷⁹

On July 21, 1998 the Advanced Test Reactor Critical Facility emergency shut down when an unplanned **power excursion** resulted from control cylinder withdrawal failed to operate. Power excursions are defined as an uncontrolled surge in reactor power which can result in a core meltdown and major radioactive emissions if the reactor cannot shutdown quickly enough.

Documents gained by the Environmental Defense Institute via Freedom of Information Act state: "During a [ATR loss of coolant accident] LOCA, the rapidly decreasing system pressure (with reactor core decay heat still significant) results in rapidly deteriorating thermal margins. To maintain acceptable thermal margins, a significant amount of primary coolant system (PCS) flow (greater than emergency flow) is required following the reactor scram. The decrease in PCS pressure results in PCP cavitation [sic], but the pump flow is sufficient to maintain adequate thermal margins. Low primary system pressure allows the air volume in the surge tank to expand into the PCS piping. This air has the potential to degrade the flow from the operating emergency coolant pump."

In plain language, a runaway ATR core will produce steam pressure that will be greater than the emergency coolant pump capacity to force coolant water into the reactor core. This "cavitation" or a pump without water can itself cause the pump to fail. In this event, a reactor meltdown would likely occur with the resultant huge radiological emissions.

"These analyses suggest that degradation of [emergency coolant pump] ECP flow due to surge tank air migration is unlikely, but they are not of sufficient depth, nor sufficiently unified to draw any firm conclusions. **It is not quantifiably certain, but it seems likely that ECP flow will be lost due to near or sub-atmospheric suction head before air binding becomes and issue.**" [emphasis added]

⁷⁹ National Institute of Standards and Technology, Meeting on Safety of Reactor and Nuclear Operations, March 1-3 2005, Summary Report. https://www.ornl.gov/nuclear_operations/2005-03-01_nist_nfsm_summary.pdf

“The pumps have not been evaluated for continuous operation at extremely low suction heads, and it is possible that pump damage could occur further breaching the [Primary Coolant System] PCS and exacerbating the event if left running.”⁸⁰

Many of the documents DOE does release under the Freedom of Information Act are heavily censored/redacted claiming bogus National Security exemptions. Despite every page having redactions, one report states: **“Neither [Office of Nuclear Facilities Management] NE-ID nor NE-HQ line management has procedures in place to conduct in-depth vertical slice reviews of the complex ATR safety systems to assess their current compliance with the [Safety Analysis Report] SAR.”**⁸¹ [emphasis added]

In other words, DOE is unable to control its nuclear reactor operations. This is nothing less than a recipe for disaster, especially with respect to the forty-year-old ATR that should have been shut down decades ago when it exceeded its design life and safe operating parameters. No commercial nuclear power reactor would be allowed, under Nuclear Regulatory Commission regulations, to continue operating under these ATR hazardous conditions.

Whose security is DOE protecting by withholding crucial safety documentation from the public on how decrepit the ATR reactor is? The answer can only be DOE, Idaho Governor, Republican Congressional policy makers (including Idaho’s Congressional delegation) that put more value on plutonium production and Generation IV fuel testing than on the huge risks to the public from continued ATR operation.

The ATR has no “sealed concrete dome” structure required by the Nuclear Regulatory Commission (NRC) that prevented most of the radiation releases from the Three-Mile-Island (TMI) commercial reactor melt-down in Pennsylvania in 1986 yet still released 13 curies of iodine-131. The NRC knew prior to the construction of TMI in the 1980s the importance of the “steel-reinforced concrete sealed dome.”⁴ Now it’s 2006 and DOE publicly claims that the ATR’s thin steel/aluminum skinned industrial building is adequate to prevent radioactive releases. This is categorically not true.⁵

Freedom of Information Act (FOIA) documents EDI has received revealed that ATR (unfiltered) vents will open to the atmosphere if there is a steam or hydrogen gas explosion caused by a reactor loss-of-coolant fuel meltdown to prevent the entire building from total destruction.⁶ The radiation release to the atmosphere in such a case could be horrendous. DOE’s own estimates of ATR radiation releases during a “loss-of-coolant” accident would be 175 million curies which includes six million curies of radioactive iodine-131.⁷ This is about half the 340 million curies of radiation released by Chernobyl which permanently contaminated thousands of square miles in Russia. President Bush and Idaho’s Republican Governor are playing “Russian roulette” with all INL downwinders’ lives just like Gorbachev did with the downwinders of Chernobyl. There is not even an off-site evacuation plan on record for a major INL radiation release.⁸ Even if there were an evacuation plan, we all saw how totally inadequate the Federal Emergency Management Agency response to the gulf coast hurricane disasters was for these residents.

DOE refuses to disclose the seismic soil spectra report (completed in 2000) on the ATR that shows the reactor and support facilities vulnerabilities to survive the existing seismic analyses. This report shows how large the earthquake accelerations are (nearly twice) for the soil. Other DOE

⁸⁰ Safety Systems of the Advanced Test Reactor Loss of Coolant Accident – Primary Coolant Pump Shutoff System, June 2005, USDOE Idaho Operations Office, FOIA Document # 42

⁸¹ ATR Planning Assessment Team, 2/13/04, Report to Elizabeth Sellers, Manager of Idaho Operations Office, page 10, FOIA document # 43

documents show this analysis was completed in 2000 but DOE refuses to release the report.⁹ The ATR location on the Snake River Aquifer Plain and deep alluvial deposits of sand and gravel and inter-spaced thin volcanic horizontal flows results in the seismic **acceleration** being 1.8 times greater than that of bed-rock.¹⁰

Another revealing DOE document states: “An identified deficiency in the interim seismic [probabilistic risk assessment] PRA model is in regard to the assumption in the model that off-site commercial power could be recovered; a review of other seismic PRAs shows that other PRAs do not assume that recovery of commercial power is possible. Inadequacies in the original seismic PRA model coupled with inadequate development of an interim seismic PRA including assumptions regarding recovery of off-site commercial power prior to exhausting above ground emergency makeup inventories are the subject of this Un-reviewed Safety Question.”⁸²

In plain language, if commercial power to the ATR is cut off and cannot be restored within ~ 72 minutes the reactor could face a loss-of-coolant accident when surface storage tanks are exhausted.

Another DOE document shows additional seismic hazards at the ATR. “Because the seismic design criteria at the time ATR was designed were essentially the 1961 Uniform Building Code (UBC) for zone 2 with a lateral base acceleration of 0.05g, conservatism regarding reactivity insertions from experiment loop seismically-induced leakage or rupture is recommended. Although experiment loop pipe stress calculations have been performed, there may be a lack of seismic review of the lateral restraint of components as has been the case with [Primary Coolant System) PCS components.”

“As discussed above, other reactor scram parameters would occur following a significant ground motion, and do not provide the protection of fuel thermal margins that the seismic reactor trip provides. Therefore, only the seismic perimeter trip is included in the event tree, based on review of detailed fault trees for the reactor trip and failure to insert [control] rods. Failure of this function is assigned to plant damage state P4 [highest category].”⁸³

“Oct. 10, 2011: Inspections conducted by the Idaho Department of Environmental Quality resulted in preliminary findings of 17 violations of underground petroleum storage tank requirements. Alleged violations included: failure to provide cathodic [sic] protection, failure to ensure proper operation of cathodic protection, failure to install adequate overfill prevention equipment, failure to use an overfill protection system, and the failure to take necessary precautions to prevent overspill/spillage. A review was performed to assess all of the INL underground petroleum storage tanks for preliminary issues identified during the inspection. Corrective actions included installation of a high-level alarm on a tank at the Central Facilities Area and ordering additional high-level alarms for other petroleum tanks identified with inadequate overfill protection. An official report from DEQ is pending. (EM-ID—BEA-CFA-2011-0005).”⁸⁴

Bechtel BWXT Idaho (BBWI) INEL operating contractor until 2/05 was cited for major Resource Conservation Recovery Act (RCRA) violations. The BBWI Integrated Safety Management System, Annual Report, FY 2004, states; “The May 2004 RCRA inspection resulted in a Notice of Violation and civil penalty of \$5,100 for two violations identified. A Notice of Violation and civil penalty of \$162,500 was received in FY 2004 for five violations identified during a RCRA inspection

⁸² Un-reviewed Safety Question, 6/10/04, Advanced Test Reactor, ATR Seismic Safety Basis Determination # TRA-USQ-2004-214, FOIA doc # 26

⁸³ Engineering Design File, EDF-5622, Interim Seismic Probabilistic Risk Assessment for the Advanced Test Reactor, Approved 3/14/05, FOIA doc # 56, page 12 through 14;

⁸⁴ DOE-ID Bi-Weekly Summary; For the Period Sept. 27- Oct. 17, 2011

conducted in FY 2003.” “The DOE Office of Enforcement did not conduct any investigations of non-compliances reported during FY-2004. However, a Preliminary Notice of Violation (PNOV) and associated Civil Penalty (CP) of \$41,250 were issued to BBWI on January 20, 2004 by the DOE Office of [Price Anderson Amendment Act] PAAA Enforcement for a report of programmatic failures that led to the waste stack toppling event which occurred at the [Radioactive Waste Management Complex] RWMC during FY 2003. The PNOV and CP were accepted by BBWI by letter dated 2/5/04.”⁸⁵

“Because the seismic design criteria at the time ATR was designed were essentially the 1961 Uniform Building Code (UBC) for zone 2 with a lateral base acceleration of 0.05g, conservatism regarding reactivity insertions from experiment loop seismically-induced leakage or rupture is recommended. Although experiment loop pipe stress calculations have been performed, there may be a lack of seismic review of the lateral restraint of components as has been the case with primary Coolant System components.”⁸⁶

This is a rare official acknowledgement that the ATR design, when constructed, was based on forty-five year old seismic criteria. Increasing the seismic hazard review to an earthquake lateral acceleration to 0.05g to evaluate the sustainability of the ATR primary operating systems is still inadequate. Seismic design reviews at other INL operations using the soil amplification of (1.8) show structures must be able to withstand greater than 0.76 g or 14 times the 0.05g.⁸⁷ DOE has finalized the ATR Safety Analysis that shows the significant earthquake vulnerability hazards, yet refuses to release the report even under the Freedom of Information Act claiming "national security exemption." Clearly, DOE is withholding the pertinent Chapter 15 of this report because they don't want the severity of the accident consequences to be known, nor do they want the assumptions and methods scrutinized from the outside. Recent DOE contract independent engineering reports say that new seismic data shows the ATR must be in category PC4 and Hazard Category I or the highest vulnerability category and the same as San Francisco because the ATR has the potential to release significant radiation to off-site populations during an accident.

ATR Lacks Seismic Safety

DOE uses a seismic and hazard category system that is not apparently used or recognized by any other federal agency including the Nuclear Regulatory Commission, Environmental Protection Agency, U.S. Coast and Geodetic Surveys, U.S. Geological Survey, or the Uniform Building Code. Whether deliberate or not, the public is left with no way of comparing this obscure DOE seismic/hazard category system with any generally accepted national seismic/hazard categories.

It should be pointed out that DOE does not use terminology consistent with standard scientific usage such as the Richter scale or Mercali Scale. For example, DOE never explains how the PC-4, Condition 4, or P4 equates to the universally recognized Richter Scale. DOE, cognizant of this, does not cite this system in its own environmental impact statements. Moreover, the public is left with comparing reports with DOE Orders and guidance to its operating contractors. This self-regulation has no external accountability. This is an untenable situation in view of the huge public safety issues these operations

⁸⁵ BBWI Integrated Safety Management System, Annual Report, FY 2004, September 2004, INEEL/EXT-04-02262, FOIA doc # 45, pages 32 to 37.

⁸⁶ Engineering Design File, EDF-5622, Interim Seismic Probabilistic Risk Assessment for the Advanced Test Reactor, Approved 3/14/05, FOIA doc # 56, page 12

⁸⁷ Development of Design Basis Earthquake Parameters for the Argonne National Laboratory-West, INL, 16 March 1998, Table 8, Woodward Clyde.

pose to residents living in the shadow of these plants.

Failure to Upgrade ATR to Meet Seismic Criteria

“Original design of the ATR for earthquake effects was based on 1961 Uniform Building Code provisions for Seismic Zone 2.”⁸⁸ DOE’s own technical analysts claim ATR “systems and components are unlikely to satisfy [Performance Category] PC-3 or PC-4 seismic criteria and should be upgraded in the near-term.”⁸⁹ Also, although the ATR is considered to be a PC-4 facility for engineering standards, the seismic design criteria have not been met by upgrades, modifications and changes necessary to protect the ATR from a PC-4 earthquake event.⁹⁰

DOE's own 2005 ATR Audit states; "The current schedule for completing the Design Basis Reconstitution [upgrades] program is in 2011 is **not timely** considering the number and importance of the design basis issues that were identified in the OA in 2003."⁹¹ This is a violation of DOE-STD-1027-92 and DOE Order 5480.23.

ATR Lacks Containment to Protect the Public and the Environment

"With a power rating of 250 MW, the ATR is the largest operating DOE Category A reactor."⁹² The DOE puts the ATR in its highest Category A and Hazard Category 1 because “it has a radioactive material inventory with the potential for significant offsite consequences. Based on total curie content, potential material forms, and maximum energy for dispersion available, one class of facilities which possess this hazard potential is the Class A nuclear reactors”⁹³

Yet, the ATR has no “sealed concrete dome” containment structure required by the Nuclear Regulatory Commission (NRC)⁹⁴ that prevented most of the radiation releases from the Three-Mile-Island (TMI) commercial reactor melt-down in Pennsylvania in 1986 yet still released 13 curies of iodine-131.⁹⁵ The NRC knew prior to the construction of TMI in the 1980s the importance of the

⁸⁸ Seismic Review of Selected Advanced Test Reactor Piping Systems, October 2003, ABS Consulting, prepared for Bechtel BWXT Idaho, page 1-1. [FOIA Doc # 51] “Seismic loads were typically specified to be products of dead load and relatively low equivalent static coefficients. For example, seismic loads on buildings were only 0.05 times the total dead load.” It doesn’t take much to design a PC-2 structure to withstand 0.05g horizontal. But it takes considerably more lateral support to survive a PC-4 0.3g horizontal acceleration.

⁸⁹ ABS Consulting, Seismic Review of Selected Advanced Test Reactor Piping Systems, October 2003, FOIA Doc. 51.”The seismic [probabilistic risk assessment] PRA considered the median ground response spectrum to be a (continued) median NUREG/CR-0098 ground response spectrum for rock sites. The maximum 5% damped spectral acceleration is 2.12 times the [peak ground acceleration] PGA, which occurs between frequencies of about 2 Hz and 8 Hz.” [page 2-6]

⁹⁰ DOE/ID Architectural Engineering Standards, Revision 29, September 2002, US DOE. Also see FN# 3 above, ABS Consulting 10/03, page 2-1, “The PC 4 ground response spectrum is used in this comparison since the ATR is currently considered to be a PC 4 facility.”

⁹¹ Independent Oversight Inspection of Environmental, Safety and Health Program at the Advanced Test Reactor, June 2005, DOE Office of Security and Safety Performance Assurance, page 45 and 49.

⁹² Advanced Test Reactor (ATR) Facility 10 CFR 830 Safety Basis Related to Facility Experiments, 6/02, 12th Annual Energy Facility Contractors Group Safety Analysis Workshop, INEEL-CON-02-00148, page 3.

⁹³ Advanced Test Reactor Upgraded Final Safety Analysis Report, SAR-153, Page ES-8 & 9. **Hereinafter called SAR-153.** Also see 10 CFR 830.207 Subpart B, Table 1, and DOE Order 5480.23.

⁹⁴ 10 CFR 120 Attachment B (V) Reactor Containment, pg. 834 .

⁹⁵ ABS Consulting, “Seismic Review of Selected Advanced Test Reactor Piping Systems”, October 2003, FOIA doc #51 page ES-1 says; "The draft PC-4 [ATR design basis earthquake] DBE ground response spectrum for the soil surface exceeds the US NRC Guide 1.6 spectrum for the soil surface, which has been used since 1989..."

“steel-reinforced concrete sealed dome.”⁹⁶ Now it’s 2006 and DOE publicly claims that the ATR’s thin steel/aluminum skinned industrial building is adequate to prevent radioactive releases. This is categorically not true.⁹⁷ DOE acknowledges “explosive or pyrophoric [sic] hazards identified for the ATR are associated with the severe accident scenarios in which hydrogen gas is released.”⁹⁸

This is a violation of Nuclear Regulatory Commission Regulation Guide 1.70 (10 CFR 820) that says a reactor is required to have a sealed over-structure adequate to confine radiation resulting from an explosion and/or accidental radiation release, and DOE's own Order 420.1 confinement requirement.⁹⁹

ATR Lacks Adequate Coolant Supply Pressure for Emergency Conditions and to Prevent Catastrophic Release

This crucial problem was reported over a decade ago by the Defense Nuclear Facility Safety Board yet, the problem remains. The 1995 DNFSB report states, "The ATR primary coolant system integrity is of concern as fuel melting could occur in loss of coolant accidents with pipe breaks greater than 3 inches. The thermal performance of the core is also of concern. An example of a proposed measure is to consider operating the ATR with three core coolant pumps instead of two to increase the core thermal margin. Primary System Coolant Flow: In 1978, the primary system coolant flow rate was reduced about 12% by going from three pump operation to two pump operation. This change was implemented to reduce the cost of electricity."¹⁰⁰

A 8/10/04 ATR Safety Analysis Report acknowledges that the same problem has yet to be resolved a decade later. "The ATR Emergency Coolant Pump flow measurements and uncertainty [seen in] recent examination of the M-11 flow showed a concern that the M-11 flow when combined with possible uncertainty might be slightly less than the analytical value used in the analysis. Until a thorough review is conducted, the same interim controls as required by [Reactor Technology Center Un-reviewed Safety Questions] RTC-USQ-2005-73 will be required."¹⁰¹

DOE's own internal reports, "Challenges the basis for reliable long-term water inventory for the [Emergency Firewater Injection System] EFIS following a seismic event... On-site raw water supplies, however are not sufficient to last until commercial power could be reasonably assumed to be restored. Therefore, uninterrupted EFIS delivery to the ATR vessel was not ensured following a seismically

Even the NRC predecessor, the Atomic Energy Commission (AEC) with regulatory control at the time the ATR was built, required that every reactor be housed inside a large superstructure called a “containment.” Its thick concrete walls were supposed to serve as a leak-tight barrier against the accidental release of radioactive materials from the plant. In the event of a pipe rupture in the reactor’s cooling system, steam and hot water from the reactor would be dumped into the containment chamber. Radioactive gases that were released from the reactor were also supposed to remain safely confined there. The AEC made exceptions for government operated reactors like the Advanced Test Reactor.

⁹⁶ Nuclear Regulatory Commission Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, 10 CFR Part 50.1 (V) and 50.120 Appendix B. Also see NRC Regulatory Guide 1.70 and 1.4.

⁹⁷ SAR-153, Page 6-36 states that there is no emergency safety feature that filters venting radioactivity to the atmosphere in an accident that causes over-pressurization of the ATR (i.e. a hydrogen explosion).

⁹⁸ SAR-153 pg ES-8

⁹⁹ DOE Order 420.1 requires in part, " the use of successive physical barriers for protection against the release of radioactivity; the provision of multiple means to ensure critical safety functions (those basic safety functions needed to control the processes, maintain them in a safe state, and to confine and mitigate radioactivity associated with the potential for accidents with significant public radiological impact)."

¹⁰⁰ Defense Nuclear Facility Board 6/23/95 letter to Dr. Terry Lash, DOE Office of Nuclear Energy, WDC, and attached site report dated 5/23/95.

¹⁰¹ Facility Certification Report No. 29, for ATR, 4/7/05, Page 12. FOIA Doc. # 50.

induced Loss-of Coolant Accident (LOCA)." ¹⁰²

FOIA documents EDI has received revealed that ATR (unfiltered) vents will open to the atmosphere if there is a steam or hydrogen gas explosion caused by a reactor loss-of-coolant fuel meltdown to prevent the entire building from total destruction. ¹⁰³

"The Vessel Vent System [VVS] provides the capability to depressurize the ATR vessel. It is needed to mitigate high-pressure events such as the long-term complete loss-of-flow accident (CLOFA). In the CLOFA, [ATR reactor] core decay heat produces steam and causes a pressure increase in the vessel exceeding the supply pressure of the Emergency Firewater Injection System (EFIS). Venting the vessel [VVS] under such conditions is required to allow the EFIS coolant to flow into the ATR vessel and keep the core covered. The VVS is manually actuated by operator action and cannot be automatically actuated... Air [and steam] in the Primary Coolant System could cause a degradation [loss of coolant] of emergency pump flow." ¹⁰⁴

"Interim operating restrictions associated with the [Preliminary Inadequacies in Safety Analysis] PISA limit ATR core power to 150 MW and include requirements to initiate EFIS and open the reactor vessel vent valves within 30 minutes of a loss of forced flow... The requirements for initiation of EFIS and opening of the vessel vent valves within 30 minutes of loss of forced flow have been incorporated into the emergency procedures." ¹⁰⁵ In another DOE report, "[C]alls for opening the vessel vent valves during loss of heat sink conditions prior to exceeding a vessel outlet temperature of 200 degrees F and actuating the EFIS prior to exceeding a vessel outlet temperature of 228 degrees F. The analysis of LOHS sequences had assumed actuation of EFIS **75 seconds** after opening the vessel vent valves." ¹⁰⁶

If the VVA System is activated there will be a release of the ATR reactor vessel radiation directly to the atmosphere. In an emergency, it is unrealistic to expect an operator to find the VVS manual controls and activate the vent control in "75 seconds." Failure or delay in opening the VVA will result in ATR reactor over-pressurization and possible explosion.

Additionally, it is also unrealistic to expect ATR operator(s), in an accident scenario, to locate and manually close non-safety related water lines currently connected to the primary coolant system, which if damaged in an earthquake, would compromise the reactor coolant water supply.

ATR Accidents are Increasing in Recent Years

The Integrated Safety Management System Report states; "FY-2003, [there were] 105 occurrences that include 12 Unusual Occurrences (10 at INTEC and TRA), two Emergency Occurrences, and 91 Off-normal Occurrences. This is an increase from FY-2002 at TRA... Violation of Inadequate Procedures" increased from 18 in 2002 to 26 in 2003... Near Misses" increased from 13 in 2002 to 19 in 2003 (four of which were at TRA). There were 15 Lockout/Tagout Occurrences that includes 5 involving 'hazardous energy.' Work Control Occurrences increased from 59 in 2002 to 71 in 2003 (includes 32 worker injuries)." ¹⁰⁷

¹⁰² Facility Certification Report No. 29 for the Advanced Test Reactor, 4/7/05, Page 8. FOIA Doc. # 50.

¹⁰³ SAR-153, Section 6.2.2.9 and Section 7-71.

¹⁰⁴ SAR-153, pg. ES-10 & 11

¹⁰⁵ Facility Certification Report No. 29 April 7, 2005, citing RTC-USQ-2005-173, page 11. FOIA Doc. # 50.

¹⁰⁶ Facility Certification Report for ATR, 4/7/05, Page 10, citing TRA-USQ-2004-341. FOIA Doc. # 50.

¹⁰⁷ INEEL Integrated Safety Management System, Annual Report FY-2003, November 2003, INEEL/EXT-03-01146" states the following [page 61 to 62]: Section 4.5 Events; FY-2003.

“Neither [Office of Nuclear Facilities Management] NE-ID nor NE-HQ line management has procedures in place to conduct in-depth vertical slice reviews of the complex ATR safety systems to assess their current compliance with the [Safety Analysis Report] SAR.”¹⁰⁸ This is a violation of DOE-STD-1027-92 and DOE Order 5480.23.

ATR/TRA/RTC accident history events between 1973 and 1981 had 16 shutdowns/ scrams; between 1991 and 1999 experienced 10; between 2000 and 20012 there were 42 emergency shutdowns “scrams” due to system failures that are indicative of reactors operating beyond their design life. [See Attachment B below] These system failures will only increase with each day the ATR continues to operate. For instance, on July 21,1998 the Advanced Test Reactor Critical Facility went into a "scram" or emergency shut down when an unplanned **power "excursion" or surge** resulted when the control cylinder withdrawal failed to operate.¹⁰⁹

The Advanced Test Reactor Critical Facility is a low-power reactor co-located with the ATR. DOE incorrectly claims that; "However, for a facility such as the ATRC, which is a low-power pool-type reactor, much of the content required by Nuclear Regulatory Commission Guide 1.70 is not applicable. The ATRC, for example, has no primary coolant system, emergency core cooling system, or secondary steam system. Considering characteristics of the ATRC and the potential severity of the consequences of postulated occurrences, the guidance provided in Regulatory Guide 1.70 is excessive."¹¹⁰

Potential for Catastrophic Release of Radiation from ATR

"The radiological analysis of the large-break loss-of coolant accident shows that an ATR core inventory of 1.11 giga-curies [1.11 billion curies] at reactor scram [emergency shutdown] conditions releases [to the atmosphere] an available source term of 175 mega-curies [175 million curies]...that includes 58,000,000 curies of **all** radioactive iodine species"¹¹¹ [See pg. 84 below]

In such an ATR "Condition 4 [accident the] radiation exposure limits would be 25 rem [25,000 millirem] whole body and 300 rem [300,000 millirem] thyroid dose [effective dose equivalent (EDE) to the maximally exposed individual] to off-site public and evacuating workers (excluding personnel considered directly at the location of the accident. Reactor fuel source term limit: The primary coolant pressure boundary must be maintained ... and the reactor confinement must not be damaged."¹¹²

Office of Facility Safety (EH-2) Office of Environment, Safety and Health Unreviewed Safety Question Activity Report July – September 2005 page 32 [B-1] shows that higher radiological

¹⁰⁸ ATR Planning Assessment Team, 22/13/04, Report to Elizabeth Sellers, Manager of Idaho Operations Office, page 10. [FOIA Doc # 43]

¹⁰⁹ See Attachment on TRA accidents. Also see Union of Concerned Scientists October 1971 Report. Between 1954 and 1967, TRA's Materials Test Reactor and Engineering Test Reactor had at least 5 meltdowns. [Citizens Guide to INL pg. 191 citing DOE/ID accident reports]

¹¹⁰ <http://www.osti.gov/bridge/servlets/purl/811929-IU9gSM/native/811929.pdf>

¹¹¹ 2000 DOE-PEIS 0310, page I-6, and Table I-4.

¹¹² Advanced Test Reactor (ATR) Facility 10 CFR 830 Safety Basis Related to Facility Experiments, 6/02, 12th Annual Energy Facility Contractors Group Safety Analysis Workshop, INEEL/CON-02-00148, page 9. The ATR Safety Analysis Report [SAR-153 pg. ES-18] estimated that populations within a 60 mile radius of an ATR loss-of-coolant accident would receive 185 rem (or 185,000 millirem) to the thyroid and 13.2 rem (or 13,200 millirem) whole body effective dose equivalent (EDE). This Safety Analysis Report which is supposed to be definitive was off by a large factor on the amount of exposure possible. This indicates that DOE throws figures at the walls and hope they will stick.

consequences could result for an accident at ATR than analyzed in the SAR-153 report because of a faulty analysis of flow rate in the hot fuel plate analysis. **Thus there is a "potentially inadequate safety analysis."**¹¹³ [emphasis added]

In other words, if the coolant and confinement are compromised, the radiation released and exposure would be significantly more for the off-site public.

The National Emission Standard for Hazardous Air Pollutants (NESHAP) for Radionuclides (40 CFR 61.92) limit is 10 millirem/year whole body effective dose equivalent (EDE) or 0.010 rem EDE.¹¹⁴ NESHAP limit for radioactive iodine is 3 millirem/year or 0.003 rem.¹¹⁵ Radioactive iodine primarily affects the thyroid.

In other words, in the event of a major ATR accident, anyone living within 60 miles (includes Pocatello) would potentially receive 2,500 times the NESHAP allowable whole body EDE radiation limit. Exposure to the thyroid would exceed the NESHAP standard by 100,000 times the Environmental Protection Agency EDE limit. These are lethal doses by any standards. Downwinders living beyond the 60 mile radius would apparently receive less radiation depending on their location from the ATR, however if there is a meteorological situation of precipitation (snow/rain), the radiation can be carried much further and be more concentrated.

Recent health studies on radioactive iodine exposure show that 0.087 Sievert (8.7 rem) (8,700 mrem) will likely cause malignant tumors to the thyroid.¹¹⁶ Independent health critics claim this exposure level is grossly misleading, and that major thyroid cancer and other autoimmune diseases will develop at much lower doses.

As noted above, DOE's own estimates of ATR radiation releases during a "loss-of-coolant" accident would be 175 million curies which includes 6 million curies of radioactive iodine-131.¹¹⁷ This is nearly half the 340 million curies of radiation released by Chernobyl which permanently contaminated thousands of square miles around Chernobyl. The President B and the Idaho Governor are playing "Russian roulette" with Idahoans and all INL downwinders' lives just like Gorbachev did with the downwinders' of Chernobyl. There is not even an off-site evacuation plan on record for a major INL radiation release.¹¹⁸ Even if there were an evacuation plan, we have all seen how totally inadequate the

¹¹³ http://www.eh.doe.gov/facility_safety/usq_activity_report_2005-3.pdf

¹¹⁴ 40 CFR Sec. 61.92 Standard: states " Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.

¹¹⁵ 40 CFR 61.102 Subpart I_National Emission Standards for Radionuclide Emissions From Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H: states: (a) Emissions of radionuclides, including iodine, to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr. (b) Emissions of iodine to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 3 mrem/yr.

¹¹⁶ "Radiation Linked to Thyroid Nodules in Atomic Bomb Survivors", Reuters, 3/1/06, As reported in the Journal of the American Medical Association for March 1, 2006.

¹¹⁷ Final Programmatic Environmental Impact Statement for Accomplishing Extended Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility, December 2000, Section I.1.1.1.2. Herein after called 2000 DOE/EIS-0310.

¹¹⁸ Idaho's present Federal Emergency Management Administration (FEMA) plans posted on <http://www.bhs.idaho.gov/>

Federal Emergency Management Agency response to the 2005 gulf coast hurricane disasters was for these residents.

DOE Suppresses Seismic Data to Hide Earthquake Risks

DOE refuses to disclose the seismic soil spectra report (completed in 2000) that would show how soils underlying the ATR and its facilities will respond during an earthquake. The seismic soil spectra report for the ATR would show whether the reactor and support facilities can survive the magnitude of an earthquake shown by existing regional and local seismic analyses. DOE is hiding information as to whether ATR is viable considering the latest seismic information for earthquake magnitude, and also how large those accelerations would be as shown in the soil spectra report. Other DOE documents show this analysis was completed in 2000 but DOE refuses to release the report.¹¹⁹

The location on the Snake River Aquifer Plain and deep alluvial deposits of sand and gravel and inter-spaced thin volcanic horizontal flows results in the seismic **acceleration** being 1.8 times greater than that of bed-rock.¹²⁰ Internal reports claim that the [Design Basis Earthquake] DBE for the ATR has since been revised upward to include the seismic soil amplification factor of 2 times rock acceleration,¹²¹ however, none of these reports have been made public or authenticated by peer review.

DOE's public statements that the Snake River Aquifer Plain alluvial soil and gravel deposits upon which all of DOE's plants rest dampen seismic impacts, are categorically wrong.¹²² In fact the soils under INL plants will **amplify** seismic shocks by a factor of nearly twice what DOE claims.¹²³ This internal data was derived from the catastrophic Los Angeles earthquakes where buildings were on alluvial sediments similar to the Snake River Aquifer Plain.¹²⁴ This is an unconscionable deception to the public about the seismic risks from forty-year-old reactors built only to the standards at the time (1960s). The public is being subjected to this risk without full disclosure.

The above cited lack of safety features, design hazard controls for ATR and lack of proper seismic analyses constitute a violation of 10 CFR 830.240 (3 &4) that requires the DOE to; "Evaluate normal, abnormal, and accident conditions, including consideration of natural and man-made external events, identification of energy sources or processes that might contribute to the generation or uncontrolled release of radioactive and other hazardous materials, and consideration of the need for analysis of accidents which may be beyond the design basis of the facility. Derive the hazard controls necessary to ensure adequate protection of workers, the public, and the environment, demonstrate the adequacy of these controls to eliminate, limit, or mitigate identified hazards, and define the process for maintaining

¹¹⁹ SRA-153, pages 7-35 through 7-71.

¹²⁰ Final Report, Development of Design Basis Earthquake Parameters for the Argonne National Laboratory-West, Idaho National Engineering and Environmental Laboratory, prepared for Lockheed Martin Idaho Technologies 16 March 1998, herein after called ANL-W.

¹²¹ Engineering Design File 5622, page 15. Design basis earthquake is an engineering process by which the seismic history of the site, and the depth/composition of the bed rock/soil are merged into an estimate of the magnitude/frequency of a seismic event will have on a particular location.

¹²² Draft Environmental Impact Statement for the Proposed Consolidation of Nuclear Operations Related to Production of Radioisotope Power Systems, DOE/EIS-0373D, Section 3.2.1.

¹²³ ANL-W, See Table 4 which is apparently under-stated based on Tables 7 and 8.

¹²⁴ ANL-W, See Table 11 "Strong motions records used in the development of the design basis earthquake (DBE) spectrum compatible time histories.

the hazard controls current at all times and controlling their use."

DOE Ignores Long Term Safety Problems and Unresolved Safety Questions and Flawed and Uncorrected Seismic Bracing

A June 2005 ATR safety report is indicative of how serious a hazard this reactor is to the INL workers and the public. In 1980, DOE tried to retrofit seismic braces to key reactor components. In 2005 workers found 18 bolts on the floor that had fallen out of seismic anchor plates because they "were found to be too short to pass through the 3/4-inch anchor plates and still properly engage the threads of the concrete expansion anchors in the walls."¹²⁵ Even more troubling, DOE has known about this problem since 1996, but as of this date still has not corrected it.

The 2000 Integrated Safety Management System (ISMS) administratively claimed that safety problems are being resolved at ATR. However, the concerns expressed in the 2003 ISMS reveal a safety culture at ATR which has been an administrative whitewash of the problems not just at ATR but site-wide for the INL. The public has been exposed to great and ongoing risk at the ATR by administrative pressures to continue operations at ATR in the face of the technical inability to protect the public against loss of coolant accidents. The 2003 ISMS is an admission of the absence or failure to maintain a safety culture at ATR¹²⁶ and an attitude of "the public safety be damned."

¹²⁵ DOE Office of Environmental Health and Safety, Occurrence Report Number: ID-BEA-ATR-2005-0004, "ATR Heat Exchanger Seismic Support Anchor Bolts too Short." This report was gained by Dr. Peter Richards through a FOIA request to DOE. Dr. Richards notes "On June 7, 2005, workers in the ATR Heat Exchanger (Hx) room discovered three bolts on the floor and determined that they had backed out of Hx seismic support anchor plates. On June 10, 2005 a sampling of accessible bolts were all found to be too short to pass through the 3/4-inch anchor plates and still properly engage the threads of the concrete expansion anchors in the walls." It goes on to describe these seismic braces were added in 1980.

"In about 1996, it was discovered that many of the lower bolts were not A325, but were actually SAE grade 5, and that some of these had suspect bolt head markings. In accordance with INL procedures, the bolts were evaluated by engineering and accepted for continued use, and were painted orange to mark them as identified and evaluated suspect bolts. Grade 5 bolts are equivalent in strength to the specified bolts, and due to the expected loading of the bolts they were deemed acceptable for use. The bolts were not removed to verify length at the time."

"Additional inspection of primary coolant system piping snubbers support bracket bolts, that were installed by the same sub-contractor that installed the primary heat exchanger seismic supports, was conducted and determined that some of the snubber support bracket bolts and anchors were not the correct size in accordance with the design and drawing."

"In the 8/22/2005 HQ Summary, approved by Martin McDonough (533-4321). While we are lucky the safety system was not challenged before this flaw was discovered, it still appears that an undisclosed number of bolts are NOT "accessible." The HQ summary states, "Later, a sampling of accessible Hx bolts indicated that all anchor bolts were too short to pass through the 3/4-inch anchor plates, and still properly engage the threads of the concrete expansion anchors in the walls."

¹²⁶ <http://www.id.doe.gov/doiid/RFPSharedLibrary/PDF/ISMS%20Phase%202%20Volume%20II.pdf> Also see ICARE Safety Concern #12838; ACLP-0.22, Status of CPP-602/ CPP-630 HVAC Equipment and Other Support Systems, Rev. 0, 6/1/2000; PRD-199, LMITCO Fire Protection Program, Rev. 0, 3/15/99; MCP-190, Event Investigation and Occurrence Reporting, Rev. 8, 9/13/99; MCP-2723, Reporting and Resolving Employee Safety Concerns & Suggestions, Rev. 3, 12/01/99; Occurrence Report Number, ID-BBWI-LANDLORD-2000-0004, Failure to Follow Work Instructions and Perform Lockout/Tagout, 2/3/2000; Occurrence Report Number, ID-BBWI-LANDLORD-2000-0005, Mobile Cranes operated Without Monthly PM, 2/3/2000; Occurrence Report Number, ID-BBWI-LANDLORD-2000-0008, Failure to Install an Audible Alarm on a Fire Protection System, FN 130 Continued; 2/29/2000; Occurrence Report Number, ID-BBWI-LANDLORD-2000-0015, Near Miss, Work on Incorrect Equipment, 5/6/2000; Occurrence Report Number, ID-BBWI-LANDLORD-2000-0017, Electrical Conduit Cut During Demolition Work, 5/24/2000; Corrective Action for Identifier Ribbon Use on Building 606 Related Jobs

"The surveillance concluded that a robust, rigorous, and credible self-assessment was lacking at TRA [where ATR is located]. A Major Finding was issued stating the [List] LST-202 (a list of required assessments) is not an active document; without an approved LST-202, the requirement of Management Control Procedures (MCP-8 and MCP-9172 could not be met. DOE Idaho Operations Office (NE-ID) identified the issue as a repeat finding with site-wide implications. Furthermore, the surveillance observed that there was a lack of evidence for planning assessments, e.g., developing a plan or outline and using a pre-determined checklist." Inspections identified, "Weaknesses at ATR design analysis raise concerns whether the systems designed to mitigate loss-of-coolant accidents adequately protect against all potential accident scenarios."¹²⁷

DOE's 2005 Reactor Technology Complex Natural Phenomena Hazards Assessment Plan lists a staggering number of seismic deficiencies at the ATR "which are not yet incorporated into an approved [documented safety analysis] DSA" to support "funding requests for fiscal years 2005 - 2007."

Fundamental assessments which have been required by Nuclear Regulatory Commission's (1978) Regulatory Guide 1.29 since at least 1995 for DOE and have not been performed include in part:

- Determining the seismic adequacy of Performance Category-4 ATR Seismic Category I by inspections of piping and structures which have not been evaluated to current seismic design criteria.
- Assessment of related structures, systems and components (SSCs) which may by failure or impairment of operator response during a seismic event interact adversely with ATR Seismic Category I SSCs.
- Developing procedure for annual inspection to avoid unsecured structures that could compromise the facilities at ATR and associated with the ATR during a seismic event.
- Resolution of issues surrounding the TRA Soil DBE report which relates to response of the soil during earthquakes and the interaction with ATR and associated facilities.
- Providing procedures for seismic safety walk-downs of both the ATR and the ATR Critical facilities so that DOE Order 433.1 requirement for annual inspection and DOE Order 420.1A requirements for mitigating natural hazards can be met. Obviously DOE is not in compliance with these Orders at the present time, nor will it be for the next two years at a minimum by its own reckoning!
- DOE has no list of current and applicable seismic analyses.
- Primary cooling piping has not been evaluated in accord with American Society Mechanical Engineers (ASME - B31.1) requirements.
- Review of Firewater piping in the ATR has not been finalized.

¹²⁷ INEEL Integrated Safety Management System, Annual Report FY 2003, November 2003, INEEL/EXT-03-01146, pages 57 and 59. These are long standing uncorrected deficiencies that were also identified in the INEEL ISMS, Phase II Verification Final Report Vol. II, September 1999 report that states: " It was reported that the requirement in MCP-3449 for a quarterly safety and health inspection of the entire worksite was not being met. The various checklists and forms used by ATR to conduct self-assessments lack a clear definition of the flow-down of requirements from MCPs and other program documents to ensure hazards associated with the work throughout the facility have been identified and analyzed. Clarified assessment requirements will improve the quality of the collected data, and help prevent duplication of the areas assessed. This issue has been identified as a deficiency through the functional area checklist review and is being tracked for correction." The concerns expressed in the 2000 ISMS compared to the concerns expressed in the 2003 ISMS demonstrate the historical lack of a safety culture at ATR.

- Canal grids, experiment storage racks, other materials in the canal, electrical conduit support and control room panels, cask tip-over have not been addressed by walk-down safety review procedures.
- ATR seismic analyses for structures such as Water Storage Tanks, the concrete block building wall and roof outside the ATR building have not been reviewed to current seismic standards.¹²⁸

There is no apparent confirmation that the requisite funding for these studies has been approved by DOE. Again, these are only deficiency analysis studies which in plain language means DOE will not know until 2007 (assuming funding) what ATR system upgrades are needed. **Then the obvious question is, how long will it take DOE to actually do the upgrades needed to prevent a major disaster?** This is a violation of DOE Order 5480.23 and DOE-STD-1027-92.

Inaccessible and Un-inspected Primary Coolant Piping.

Additionally, the Defense Nuclear Facility Safety Board complained in 1995 that some of the actual primary coolant pipes were inaccessible, and that remains uncorrected and un-inspected, in this 40-year-old reactor.

This Un-reviewed Safety Question (USQ) follows the earlier 2004 consulting report questioning the adequacy of the analysis of primary cooling system (PCS) piping (and tank) supports, and indicates how little was done to address the issue and to consider root cause and broader implications about lack of rigor in the analysis and oversight of pipe and tank supports. Also, engineers shrugged off questions of installed bolt adequacy during the walk-downs.¹²⁹

Backlogs in Maintenance Don't Express the Real Squeeze on Engineering Support and Money for Maintaining the ATR

According to Dave Richardson TRA/TRU Operations Manager, **"ATR has about 75 man-years of maintenance backlog without design basis reconstitution [facility construction upgrading]."** As of 3/05 ATR contractor (BEA) was still negotiating with DOE for "...funding for the seismic **evaluation** at the ATR of \$2M."¹³⁰ The backlog of ATR system upgrades, called Engineering Change Forms (ECF) increased dramatically in "2005 to 91 ECF that either directly or indirectly support the operation of the ATR."¹³¹ There are no apparent cost estimates on how much these existing upgrades or near future upgrades to the ATR will cost. Even a pedestrian cost-benefit analysis would conclude the ATR is not worth any additional investment and should be shutdown.

A more recent (3/06) DOE report states: "The total backlog of work is normally presented in man-hours of work. For July [2005] **the ATR deferred maintenance and engineering backlog**

¹²⁸ Reactor Technology Complex Natural Phenomena Hazards Assessment Plan, PLN-588, September 14, 2005, Idaho National Laboratory. FOIA Doc. # 48.

¹²⁹ SAR-153, page 5-34 through 5-38. SRA-153 Chapter 5 summary pg 9 that states "The safety analysis [see chapter 15 (Accident Analyses)] has demonstrated any break in the Primary Coolant Pressure Boundary (PCPB) with an equivalent area of a 3 inch diameter break or less can be mitigated by plant protective functions such that ATR Plant Protection Criteria are not exceeded. As a result, and Primary Coolant System (PCS) component whose failure could result in a break in the PCPB greater than the area of a 3-in. diameter break is classified as safety-related."

¹³⁰ Meeting on Safety of Reactor and Nuclear Facility Operations, March 1-3 2005, National Institute of Standards and Technology, Summary Report, http://www.ornl.gov/nuclear_operations/2005-03-01/.

¹³¹ Facility Certification Report No. 29 for the ATR, 4/7/05, page 29. FOIA Doc. # 50.

totaled almost 115,000 resource-hours at an average hourly rate of [redacted] for craft personnel and approximately [redacted] per hour burdened for engineering, this translates into approximately \$5 million in work that must be completed (\$2.5 million for deferred maintenance and \$2.4 million for engineering) for the overall work backlog to be reduced to the level that engineering and maintenance organizations can routinely maintain." ¹³² [emphasis added]

This is an apparent violation of DOE Management Control Procedure (MCP-3480) Environmental Instructions for Facilities, Procedures, Materials and Equipment (Appendix F) "Routine Maintenance Activities" as well as DOE-STD-1027-92 Facility's Stage in its Life-Cycle that states; "When modifications are performed or the facility mission is extended or changed, additional detail to support the justification for the design adequacy will be required." ¹³³ [Emphasis added]

Deficiency Report Reviews of Repetitive Failures of Equipment have not been Entered into Machinery History

"The implementation of a INTEC Configuration Management (CM) Program was reviewed and the INTEC CM Coordinator was interviewed. Configuration management deficiencies have been identified from a number of resources, events and assessments that caused the development of a Configuration Management initiative. This initiative produced a schedule and the core CM documents for the Integrated Safety Management System (ISMS) Phase I milestone. However, these initial efforts were limited to CM of facility structures, systems, and components (SSCs). The site-wide CM program has been developed and extends down to the facilities to ensure effective and proper control of all programs, processes, and activities that should apply CM principles and conventions. The implementation of the CM project plan at the facility level will take a concerted effort on the part of line management. **The team found during the review that the INTEC CM program has a sufficient project plan but the resources to successfully work the design recovery element of the CM plan has not been identified to ensure success of the plan execution (IMG1-1).**" (emphasis added) [page 8]

"There is some room for improvement for managers to implement established programs that identify improvement opportunities. Currently there is not a implemented program for tracking and trending for maintaining equipment history. Because of the age of the INTEC facilities this trending history could prove invaluable for maintaining important facility operations. This issue has already been recognized as a deficiency by the INTEC Contractor and is captured in Deficiency Report No. 10728. The issue is raised in this report to emphasis the importance that the ISMS Validation Team places on it." [pg 9] ¹³⁴

DOE Refuses to Perform Pipe Stress Analysis

When suggested that at least DOE needed to have an analyst update pipe stress calculations based on "as-built" walk-downs of pipe supports, and do this for a sampling of selected interesting areas of the primary cooling system (PCS) as a basis for restart, performing new pipe stress analysis

¹³² Advanced Test Reactor Life Extension Program Plan, BEA, March 2006, USDOE

¹³³ DOE Standard, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23 Nuclear Safety Analysis Reports, DOE-STD-1027-92, page 11.

¹³⁴ Deficiency Report, Action Item Number 10728, Studies and reviews of repetitive failures of equipment have not been entered into Machinery History.

or having a pipe stress analyst walk-down the supports was ruled out. Instead, an engineer confirmed bracing adequacy on smaller piping he selected by banging on piping with a rubber mallet and found numerous additional deficiencies not included in the previous review by consultants walk-downs. DOE did not want to do re-analysis because of the fear that it might lead to identifying more problems that would take more time to fix - in fact, they expected deficiencies to be found if they did the re-analysis, but they would not put anything in writing or give straight answers about the adequacy of pipe support calculations.

Issues of gumming in-support bolts are not new. That the ATR plant management did nothing to address an issue that is well known as a problem in the industry is just another example of how shockingly far below par the engineering and lessons-learned programs are for the facility. The facility essentially operates with no meaningful regulatory oversight. This ATR un-reviewed safety question (USQ) report is representative of concerns about the rigor with which some of the fixes were being handled with more short-cuts. And as we now understand, small pipe breaks can have serious reactor safety implications.¹³⁵

An example of the immediacy of these ongoing problems is the unplanned ATR shutdown in 2003 because of Emergency Fire Water Injection System failures.¹³⁶ Also the March 16, 2006 DOE report that: "Primary coolant water leaked from a pump seal at the Advanced Test Reactor on March 13. The reactor was shut down for maintenance prior to the leak. The leaking pump was secured and isolated, appropriate notifications made and a critique was held. No personnel were contaminated and there was no release of contamination."¹³⁷

Again as previously noted, this is an apparent violation of DOE-STD-1027-92 Facility's Stage in its Life-Cycle that states; "When modifications are performed or the facility mission is extended or changed, additional detail to support the justification for the design adequacy will be required."¹³⁸

Higher Risks for Meltdown than DOE Analyses

What this lack of seismic bracing indicates is yet another occurrence where the risk of core melt was much higher than stated in analyses and accepted by DOE, higher than would be considered acceptable for a US commercial reactor, higher than the levels of safety DOE has delineated for the ATR, and was higher than the supposedly bounding assumptions in the 2005 Environmental Impact Statement (EIS). Perhaps conservatively, a one in 2500 year event or even a one in 1000 year event would have resulted in a significant primary coolant system pipe rupture, making core damage above a $1.0E-4$ /yr event that was in the EIS, and containment would not necessarily be intact, making the EIS not bound by the actual likelihood and consequence of an accident at the facility. With the seismic primary coolant system (PCS) issues supposedly addressed in the 90s, more problems supposedly fixed in 2003, and more problems supposedly fixed in 2004, and now supposedly fixed in 2005 for this

¹³⁵ SAR-153, page 5-9. Also see Authorization Agreement, US DOE Idaho Operations Office and Battelle Energy Alliance, LLC Authorization Agreement for the Reactor Technology Complex (RTC) Advanced Test Reactor, Document ID: IAG-31, Revision ID:5 Effective Date 2/01/05, LST-100, "Safety Basis List for the Advanced Test Reactor, that lists nine relevant reports plus and additional eight unresolved safety question reports. Also see USQSE-2003-146 Potential Deficiencies Identified During System Interaction Walk-down (11/12/03).

¹³⁶ ID-BBWI-ATR-2003-0012 Un-reviewed Safety Questions.

¹³⁷ DOE/ID, John Walsh email (3/22/06) reporting NE-ID-BEA-ATR-2006-0004

¹³⁸ DOE Standard, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23 Nuclear Safety Analysis Reports, DOE-STD-1027-92, page 11.

occurrence report, **how confident can the public be that the problems are really fixed?** ¹³⁹

Office of Facility Safety (EH-2) Office of Environment, Safety and Health Unreviewed Safety Question Activity Report July – September 2005 page 32 [B-1] shows that higher radiological consequences could result for an accident at ATR than analyzed in the Safety Analysis Report (SAR-153) because of a faulty analysis of flow rate in the hot fuel plate analysis. **Thus there is a "potentially inadequate safety analysis."** ¹⁴⁰

A May 4, 2005 Occurrence Report also discovered; "The derivation of the analytical limit set-point and response time are not consistent with the methods used in the radiological consequence analyses presented in SAR-153, Section 15.7 and 15.12. The methodology used for the derivation of the set-point could allow higher off-site doses than predicted by the radiological consequence analyses. Since these radiological consequence analyses are the basis upon which DOE approved operation of the ATR, the discrepancy represents a potentially inadequate safety analysis." ¹⁴¹

Again, DOE is violating 10 CFR 830.204(4) that requires DOE managers and operators to; "Derive the hazard controls necessary to ensure adequate protection of workers, the public, and the environment, demonstrate the adequacy of these controls to eliminate, limit, or mitigate identified hazards, and define the process for maintaining the hazard controls current at all times and controlling their use."

The ATR Core Configuration Creates Special Risks

DOE internal reports show that ATR core components have warped significantly over time so that special tools were made to force insertion and extraction of test elements in the nine ATR lobes. Few people know just how uniquely complex the ATR core configuration is in comparison to a "typical commercial power reactor" that has only one core with uniform neutron power levels throughout. The ATR has a serpentine fuel configuration and nine "lobes" where radiation exposure to test units can vary widely. The ATR power limit of 250 MW sounds low compared to a commercial 1000 MW commercial power reactor, yet radiation levels to one or more of the "lobes" using highly-enriched uranium fuel can be extremely high.

Battelle Energy Alliance which operates the ATR set forth control rod problems at the ATR in a report that states; "Although testing was completed successfully, after testing the southeast safety rod failed to withdraw. Even when it was manually withdrawn, it stopped short of full withdrawal. Ultimately, debris was found in the rod. An 'unacceptable' amount of debris was found in the fuel elements, and cooling channels." ¹⁴²

¹³⁹ USDOE/ID Unreviewed Safety Questions: 1.) TRA-USQ-2004-176, "Reactor Shutdown system Reactor Vessel Level Limiting Control Settings;"; 2.) TRA-USQ-SE-2003-145, "ATR firewater supply system modeling issues"; 3.) TRA-USQ-2004-214. "Revision 1. ATR Seismic Safety Basis Determination." 4.) TRA-USQ-2004-385, Revision 1, "ATR Surge Tank Level Instrument Limiting Control Settings." 5.) TRA-USQ-2004-396, "ATR Seismic Primary Coolant System Break Size and TRA Support Building Vulnerabilities." 6.) TRA-USQ-2004-413, "ATR Seismic Primary coolant System Break Size Contribution from Letdown Valves." 7.) RTC-USQ-2005-173, "Impact of Potential PSC Leakage on Fuel Element Thermal-Hydraulic Conditions Prior to Reactor Vessel Venting." 8.) RTC-USQ-2005-197, "—11 Emergency Coolant Pump Flow Measurements and Uncertainty."

¹⁴⁰ http://www.eh.doe.gov/facility_safety/usq_activity_report_2005-3.pdf

¹⁴¹ Occurrence Report No. 14, USQ No.: RTC-USQ-2005-248, Discovered: May 4, 2005, 1630.

¹⁴² Battell Energy Alliance Report, page 3 and 4 , cited by Mark Sullivan in Section 5-A below.

ATR Regulating Control Rods are Literally Falling Apart

"During removal of the regulating rods during [Core Internals Change-out] CIC, one of the followers detached and fell into the tank. A thorough inspection of the aluminum follower [attachment at the end of the rod] in the canal revealed heavy pitting of the follower and it was apparent this was the cause for the follower to become detached... The new regulating rod followers, however, are chrome plated and can be expected to experience the same failure mechanism. The metallurgical evaluation suggests that within two to three years the regulating rod followers should be replaced with a different metal such as zircaloy... There is currently no spare safety rod drive... A new motor still needs to be procured. In addition, there are two other new safety rod drives that have deficiencies that prevent them from being used." ¹⁴³

The ATR Power Level for Operation Poses Significant Risk of Offsite Radiation Releases

DOE is waffling about the level of power to be used for ATR's operations. Supposedly the ATR power level was administratively limited to 140 MW due to operational safety concerns for the ATR. The power level at which the ATR operates is a crucial issue because of the enormous difference in radioactive releases between 250 MW and 140 MW power levels in the event of an accident. Additionally, DOE fails to set time limits for crucial reactor upgrades leaving the process open-ended with respect to safety of power level for operations of ATR.

However, the department's Environmental Impact Statement, (DOE/EIS-0373D) June 2005, states at page 2-19: "ATR is currently operating at approximately 140 megawatts [MW] or less. The power level of ATR would not change under any alternative for producing plutonium-238." An internal DOE report, however, states, "The [ATR] core power limitation will be controlled by issuance of the [Core Safety Assurance Package] CSAP for each reactor startup." ¹⁴⁴ [emphasis added]

Significant uncertainty exists about the current and future ATR power levels because DOE's own reports state operations at power levels of both 250 MW and 140 MW. DOE's internal report gained by EDI through a FOIA request, The Upgraded Final Safety Analysis Report for the Advanced Test Reactor states; "The ATR is a Category A [the highest] reactor with an operating power level of up to 250 MW, with potential for significant offsite radiological consequences. The ATR is classified as a Hazard Category 1 [the highest] nuclear facility in accordance with Department of Energy standards for hazard classifications of nuclear facilities (DOE 1997)." ¹⁴⁵

The ATR Capabilities and Future Operating Plans report states: "The US DOE is funding a modification to the ATR to establish a lobe of the ATR that will support fast spectrum testing. In order to achieve the desired testing conditions, the reactor lobe will have to be operated at approximately double the current lobe power, and additional fuel elements ("booster fuel") will be installed in the same lobe." ¹⁴⁶

This is a significant ATR development to an already problematic unbalanced (core hot spots that cause steam voids that block coolant) ATR cooling system.

"Several tests were performed in the ATR on particle fuels. One experiment was performed, but

¹⁴³ Facility Certification Report No. 29 for the ATR, 4/7/05, Page 33 & 34 & 36. FOIA Doc # 50.

¹⁴⁴ Facility Certification Report No. 29, for ATR, 4/7/05, Page 11. FOIA Doc. # 50.

¹⁴⁵ Document ID: SAR-153, Revision ID:16, Effective date 4/7/05, page ES-9.

¹⁴⁶ Advanced Test Reactor Capabilities and Future Operating Plans, Francis M. Marshall, Idaho National Lab., pg 7.

there was evidence of fuel failure, so the test was terminated."¹⁴⁷

Also this is an apparent violation of 10 CFR 830.204 (4) Limiting Conditions for Operations that states; "The limits that represent the lowest operations, functional capability or performance level of safety structures, systems, and components required to perform an activity safely. The limiting conditions for operation section describes, as precisely as possible, the lowest functional capability or performance level of equipment required for continued safe operation of the facility. The limiting conditions for operation section also states the action to be taken to address a condition not meeting the limiting conditions for operation section. Normally this simply provides for the adverse condition being corrected in a certain time frame and for further action if this is impossible."

Limiting ATR power levels to 140 MW is a self-imposed DOE "**interim operating status**" based on recent Design Basis Reconstitution (plan for ATR upgrades) that revealed major ATR safety system vulnerabilities. Moreover, this "interim operating status" can be changed without public notice for purely administrative production schedule priorities. This makes a prima-facie case that the ATR is unsafe at any power level.

ATR Power Level for Operation Exceeds Design Limits and Administrative Limits

To further show DOE's waffling about operational power level, another FOIA document received by EDI states: "The ATR total core power of 150 MW and the maximum effective plate power for any inner fuel plate of **347 MW** which is over the ATR design parameters of 250 MW."¹⁴⁸ Uneven power levels can exacerbate coolant malfunctions that can cause cascading system failures.

The ATR complex design makes it significantly more vulnerable to malfunctions than the run-of-the-mill commercial light-water power reactors with straight vertical fuel and control rod configuration. All the more reason why credible independent technical reviews must be conducted to assess the hazards of widely varying power levels within the reactor and the support systems to mitigate localized reactor core overheating.

ATR is rated for 250 MW thermal, and is a DOE category A reactor and a DOE Hazard Category I facility. And note, the fission product inventory of 150 MW operation may be as large as the fission product inventory from 200 MW operation – fission product inventory depends not only on the power level but also on how long the fuel has been operated. Reactor fuel has the highest fission product inventory at the end of its cycle.

For that reason, it is not a meaningful cutoff to have the DOE standard distinguish between a reactor running at 100 MW vs. 200 MW. DOE had knowledge that ATR typically operated under 200 MW. DOE then placed the 200 MW criterion in the DOE 1021 Standard as a means to preclude the ATR from being seismic Performance Category PC-4. This administrative sleight of hand does not provide any margin of safety for the public given the potential for large accidental releases of radiation and the absence of containment systems at ATR.

The ATR Capabilities and Future Operating Plans report states: "The US DOE is funding a modification to the ATR to establish a lobe of the ATR that will support fast spectrum testing. In order to achieve the desired testing conditions, the reactor lobe will have to be operated at approximately double the current lobe power, and additional fuel elements ("booster fuel") will be installed in the same

¹⁴⁷ Ibid, page 5

¹⁴⁸ FOIA document received "USQ Process, Potential Inadequacy in the Safety Analysis (PISA) Form, TRA-670, RTC-USQ-2005-197, M-11 Emergency Coolant Pump Flow Measurement and Uncertainty." page 3

lobe." This is a development to an already problematic unbalanced (core hot spots that cause steam voids that block coolant) in the ATR cooling system.¹⁴⁹

DOE Fails to Comply with Clean Air Act

"In FY 2002, it was recognized the [INL] Hazardous Air Pollutants (HAPS) emitted from Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities should be included in a determination under the Clean Air Act as to whether or not a facility is a major source of Hazardous Air Pollutants (HAP). As a result, certain Maximum Achievable Control Technology (MACT) notifications were submitted in FY 2002 Integrated Safety Management System (ISMS-2002-420). Since then, the permit application was revised and submitted to the State of Idaho on January 30, 2003."¹⁵⁰

Toxic contaminants released from INL in excess of criteria for air pollution emissions include benzene, beryllium, chlorine, and naphthalene. Despite this, "INL Site has not been required to apply for any IDAPA Toxic Permit to Construct Air Permits."¹⁵¹

A INL Title V Air Permit is on file but it is grossly deficient in identifying all the hazardous air pollutants from specific INL operations as required under Section 112 of the Clean Air Act and 40 CFR Part 63. The Title V Permit also incorrectly claims (Section 2.17 pg.16) exemption from the MACT Standard since INL claims off-site hazardous waste is less than 1 mega-gram (one million grams = one metric ton, or 2,205 pounds) per year.

DOE refuses to acknowledge off-site spent nuclear fuel (SNF) shipped to INL from numerous Navy yards on each coast and other off-site and foreign generators. This SNF waste is put in cooling pools awaiting decay, processing, and interim "Independent Spent Fuel Storage Installation" (ISFSI) at INTEC for final disposition in a deep geologic repository. Plus SNF from TMI in Pennsylvania and Fort St. Vrain in Colorado, Peach Bottom, and scores of foreign research reactor SNF (under the Non-proliferation treaty) ended up at INL.¹⁵² Mixed waste generated by reprocessing SNF and/or processing for dry interim storage at INL ISFSI was not included in EPA's review.¹⁵³ Off-site mixed hazardous

¹⁴⁹ Advanced Test Reactor Capabilities and Future Operating Plans, Frances M. Marshall, Idaho National Laboratory, page 7.

¹⁵⁰ INEEL Integrated Safety Management System, Annual Report FY-2003, November 2003, INEEL/EXT-03-01146, page 65.

¹⁵¹ 2005 Supplemental Analysis, 6/05, to DOE Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, lists naphthalene emission at 309 kg/yr; benzene at 919 kg/yr; beryllium at 0.49 kg/yr. These three hazardous air pollutants (HAPS) alone total 1,228.49 kg/yr. Other major HAPS listed in kg/y are Carbon Monoxide at 25,000; Nitrogen Oxides at 105,000; Sulfur Dioxide at 9,000; PM90-100) at 4,900; Volatile Organic Compounds at 6,400; Lead Compounds at 1.7, page 49 and 52. Herein after 2005 DOE/EIS-0203-F-SA-02.

¹⁵² DOE Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, 4/95, page 3-7, describes how consolidation of SNF with stainless steel/zirconium cladding will be shipped to INL and aluminum clad SNF was shipped to Savannah River Site, Herein after 1995 DOE/EIS-0203F. DOE's INL INTEC EM-Owned Spent Nuclear Fuel Inventories (Exhibit C.7), DE-AC07-05ID14516, 10/1/04, 180,756 Metric Tons Heavy Metal including ERB-II and Navy SNF. Does not include Post FY2005 ATR SNF receipts. DOE Updated Final Safety Analysis Report for the ATR cites ATR SNF storage canal has 600-700 irradiated fuel assemblies, pg. 15.12-11.

¹⁵³ Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement, September 2002, Herein after 2002 DOE/EIS-0287F.

waste shipments to INL also include Sandia National Laboratory in New Mex. and Paducah in Ohio.¹⁵⁴

DOE's EIS states, "At INTEC, all [high-level waste] HLW is also considered a mixed waste because in addition to radionuclides the HLW also contains hazardous materials. **Some of the hazardous materials, such as heavy metals, were present in the spent nuclear fuel.** Other hazardous materials were introduced during processing and decontamination activities. Examples include mercuric nitrate used as a catalyst to dissolve the fuel and various solvents. The mixed nature of this waste implicates additional management considerations and regulatory requirements."¹⁵⁵ **The bottom line is that DOE cannot legitimately use the Clean Air Act MACT exemption claiming less than one metric ton of off-site hazardous waste shipped to INL.**

DOE Censors the Design Basis Safety Review to Cover Up ATR Safety System Vulnerability

The ATR Safety Analysis Review states: "The Design Basis Reconstitution (DBR) [structural upgrade plan] was used to identify the limiting event(s) in each accident category (e.g., loss of heat sink, loss of flow, reactivity/power anomalies, etc.) and, with results from the Reactivity Insertion Accident (RIA) and Probabilistic Risk Assessment (PRA) programs ...including complete loss-of-heat sink (CLOHS) that was determined based on the PRA analysis, that needed reanalysis for long-term, post-scrum consequences....[and a] comprehensive full scope PRA was performed for the ATR for severe fuel damage event sequences (Level-1 PRA) and the risk to public and INEEL populations (Level-3 PRA). The offsite and onsite radiological consequences were reanalyzed only for the hypothetical beyond design basis loss-of-coolant accident resulting in 100% core damage. Radiological consequences from this event bound all design basis events."¹⁵⁶

It must be noted that the above SAR-153 Design Basis Review (Chapter 15) was censored from EDI FOIA request based on "national security."

DOE Downplays Safety Problems for Operational and Budgetary Concerns

What strikes the public as the major theme raised is the mentality surrounding Department of Energy (DOE) operations at the Idaho National Laboratory (INL) that safety concerns are downplayed for operational needs and budgetary concerns. All else seems to flow out of that mentality along with the lack of set standards for this DOE reactor.

Whistleblower Safety Analyst Concerns Suppressed by DOE Firing the Employee

Tami Thatcher worked for 16 years at the Idaho National Laboratory (INL) Advanced Test Reactor (ATR) as a safety analyst. She has a BS degree in mechanical engineering from the University of Idaho and 20 years of engineering experience with numerous publications about the ATR and its safety systems. Thatcher was fired when she persisted in challenging DOE's ATR reports that failed to show major safety issues.¹⁵⁷

¹⁵⁴ 2005 DOE/EIS-0203-F-SA-02, page 83.

¹⁵⁵ Idaho High-Level Waste and Facilities Disposition, Draft Environmental Impact Statement, 12/99, page 1-9. Herein after 1999 DOE/EIS-0287D.

¹⁵⁶ ATR Safety Analysis Review-153, Design Basis Accidents, page ES-16.

¹⁵⁷ Tami Thatcher eventually was successful in a Whistleblower law suit against DOE in 2006 and was rehired

Lack of Safety Culture at the ATR

Thatcher knows the ATR inside out and is extremely aware of the lack of a safety culture at the facility.¹⁵⁸ Those concerns go to the safety of containment during seismic events, the lack of seismic qualifications for the ATR, the potential inability of the emergency core cooling system to handle those events, the use of the emergency fire water system "(which is tied to the Emergency Core Cooling System [ECCS]) and the fact that that system is tied to sprinkler systems for up to 50 year-old masonry buildings that are not seismically qualified and could cause rupture of the piping and rapid draw-down on water inventories during even a low level seismic event. The cooling system problems alone are formidable! The calculations for the water inventory that would be needed for ATR were numbers made up simply for the convenience of justifying the inventory that would exist from 3 cooling towers if one of them was down for maintenance. Before Thatcher filed a safety issue concern there was no emergency diesel pump for the deep well to replenish the water supply to the water towers, but she says that the diesel pump has been improperly placed and secured so that it could be ineffective during a seismic event.

There is lack of containment and air confinement problems in the ATR building. There are problems with the changes in seismic standards over the years and the lack of upgrades for the ATR. There are major inconsistencies between how the reactor and its systems supposedly function and how those systems have been changed over time. There are problems with the types of experiments that are done *at ATR* by what are called "drop in" loops. There is the potential for meltdown of the fuel from these experiments.

Thatcher is aware of the design deficiencies and the failure of DOE to correct them because of a culture that just wants to keep the reactor operating on as low a budget as possible. She is aware of the unique design of the ATR and why that gives a much different outcome to how the facility is managed compared to commercial nuclear reactors regulated by the NRC. Her analysis of the lack of independent oversight for the ATR is flat out scary when coupled with the budget constraints and management's push to keep the reactor up and running despite safety problems. DOE is playing the dual roles of both operator and regulator to the detriment of public safety for operations. There haven't been any medical isotopes made at ATR for over two years and that the ATR operates basically at a loss.¹⁵⁹

DOE Policy of Secrecy to Withhold Safety Problems from Public Awareness

Perhaps most devastating is Thatcher's analyses of how all these safety problems are kept secret from the public by the DOE. The ATR was recently shutdown for 3 weeks for problems related to fire water system support hangers. Additional ATR vulnerabilities include:

- ATR reactor coolant relies on a half-century-old water system that has yet to be upgraded.
- In a loss-of-coolant accident the primary coolant pump and the Emergency Fire Injection System (EFIS) that provides emergency reactor core cooling and flooding of the reactor vessel in the event of a major peak in the Primary Coolant System piping or other events resulting in loss of primary coolant could cause a degradation of emergency pump flow."¹⁶⁰
- The ATR is tied into the whole Test Reactor Area (TRA), currently called the Reactor Technology Complex (RTC) that loses through leaks about 10% of water volume.

under a two year subcontract.

¹⁵⁸ Tami Thatcher public testimony at Idaho Falls and Fort Hall hearing.

¹⁵⁹ Tami Thatcher public testimony at Idaho Falls and Fort Hall hearing.

¹⁶⁰ SAR-153 page ES-10

- No automatic isolation water zone shutoff exists if a major accident occurs which means a seismic event that ruptures a stand pipe in one of more than 12 seismically fifty-year-old unreinforced TRA buildings, ATR coolant water would be compromised. Even a break in the grounds irrigation system could compromise crucial ATR safety coolant systems.
- Water supply relies totally on an antiquated pumping system that has repeatedly failed sequential testing. The TRA water holding tanks built in the 1950's cannot qualify any current seismic criteria.
- There is only one emergency backup diesel power generator for the water pumps and ATR reactor shutdown system, that itself is unsecured for any seismic event. Even the generator electrical connections are not seismically protected.
- Any break in the TRA water system will cause loss of volume and pressure to the ATR coolant, and generate a major "loss-of-coolant accident" (LOCA). All of DOE's assumptions on LOCA depend on a problematic water flow (volume and pressure).
- All of DOE major ATR accident radiation release assumptions assume structural containment within an industrial steel paneled wall and roof that is not credible.
- DOE acknowledges that a LOCA could release 175 million curies of radiation over several days. That is over half of the Chernobyl release.
- Congressionally authorized Defense Nuclear Facility Safety Board reports repeatedly cited major safety deficiencies at the ATR.
- DOE's own 2003 safety report from its oversight office has issued reports that identify significant ATR safety system deficiencies. Yet, TRA/ATR water system is not considered "safety equipment" and therefore not reviewed by DOE nor is a major loss-of coolant accident analyzed.
- DOE fails to acknowledge the low reactor fuel melting temperature of ATR highly-enriched Uranium-235 aluminum clad fuel or the aluminum clad Neptunium-237 targets for the production of plutonium-238. This is a significant vulnerability in a LOCA event because a chemical reaction can cause generation of explosive hydrogen gas.
- On 8/25/05, the Oak Ridge K- Area Facility Over-site Safety Committee (FOSC) concurred with the USQ prepared to evaluate Neptunium Oxide High Moisture Content for drums stored in K- Area. The USQE evaluated the question of "Could the Proposed Activity create the possibility of an accident of a different type than previously evaluated in the facility Authorization Basis?" as "yes" based on the higher than expected moisture content leading to a potential deflagration concern which was not previously evaluated. The positive USQ is being administratively processed and will be forwarded to DOE- SR.
- The DOE Office of Oversight and Performance Assessment (OA) report identified weaknesses and safety concerns. The ATR was then shut down for 3 months. Bechtel then supposedly cleared the problems, got the reactor re-started, and commenced its "ATR Design Basis Reconstitution Program", by which the ATR's configuration and alterations over time, which were apparently poorly documented, were to be comprehensively evaluated and a new "design basis" created for evaluating the safety of the facility. Apparently, however, the job hasn't even gotten underway, because Bechtel is only now, as of this month, seeking a vendor to provide the engineering services necessary. The project will not be complete until October 1, 2007 according to this solicitation.

The bottom line is the Advanced Test Reactor is a catastrophic accident waiting to happen and no credible national security interest can be claimed to over-ride the huge public hazards these operations pose.

DOE uses Accident Analyses for ATR that Significantly Understate the Risk to Workers and to the Public.

Ms. Thatcher continues in her public testimony; “I know first hand how DOE and its contractors operate their nuclear facilities at INL. I am a nuclear proponent --- however, there are many troubling aspects of how DOE has historically and is currently conducting its nuclear reactor operations. The consequences that the ATR poses are comparable to a commercial nuclear reactor, but the quality of programs to ensure safety is not. The accident analyses for ATR in this EIS have serious omissions that significantly understate the risk to workers and to the public. I wish to comment on record about the handout DOE has prepared about ATR.

“DOE states that no containment is required, and that it’s inventory of radioactive material is 1/60th of the inventory of a U.S. commercial power reactor.

“The 2000 EIS states that ATR has approximately 1 billion curies, and a 1000 mega watt electric (MWe) plant has about 15 billion curies, ATR has about one tenth of the curies of an average sized light water reactor and one fifteenth (1/15th) of the curies of a 1000 MWe plant.

“DOE states that the ATR operates at temperatures essentially the same as a hot water heater. I think the pressures at ATR are higher than my home water heater and my water heater isn’t heating 40,000 gallons per minute. However, the statement is misleading because the piping systems are designed commensurate with stresses imposed. The primary coolant piping system does not have excess margin for stress analyses. The pipe stress analyses does not use the maximum allowable stress limits allowed by the code the piping was designed to, rather, it has adopted less conservative, higher allowable stress limits to show that the stresses were acceptable. One of the tasks on the seismic performance assessment plan is to revisit the pipe stress analyses for the more current site-specific seismic criteria and to assure that the pipe supports modeled in the stress analysis represent the as-built configuration. Pipe stress analysts familiar with the facility were adamant that this be done, yet these analyses have not been funded.

“The DOE states that release of 175 million curies is reflective of a “perfect storm” accident that amounts to the worst imaginable event, that multiple failures would be required, and such an accident would not occur more than once in one million years. One text book cites the Chernobyl release as 30 million curies. The 175 million curies release for ATR is not bounding of seismic accidents, accidents without an intact confinement building, with unfavorable break location, or consideration of a canal draining event, or sabotage. The once in one million year criteria is for an accident category and is not strictly adhered to in the ATR safety analysis, and it does not represent the summation of all severe accidents or of all severe accidents with early release of fission products.

“The DOE states that the ATR complies with the federal safety rules and DOE orders. By compliance, they mean that they have made statements in the safety analysis, and have reported the deviations. An example of compliance with DOE Order 420.1A “Facility Safety,” a prominent DOE order, there has been 8 years of evasions since the safety analysis was upgraded and the lack of seismic qualification acknowledged. DOE has failed to come into compliance on seismic events and failed to fully fund the seismic performance assessment plan since 1997 when the plan was first issued, and they still have not approved the complete seismic design spectra needed to perform seismic qualification –

that is what DOE calls compliance with DOE orders.

“The DOE emphasizes the 1983 seismic event at Borah Peak, and the epicenter was many miles from the ATR. From this event the ATR experienced only about a 0.03g event. And DOE keeps talking about the Borah Peak event, not ATR's actual condition with regard to noncompliance.”¹⁶¹

INL Worker Radiation Exposures are Increasing

The June 2005 Independent Oversight Inspection of the ATR notes that worker radiation exposure was exceeded due to inadequate and improper locating on worker body of monitoring badges.¹⁶² The INEEL Integrated Safety Management System Annual Report FY 2003 states; "The 318 employee safety concerns reported in FY 2003 was an increase from the 209 reported in FY 2002. However, the 209 reported in FY 2002 was a significant decrease from the 642 reported in FY-2001." ¹⁶³

DOE Fails to Track Changes in Design Alterations and Whether Safety Systems Will Perform

The 2003 DOE Office of Independent Oversight and Performance Assurance (OA) report identified weaknesses and safety concerns. The ATR was then shut down for 3 months. Bechtel then supposedly cleared the problems, got the reactor re-started, and commenced its "ATR Design Basis Reconstitution Program", by which the ATR's configuration and alterations over time, which were apparently poorly documented, were to be comprehensively evaluated and a new "design basis" created for evaluating the safety of the facility.¹⁶⁴

Apparently, however, the job hasn't even gotten underway, because Bechtel is only now, as of 7/05, seeking a vendor to provide the engineering services necessary. The project will not be complete until October 1, 2007 according to this solicitation.¹⁶⁵

An in-house group was created after the 2003 OA report. Perhaps only 3 or more technical staff are available. Because ATR staff is spread so thin, the call for a vendor is an indication that more money is being thrown at the problem that they are hiring outside people but funding for substantive structural upgrades remains uncertain.

There are ongoing significant problems with ATR configuration control, but the design basis reconstitution program is actually a nice way of saying we put nice words on paper that DOE approved, but nobody thought too hard or verified whether the systems will actually perform as needed to meet design requirements (that were not fully developed). It is about having a safety analysis that assumes safety systems perform a function that hasn't been defined sufficiently and hasn't been tested sufficiently. It's about trying to make up for the lack of engineering and technical support for safety systems.

DOE must put the safety analysts on a tight schedule to update and upgrade the safety analysis report. DOE has not given ATR much engineering support; and the ATR system engineers are busy fixing what breaks. DOE must put ATR staff on mandatory extended work weeks until the safety analysis is done. DOE and operating contractor offers no encouragement to ask questions about safety

¹⁶¹ Tami Thatcher public testimony at Idaho Falls and Fort Hall hearing July 26, 2005.

¹⁶² Independent Oversight Inspection of Environmental Safety and Health Program at the Advanced Test Reactor, DOE Office of Security and Safety Performance Assurance, page 18, June 2005.

¹⁶³ INEEL Integrated Safety Management System Annual Report FY 2003, 11/03, page 66, INEEL/EXT- 03-01146.

¹⁶⁴ Fort Hall July 26, 2005 public testimony by Tami Thatcher.

¹⁶⁵ Go to the link. <http://www.fbodaily.com/archive/2005/08-August/10-Aug-2005/FBO-00864341>.

systems or look into whether requirements are being met. The milestone for finishing is set and the contractors are already late. Some of these new inexperienced safety analysts can't find the control room, let alone a firewater pump. They saw their job as mainly to put words on paper to show things are safe, not to verify that systems were designed adequately.

The current safety analysis is DOE approved and considered 10-CFR-830 compliant. The need for a design basis reconstitution program really says that you shouldn't believe the safety analysis report.

The Defense Nuclear Facility Safety Board commissioned by Congress requires an Operational Readiness Review after every significant shutdown to ensure that all problems have been resolved. There was only a "contractor expanded review" when the Upgraded Final Safety Analysis Report was implemented in 1997, but it is uncertain that ATR came into the requirement of needing an ORR, and additionally DOE Order 425.1 that states; "The readiness reviews are not intended to be tools of line management to confirm readiness. Rather, the readiness reviews provide an independent review to start or restart operations."

Other deficiencies in the Draft EIS include;

- Inadequate radioactive emission containment of other INL facilities in DOE's plan for plutonium-238 production. Specifically, former Argonne National Laboratory-West, now called the INL Materials Fuels Complex (MFC) that also uses industrial buildings with thin skinned siding and roof components that do not meet current standards for containment.¹⁶⁶
- Inadequate accident and emission analysis of the MFC.
- Inadequate waste characterization data for all aspects of Pu-238 production.
- Inadequate waste disposition mostly due to DOE's illegal attempts to reclassify formally high-level wastes as outlined in NRDC v. DOE.¹⁶⁷

DOE's decade long obfuscation correcting major fundamental ATR design safety issues is authenticated in the 1997 Defense Nuclear Facilities Safety Board report that states: "[A]n area that has not received in-depth review is the ATR design basis. Also, personnel with sufficient information to reconstruct and assess the nuclear and thermal-hydraulic design bases are limited in number."¹⁶⁸

The crucial issue of independent oversight of ATR operations is more recently undermined in a March 2006 Defense Nuclear Facility Safety Board (DNFSB) letter that states; "The Board's jurisdiction extends to defense nuclear facilities as they are defined in 42 USC Section 2286(g) as being production or utilization facilities under the control or jurisdiction of the Secretary of Energy and operated for national security purposes. At this time, ATR is not operated for national security purposes; consequently, ATR is not a defense nuclear facility subject to the Board's oversight."¹⁶⁹

There is no apparent regulatory or statutory rationale as to why DNFSB issued ATR specific reports in earlier years and now claims that the ATR is beyond DNFSB inspection oversight. Moreover,

¹⁶⁶ DOE/EIS-0373D, page 2-23

¹⁶⁷ Natural Resources Defense Council; at. el. v. Samuel Bodman, Secretary, Department of Energy, Case No. 01-CV-413-S- (BLW)

¹⁶⁸ Defense Nuclear Facility Safety Board, June 28, 1997. http://www.dnfb.gov/pub_docs/ineel/sir_19960618. Also DNFSB reports 10/2/01 that states 10 CFR 830 Subpart B Nuclear Safety Management hazard facilities are at risk because of potential budget shortfalls in fiscal year 2002, 5/23/95 and 9/16/94 that identify major deficiencies at the Advanced Test Reactor.

¹⁶⁹ A.J. Eggenberger, Chairman, Defense Nuclear Facility Safety Board, 3/28/06 letter to Mark Sullivan.

DOE's 2005 EIS states; "The primary user of the ATR is the U.S. Naval Nuclear Propulsion Program."¹⁷⁰ This same EIS lays out DOE's plan for consolidation of plutonium-238 production that includes the ATR as a major component. Pu-238 is used as a power source in military satellites and the Strategic Defense Initiative (SDI) space based platforms.¹⁷¹ The ATR is currently, and has been for years, irradiating neptunium-237 targets for the production of plutonium-238 under the EIS "no action alternative." Clearly, the ATR is a "defense nuclear facility."

It would appear that the DNFSB has made a decision not to investigate the deplorable conditions at ATR that is not based either on the historical record of its previous examinations of the ATR nor based upon the fact that the ATR is intimately involved as a resource for ongoing military and national security interests.

The public is justified in concluding that the DOE self-regulation and non-accountability to independent outside regulation has failed and the public health and safety is at risk.

"A life extension feasibility study for the ATR, completed in 1988, concluded that the ATR could be operated well into the 21st century (2014). ...However, as noted in the February 2004 special review, budgetary shortfalls over the previous ten years have resulted in the necessary maintenance, upgrades, and infrastructure being threatened."¹⁷² [LEPP pg. 1]

"The ATR was designed in the late 1950s and started full power operations with inpile [sic] experiments in 1969 and is now being evaluated for extending its role in materials testing through the year 2040. ...This extended operation will result in a 71-year operating lifetime for the ATR. It is unlikely that, at the time of the original design, the design lifetime was evaluated for this length of service." [LEPP pg. 13]

Due to the ATR age, replacement parts are "special equipment items [that] are one-of-a-kind, uniquely manufactured items." [LEPP pg. 19] This life extension plan would not pass any independent NRC regulatory analysis because of the current materials knowledge base on the radiation "aging effect" on reactor system components that limited the original ATR design-life to 20 years which should have ended for the ATR in 1989.

"Strategic Issues: Identification of these issues and development of a recommendation for the path forward to resolution is critical to the long-term operation of the ATR. Such issues included spent fuel disposal, radioactive waste disposal, disposal of irradiated beryllium, new fuel procurement and shipping, availability of spares for the plant and for the experiments, and so on." [LEPP pg. 8]

"Configuration Management: A configuration management database (CMD) already exists at INL. However, this database has not been systematically populated with design basis documentation and supporting design information. The commercial nuclear industry has been required to spend significant amounts of time and resources to reconstitute an accurate and valid CMD **before** they conduct their material condition assessments as part of their license renewal process. Because the ATR

¹⁷⁰ 2005 DOE/EIS-0373D, page 2-19.

¹⁷¹ 2005 DOE/EIS-0373D, page S-63, that defines; "Radioisotope Power System (RPS) as any one of a number of technologies used in spacecraft and in national security technologies, that produces heat and/or electricity from the radioactive decay of...plutonium-238."

¹⁷² Advanced Test Reactor Life Extension Program Plan, Battelle Energy Alliance (BEA), March 2006, USDOE, hereinafter referred to as LEPP.

is not under the same licensing renewal requirements the accomplishment of these activities (update of CMD and MCA [material condition assessment]) **will be performed** in parallel, resulting in an approximate two year time savings in schedule for the Integrated Plant Assessment process." [LEPP pg. 14] [emphasis added]

The above is a clear statement on how DOE's self-regulation of its nuclear reactors is fundamentally inferior to Nuclear Regulatory Commission licensing requirements of commercial nuclear reactors. It's now 2006 and the CMD/MCAs as well as Design Basis Reconstitution, Probabilistic Risk Assessment, Seismic Evaluation will not be completed until 2009 **if** DOE funding is provided. [LEPP pg. 11] Moreover, these studies, if made public, may well show as previous studies have shown that the ATR is unsafe.

"Design Basis Reconstitution: The original safety basis for the ATR was documented in a Safety Analysis Report (SAR) dated April 1965 and was not maintained beyond the first few years. The ATR Plant Protection System (PPS) and Technical Specifications Design Basis Report (DBR), dated May 1976, [FN 9] was prepared to support the design of an upgraded PPS, which included the reactor shutdown system and the facility-engineered safety features. ... 'Upgraded Final Safety Analysis Report for the Advanced Test Reactor,' was implemented. SAR-153 was prepared in response to **DOE Order 5480.23 and 10 CFR 830** [FN 8] for upgrading and maintaining a facility safety basis. SAR-153 development did not include a design basis reconstitution but was based on the 1996 SAR. [FN 8]" [LEPP pg. 15]

"As noted in [LEPP] section 5.1.1, a complete baseline of controlled design basis and supporting design information documentation does not specifically exist for the ATR." [LEPP pg. 16]

"Design codes and standards have evolved significantly during the life of the [ATR] plant. Efforts over the years to demonstrate facility safety by comparison to modern design codes and standards have resulted in a **partial application** of new codes and standards to applicable portion of the ATR facility, based on independent cost/value determinations made on a case-by-case basis. This **partial application updated codes and standards**, combined with the long operating history and obscure documentation for the basis of some of the rationale for applying updated standards, has resulted in confusing design documentation that is difficult to utilize or apply. In consequence, the established baseline of facility design documentation require special experience and perseverance to use." [LEPP pg. 15] [emphasis added]

"Partial application" This is a clear acknowledgement of violation of DOE Order 5480.23 and 10 CFR 830 and US Nuclear Regulatory Commission (NRC) Regulatory Guidance 1.60 and 1.70 (that DOE regulations require compliance with) as well as other applicable statutes and regulations (RCRA, CAA, CWA).

"Probabilistic Risk Assessment: The ATR Probabilistic Risk Assessment (PRA) was last published in 1994. Since that time the PRA has been updated in response to several facility modifications but at this time incomplete." [LEPP pg. 16]

Currently, no PRA has been finalized and approved for the ATR and RTC. Based on DOE funding schedule this will not occur until 2009 **if there is funding**.

The PRA Level 1 is all the combinations of faults that lead to core and/or canal melt, and their likelihood. The Level 2 PRA describes the various ways a severe accident might progress, timing and radionuclide hold-up specific to the type of event. The level 3 describes the release magnitude and predicted health effects. I was not involved with the level 2 or 3 PRA development, only the Level 1.

The Safety Analysis report analyzes more frequent hypothetical not-so-severe accidents and only

one arbitrary “hypothetical maximum” accident which isn’t necessarily the worst in terms of timing and release.

Even a decade old summary report, that DOE refuses to release, would be helpful, even if a newer report has not been finalized. While the Level 2 frequency/likelihood of various groups of accident types would change with any level 1 result changes, the basic scheme of grouping accidents would not necessarily change. The point of interest was that many types of accidents led to steam or hydrogen explosion and not the mythic maximum hypothetical large loss-of-coolant accident (LOCA) that melts the core but firewater is injected and there is no energetic release. There may not have been any changes to the Level 2 PRA analysis – only the fed-in newer Level 1 results.

"Seismic Qualifications Update: The original seismic design of RTC [Reactor Technology Complex] was based on the provisions of the 1961 Uniform Building Code. [FN 16] Certain upgrades and plant modification were performed to more recent criteria as they were developed during the history of the RTC, per Housner spectra [FN 18] and US Nuclear Regulatory Commission (NRC) Regulatory Guidance 1.60. [FN 19] During the review process for SAR-153 (CIRCA 1998), numerous comments regarding seismic issues were allowed to be deferred to the first annual update. [FN 10] Some of the original comments were addressed in the update but the seismic qualification information was not updated. **Eighteen comments remain unresolved, though DOE approved Revision 2 SAR-153.**" [LEPP pg.17]

"ATRC: The long-term viability of the Advanced Test Reactor Critical facility, a very-low-power reactor, used to confirm the safety of reactor experiments, has not been seriously evaluated since the start of ATR operation in the late 1960s." [LEPP pg. 24]

Section 2

History and Technical Description of the ATR at INL

The Advanced Test Reactor (ATR) is a light-water-cooled and moderated reactor with a design thermal power of 250 megawatts that is owned by the U.S. Department of Energy (DOE) and is located in the Test Reactor Area, now called the Reactor Technology Complex (RTC) in the southwestern portion of the DOE’s Idaho National Laboratory (INL) formerly called Idaho National Engineering and Environmental Laboratory (INEEL). Attached Figure Number 1 presents a map of INL that depicts ATR’s location. Under DOE’s Idaho Operations Office operating structure of government-owned-contractor-operated (GOCO), the current (as of 2/05) INL site-wide operations contractor is Battelle Energy Alliance (BEA). Bechtel (BBWI) operates the Advanced Mixed Waste Treatment Project at the INL Radioactive Waste Management Complex burial grounds (previously operated by British Nuclear Fuels Ltd BNFL), and CH2M.WG Idaho LLC is involved in INTEC cleanup of high-level wastes. Previous recent contractors that operated the ATR were Lockheed Martin and EG&G.

Analysts believe correctly that this "marry-go-round" of INL contractors is a deliberate attempt by these corporations to limit their liability. These contractors can just claim the environmental contamination was caused by the previous contractor and thus limit their liability during their operation despite evidence that each contractor contributed to environmental contamination that violated

environmental statutes and regulations.

“ATR is connected by a water canal to the ATR Critical Reactor Facility. The ATR Critical Facility is a low-power full-size nuclear duplicate of ATR, and is used to provide data, as needed for experiment loadings prior to irradiation of the actual experiments in ATR.”¹⁷³

ATR’s current mission requirements include naval reactor research and development, medical and industrial isotope production, and civilian nuclear energy research and development activities. The reactor, its primary coolant system, control room, and much of its auxiliary and experimental support equipment are in Test Reactor Area Building 670.

Major new "Generation IV" reactor fuel testing program¹⁷⁴ and new spent nuclear fuel transmutation experiments¹⁷⁵ and Cesium-131 production¹⁷⁶ loom at Advanced Test Reactor.

ATR began operation in 1967 and DOE expects to continue operating it for several decades despite its age and lack of compliance with relevant DOE and NRC regulations. The reactor vessel is constructed entirely of stainless steel, and the core internals are replaced every 7 to 9 years. [PEIS pg B-1] See Figure Numbers 2 and 3. The most recent change-out was completed in 1994. Buildings and structures in other parts of the Test Reactor Area (TRA) provide additional support functions. ATR is connected by water canal to the ATR Critical Facility. The ATR Critical Facility is a low-power, full-sized nuclear duplicate of ATR, and is used to provide data, as needed, for experiment loadings prior irradiation of the actual experiments in ATR. [PEIS pg B-3] Therefore, by definition all reviews of the ATR must also include ATR Critical Reactor Facility and related TRA support operations. For instance, what impact would a loss-of-coolant-accident at the ATR have on the ATR Critical Facility, or vice-versa?

DOE's PEIS claims ATR is currently operating at approximately 140 megawatts or less. ATR operates with highly enriched uranium fuel. Typical operating cycles are 42 days or 49 days at power followed by a 7-day outage for refueling and change-out of experiments and isotope production targets. The core is 1.2 meters (4 feet) high and is surrounded by a 1.3-meter-diameter (4.25-foot-diameter) beryllium neutron reflector used to enhance the neutron flux essential to a test reactor. [PEIS pg 2-16] The beryllium reflectors sustain considerable radiation deterioration, so at each reactor fuel change-out, the damaged blocks are replaced.¹⁷⁷

Internal INL reports gained by EDI show the ATR power levels can vary radically. One report states: “The ATR total core power of 150 MW and the maximum effective plate power for any inner fuel plate of **347 MW** which is over the ATR design parameters of 250 MW.”¹⁷⁸ Uneven power levels can exacerbate coolant malfunctions that can cause cascading system failures.

ATR has nine flux traps in its core and achieves a close integration of flux traps and fuel by means of a **serpentine fuel arrangement**. The neutron flux levels (ranging from 1×10^{15}) neutrons per square centimeter per second in the flux traps to 1×10^{13} neutrons per square centimeter per second in

¹⁷³ 2000 DOE/EIS-0310, page B-3 December 2000, www.eh.doe.gov/nepa/eis/eis0310/eiso310.html

¹⁷⁴ <http://hanaro2005.kaeri.re.kr/data/proceeding/IR-O-05.pdf> Proceedings of the International Symposium on Research Reactor and Neutron Science. Also see <http://anes2002.hcet.fiu.edu/ProceedingCD/s8Fur.pdf> The Advanced Test Reactor Irradiation Facilities and Capabilities.

¹⁷⁵ Hardening neutron spectrum for advanced actinide transmutation in the ATR, G.S. Chang and R.G. Ambrosek, INL, published in the Oxford University Press, 2005.

¹⁷⁶ IsoRay Begins Production of Cesium-131 Isotope through Agreement with INL at Advanced Test Reactor, 7/6/06.

¹⁷⁷ Facility Certification Report No. 29 for the Advanced Test Reactor, 4/7/05, page 2. FOIA Doc. #50.

¹⁷⁸ "USQ Process, Potential Inadequacy in the Safety Analysis (PISA) Form, TRA-670, RTC-USQ-2005-197, M-11 Emergency Coolant Pump Flow Measurement and Uncertainty." page 3

the outer reflector regions. When viewed from above, the reactor fuel region resembles a four-leaf clover. The four flux traps positioned within the four lobes of the reactor core are almost entirely surrounded by fuel, as is the center position. Four other flux traps positioned between the lobes of the core have fuel on three sides. ATR's unique control device design permits large power shifts among the nine flux traps. Testing can be performed in test loops installed in some flux traps without individual flow and temperature control or in reflector irradiation positions with primary fluid as coolant. **The curved fuel arrangement** brings the fuel closer on all sides of the test loops than is possible in a rectangular grid. [PEIS pageB-1] It is uncertain if this "serpentine/curved fuel" configuration would be problematic in case of an excursion (melt-down) and/or loss-of-coolant accident that would make insertion of control rods more difficult if not impossible.¹⁷⁹

According to a DOE internal report, the amount of debris in the ATR fuel rod channels is unacceptable. "During the outage between NT-3 and NT-4 the fuel was inspected and debris was noted on the top of the fuel elements. The fuel was removed from the reactor and inspected in the canal. Several fuel elements were noted to have debris in the cooling channel. . . . **Because the amount of debris was unacceptable, several strainer runs were performed to clean up the primary system.** . . . Following NT-4 and NT-5 the fuel was again inspected for debris and five fuel elements had debris in the fuel channels."¹⁸⁰ Debris blockage of coolant channels can lead to localized reactor core overheating and a meltdown. Debris blockage of control rod channels needed for emergency shutdown can exacerbate the severity of a meltdown.

Much of the ATR's complexity as a reactor comes from a unique serpentine fuel arrangement that offers nine high-intensity neutron flux traps and 68 additional irradiation positions inside the reactor core reflector tank, each of which can contain multiple experiments. Two capsule irradiation tanks outside the core provide 34 additional low-flux irradiation positions. The four flux traps in the corner lobes of the reactor core, as well as the core central position, are almost entirely surrounded by fuel. Four other flux traps between the lobes have fuel on three sides. The curved fuel geometry brings fuel closer on all sides of the flux trap positions than would be possible with a rectangular grid.

The unique core arrangement provides one of the ATR's major vulnerabilities for fuel and power reactor operations. In a matter of months or even weeks it can duplicate years of radiation in a normal power reactor. In fuel studies, researchers can simulate 20 years of in-reactor operation in a year. The ratio is slightly less for accelerated materials testing.

The control cylinders rotate neutron absorbing hafnium plates and neutron reflecting beryllium plates towards and away from the core. The shim rods, which withdraw vertically, can be individually inserted or withdrawn to adjust power to individual flux traps. Researchers can independently control the power level in each of the four corner lobes.

On June 26, 2006, during post-maintenance testing at the Advanced Test Reactor Critical [exact twin to the ATR] (normal shutdown/outage period), the #3 safety rod failed to drop into the reactor core, as required. A spare actuator controller was installed in the #3 position and the test repeated. The #3 safety rod again failed to drop into the reactor core, indicating performance degradation associated with the actuator controllers and their circuitry. Plant and Nuclear Safety Engineering commenced an

¹⁷⁹ There are major inconsistencies between how the reactor and its systems supposedly function and how those systems have been changed over time. There are problems with the types of experiments that are done *at ATR* by what are called "drop in" loops. There is the potential for meltdown of the fuel from these experiments. [Thatcher 7/26/05]

¹⁸⁰ Facility Certification Report No. 29 for the Advanced Test Reactor, 4/7/05, page 4. FOIA Doc. # 50.

evaluation of the problem for indication of a possible original design deficiency and a reasonability determination of the existence of a potential inadequacy in the safety analysis (PISA). There was no safety impact since the discovery was during facility shut down. Currently, there are no programmatic impacts. There is potential for future impacts, if further evaluation reveals the need for component redesign. (NE-ID--BEA-ATR-2006-0009)¹⁸¹

Another unique complexity of the ATR is the control rod design, comprised of control cylinders or drums and neck shim rods, that permits large power shifts among the nine flux traps. The Union of Concerned Scientists (UCS) generated, in October 1971, a detailed analysis of emergency core coolant systems (ECCS) in the event of a loss-of-coolant-accident of the government approved reactor designs at the time (that includes the ATR built in the mid-1960s) using the government's own data "to demonstrate that approximately 85% of the fuel rods are 'candidates' for producing coolant channel blockage in the range of 90 to 100 %." UCS research also found the government "overlooked the fact that the steam pressure inside the reactor would drastically limit the rate at which emergency cooling water could rise up into the core. Because of 'steam binding' the current ECCS might have only a 'marginal capability' for preventing the China Syndrome." DOE's ATR Safety Review Analysis also states "Air in the Primary Coolant System could cause a degradation of emergency pump flow."¹⁸²

The USC assessment states: "At the Idaho Lab, senior personnel who had criticized the 'established policy' found themselves, as one of them noted, switched from responsible position to 'nothing jobs.' Some of them like George Brockett, took advantage of the company policy that encouraged those who criticized AEC policies to 'look outside the company' for new jobs."¹⁸³

Of the nine ATR flux traps, five are configured with pressurized-water loops that allow for individual temperature, pressure, flow, and chemistry controls. The five test loops are used by the Naval Reactors program. Of the remaining four flux traps, one is dedicated to the Naval Reactors program, one is used for isotope production, one is used for low-specific-activity cobalt production, and the fourth has recently had the Irradiation Test Vehicle installed, that can be described as three small pressurized-gas test loops. Use of one of these three loops has been purchased by a British corporation. Approximately 25 percent of the high-flux test positions (A holes, B holes, and H holes) are currently used for iridium-192, with the remaining for cobalt-60 and strontium-90, nickel-63 production.

DOE is now using the ATR in plutonium-238 (Pu-238) production by irradiating neptunium-237 (Ne-237) targets in the reactor core.¹⁸⁴ The production planning assumption for ATR is for 5 kilograms (11 pounds) of plutonium-238 per year. This new added mission demand on top of current operating production demands will push the ATR operating level to its maximum of 250 megawatts. For the production of Pu-238, neptunium-237 targets would be placed in the beryllium reflector positions. The proposed target design consists of neptunium dioxide blended with aluminum powder,

¹⁸¹ DOE-Idaho Bi-Weekly Operations Summary For the Period of June 26-July 09, 2006

¹⁸² ATR SAR-153, ES-10

¹⁸³ Ford, Daniel, "Cult of the Atom, The Secret Papers of the Atomic Energy Commission" published with support of the Union of Concerned Scientists, pages 100 to 113, and 129.

¹⁸⁴ http://www.oversight.state.id.us/ov_library/All_PDFs/oversight_overview.pdf

"The Advanced Test Reactor (ATR) at the INEEL's Test Reactor Area may be the location where plutonium material is created. Neptunium 237 targets would be fabricated at a DOE site outside of Idaho and shipped to the ATR for irradiation which would convert the neptunium into plutonium. Once irradiated, the targets could be shipped to another DOE site outside of Idaho for processing to extract the plutonium."

pressed into a target core, and clad with aluminum.¹⁸⁵ "The production planning assumption of ATR is from 3 kg of Pu-238 /yr (no action alternative) to 5 kg/yr of Pu-238 if the ATR were used alone (preferred alternative)." [DEIS pg. S-25] This is a 60% increase in production that should trigger an EIS under NEPA.

"The ATR is fueled with enriched uranium-235 and has a full-power level of 250 megawatts, but typically operates at 140 MW or less." "The production planning assumption of ATR is from 3 kg of Pu-238 /yr (no action alternative) to 5 kg/yr of Pu-238 if the ATR were used alone (preferred alternative)." [DEIS pg. S-25]

"The ATR is fueled with enriched uranium-235 and has a full-power level of 250 megawatts, but typically operates at 140 MW or less." [DEIS pg. S-25] DOE internal reports acknowledge that the ATR power reduction was to mitigate unresolved safety problems.

Pu-238 requirements "Assumes RPS use only for the New Horizons Pluto mission. If NASA schedules the Mars Science Laboratory Mission during this time period, and additional 11 kg will be required for the RPS's based on the number of RPS's and their electric power requirements for the mission." [DEIS pg. S-6] This potential for more than doubling the Pu-238 requirements and the additional production demands on the ATR is significant.¹⁸⁶

The un-irradiated NE-237 targets will be transported to the ATR for temporary underwater storage in the ATR reactor canal pending insertion into the reactor. The Un-reviewed Safety Activity Report 2005-3 indicates that there is an un-reviewed safety question regarding the 9975 containers that are storing the Neptunium 237 at Savannah River Site for shipment to INL. The containers can undergo deflagration. **Deflagration** is a process of subsonic combustion that usually propagates through thermal conductivity (hot burning material heats the next layer of cold material and ignites it).¹⁸⁷

Each target would contain, on average, approximately 750 grams (approximately 0.5 curie) of Ne-237 and up to an equivalent curie amount of protactinium-233 depending on the elapsed time following the Ne-237 purification. The targets then would be manually transferred underwater to ATR and inserted into the beryllium reflector area of the reactor. This loading would take about 2 to 4 hours to complete. Normally, 94 targets would be irradiated currently in ATR for a period of about 6 months to two years. The length of irradiation depends on the positions of the targets in the reactor. Following irradiation, the targets, each nominally containing on average 63 grams of Pu-238, smaller amounts of plutonium isotopes with higher atomic weights amounts of Ne-237, would be removed from ATR using the same underwater manual transfer system used during loading and would be stored in the reactor canal. The irradiated targets would be stored for a period of 4 to 6 months to allow for the decay of

¹⁸⁵ 2000 DOE/EIS-0310, page 2-16. DOE also refers to this as the Nuclear Infrastructure PEIS or NI PEIS. DOE issued a Record of Decision 1/26/01 that selected NI PEIS Alternative 2 Option 7 [Federal Register Vol. 66, No. 18]. PEIS page 2-16.

¹⁸⁶ Consolidation Draft Environmental Impact Statement, June 2005.

¹⁸⁷ Laboratory analysis performed on (2) samples taken early in production of neptunium indicate moisture content in excess of that expected from the HB- Line process. A potential New Information (NI- 105K- 05- 03) was opened on 7/ 7/ 05, based on this preliminary information. To evaluate the potential for generation of hydrogen and oxygen gas resulting from radiolytic decomposition of water with this higher moisture concentration, Calculation X- CLC- H- 00560, Analysis of Gas Generation of Off- Specification Neptunium Oxide Stored in 9975 Shipping Package was developed at SRNL. Higher hydrogen and oxygen in the storage containers could cause them to rupture, and present a potential for deflagration. Page 42 [page A-11] (http://www.eh.doe.gov/facility_safety/usq_activity_report_2005-3.pdf)

short-lived radionuclides generated during irradiation.¹⁸⁸

The ATR and related Test Reactor Area (TRA) now called the Reactor Technology Complex (RTC) irradiated reactor fuel storage pools have no apparent stainless steel liner with compliant leak detection systems required under either current RCRA¹⁸⁹, DOE regulations or Nuclear Regulatory Commission regulations. The ATR and other reactors at TRA are housed in industrial steel framed and paneled steel skinned (roof and walls) buildings that do not meet the “containment” criteria required by the Nuclear Regulatory Commission for nuclear reactors (i.e. sealed concrete over-structure).

During 2003, the RTC/ATR released 1,180 curies to the atmosphere, and INTRC operations that treat ATR waste released 6,020 curies to the atmosphere during 2003.¹⁹⁰ In 2000, the RTC/ATR released 1,802.69 curies that included 0.39 curies of iodides (or over one-third that released at Three Mile Island (TMI)).¹⁹¹ At this rate, ATR releases every three years the equivalent radioactive iodine to the TMI commercial reactor meltdown. These high emissions from RTC/ATR suggest liquid waste is first sent to the ATR cooling towers w/o treatment and the precipitates are then pumped to INTEC evaporators or the percolation ponds.

In a four decade history of operating the ATR and the TRA/RTC DOE has dumped huge quantities (more than 85 billion gallons) of radioactive waste water into illegal, unlined percolation ponds that resulted in massive groundwater contamination.¹⁹² DOE constructed new unlined waste water percolation ponds (also used by INTEC Liquid Waste Management System) immediately south of TRA that will continue the contaminate migration into the aquifer.¹⁹³ Also see INTEC groundwater sample data documenting extensive contamination exceeding regulatory limits.¹⁹⁴

The ATR’s Emergency Firewater Injection System (EFIS) deficiencies have been documented for over a decade, yet, this major problem has NOT been corrected. See Attachment A. “The Emergency Firewater Injection System (EFIS) provides emergency reactor core cooling [ECCS] and flooding of the reactor vessel in the event of a major break in the Primary Coolant System pipping or to the events resulting in loss of primary coolant.”¹⁹⁵

Even DOE’s Problematic Risk Assessment (PRA) states that at the “ATR these are beyond design basis events and include the anticipated transient without scram (ATWS) and the hypothetical large break [loss-of-coolant accident] (LOCA).”¹⁹⁶

The public can have no confidence in DOE’s self-regulation. DOE fails to respect or obey federal pollution laws; DOE disregards its own Orders and Regulations and nuclear industry standards; DOE ignores and deliberately buries safety concerns of its own safety analysis and engineers; and DOE continues operations despite known equipment failures and deficiencies and threats to public safety.

The ATR/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

¹⁸⁸ 2000 DOE-PEIS-0310, pg. B-3 to 6.

¹⁸⁹ 40 CFR 264.193 Subpart J Tank Systems or 40 CFR 265 Subpart J Tank Systems.

¹⁹⁰ DOE/DEIS-0373D page 3-26

¹⁹¹ DOE/EIS-0287 pg.4-30

¹⁹² See Attachment D, TRA groundwater sample data table

¹⁹³ Environmental Defense Institute, Keep Yellowstone Nuclear Free, and David McCoy 11/25/05 comments on the INTEC Liquid Waste Management System RCRA permit. www.environmental-defense.org

¹⁹⁴ DOE/EIS-0287 page 4-52

¹⁹⁵ SAR-153, ES-10

¹⁹⁶ SAR-153- ES-10

shutdown. The ATR was designed in 1961 in accordance with national building code standards (Uniform Building Code) applicable at that time, but it was never upgraded to 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.¹⁹⁷ This means the system is functional but documentation does not support operability for the full range of intended safety functions (i.e. earthquakes).¹⁹⁸ The ATR also has no containment building currently required around nuclear reactors to contain radioactive releases in the event of an accident.

Section 3. Violations of Statutes and Regulations

3-A Environmental Laws

1. National Environmental Policy Act [NEPA] (42 USC Section 4332 et seq.)

Environmental Impact Statement for the Proposed Consolidation of Nuclear Operations Related to Production of Radioisotope Power Systems [DOE/EIS-0373D 6/05] is inadequate related to Advanced Test Reactor accident hazard and NEPA requirements for inclusion of programmatic issues.¹⁹⁹

"These related proposals for substantial change in an ongoing DOE program constitute a 'major Federal action significantly affecting the quality of the human environment.' 42 U.S.C Section 4332(2)(c), and 'thereby require the preparation of a Programmatic Environmental Impact Statement (PEIS) under the National Environmental Policy Act, 42 USC Section 4321, et seq.'

"The Supreme Court has indicated that NEPA 'may require a comprehensive impact statement...where several proposed actions are pending at the same time...Only through comprehensive consideration of pending proposals can the agency evaluate different courses of action.' *Kleppe v. Sierra Club* 427 U.S. 390,409-10. 'A programmatic EIS reflects the broad environmental consequences attendant upon a wide-ranging federal program. The thesis underlying programmatic EIS's is that a systematic program is likely to generate disparate yet related impacts. Whereas the programmatic EIS looks ahead and assimilates 'broad issues' relevant to the program, the site-specific EIS addresses more particularized considerations"²⁰⁰

DOE fails to implement NEPA regulations in the Nuclear Regulatory Commission's (NRC) Reactor License Renewal Process, that states: "The license renewal process requires that both a technical review of safety issues and an environmental review be performed for each application. NRC regulations, 10 CFR Part 51 and 10 CFR Part 54, contain the requirements for these reviews and various other publications provide general process guidance to both the applicant and the reviewer.

"Environmental Review: In addition to its mission of protecting public health and safety under the Atomic Energy Act, the NRC is charged with protection of the environment in the use of nuclear materials. Each license renewal applicant must include a supplement to the environmental report that

¹⁹⁷ DOE Office of Environmental Health and Safety, Occurrence Report Number: ID-BEA-ATR-2005-0004, "ATR Heat Exchanger Seismic Support Anchor Bolts too Short."

¹⁹⁸ 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

¹⁹⁹ See Plaintiffs EIS comments and Natural Resources Defense Council (NRDC) statement on NEPA Programmatic Environmental Impact Statement (PEIS) requirements.

²⁰⁰ *National Wildlife Federation v. Appalachian Regional Comm.*, 677 F.2d 883, 888 (D.C. Cir. Ct. 1981), cited in Natural Resources Defense Council analysis.

contains an analysis of the plant's impact on the environment if allowed to continue operation beyond the initial license. The NRC performs plant-specific reviews of environmental impacts of operating life extension in accordance with National Environmental Policy Act (NEPA) and the requirements of 10 CFR Part 51, 'Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.' This review continues on a separate 'track' from the safety reviews of the technical information. Environmental requirements for the renewal of power reactor operating licenses are contained in NRC's regulations, 10 CFR Part 51. The environmental protection regulations in 10 CFR Part 51 were revised on December 18, 1996, to improve regulatory efficiency in environmental reviews for license renewal and codify the findings documented in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437)."²⁰¹

2. Resource Conservation Recovery Act/ Hazardous Waste Management Act

(42 USC Section 6901 et seq.).

Inadequate Storage, Treatment, and Disposal of mixed hazardous and radioactive waste. ATR solid, liquid waste is processed at INL INTEC Liquid Waste Management System (ILWMS).²⁰² During 2003, the RTC/ATR released 1,180 curies to the atmosphere, and INEC operations that treat ATR waste released 6,020 curies to the atmosphere during 2003.²⁰³ These significant radioactive releases from RTC suggests that DOE is using ATR cooling tower to dispose of untreated liquid mixed waste in violation of RCRA 40 CFR 264.1032 Subpart AA Air Emission Standards for Process Vents. These high RTC emissions additionally suggest significant leaks between ATR closed primary coolant system and the secondary "once through" coolant system.

The public questions why the DOE, EPA and Idaho DEQ choose to allow these enormous quantities of radiation to escape uncontrolled into the community and environment.

Cross Reference Report 2001, Idaho Department of Environmental Quality Report lists each hazardous material (hazmat) by EPA code number and shows the quantities generated for each code number for each of the INL operations.²⁰⁴ EDI added up all the hazmat attributed to the Test Reactor Area where the Advanced Test Reactor is the main generator. Totals for Test Reactor Area (TRA) generated in 2001 are 52,875 pounds of RCRA listed hazmat. Total hazmat generated at INTEC in 2001 was 58,355 pounds.²⁰⁵

Of that TRA hazmat total in the Cross Reference Report there is a total hazmat in storage at TRA in 2001 of 7,495.50 pounds. There is no statement in the report if this hazmat is within the RCRA 90 day storage time limit.²⁰⁶

The ATR facility and other facilities which support it in the Test Reactor Area (TRA) now called the Reactor Technology Complex (RTC) area produce mixed hazardous/radioactive wastes which

²⁰¹ <http://www.nrc.gov/reactors/operating/licensing/renewal/process.html#scoping>

²⁰² Environmental Defense Institute and David McCoy comments 4/7/04 and 11/25/05 comments on the INL INTEC Liquid Waste Management System (ILWMS) system permit.

²⁰³ DEIS DOE-0373D page 3-26

²⁰⁴ Cross Reference Report 2001, Idaho Department of Environmental Quality Report ID4890008952 (dated 12/31/01)

²⁰⁵ See Environmental Defense Institute RCRA Hazardous Material Table in Attachments.

²⁰⁶ 40 CFR 261.31, 261.32 and 261.33(e).

are of the type and quantity of hazardous wastes required to be regulated under the Resource Conservation and Recovery Act (RCRA). For example, DOE contaminated the soil at INL with six beryllium reflector blocks from the ATR. The blocks contained a total of 293,000 curies of tritiated hydrogen gas and approximately 20 curies of carbon-14. Both radionuclides form mobile compounds and represent a threat to the Snake River aquifer over the next three hundred years. The beryllium reflectors sustain considerable radiation deterioration, so at each reactor fuel change-out, the damaged blocks are replaced. Beryllium is a RCRA waste. Yet the ATR and facilities of the TRA\RTC do not have the Part A and Part B permits which are mandated for such facilities by RCRA. Thus the ATR and facilities of the TRA\RTC are illegally operating federal facilities. DOE has assiduously avoided addressing the RCRA issues which exist for the ATR and TRA\RTC facilities.

"The uranium impurity when irradiated resulted in classification of the beryllium blocks as transuranic (TRU) waste, when they are removed from the core." ... "Currently, there is no identified path for disposal for this TRU waste which is not allowed to be disposed in the RWMC SDA [Radioactive Waste Management Complex - Subsurface Disposal Area]. Contact-handled TRU waste that is 'defense related' is permitted to be disposed at the Waste Isolation Pilot Plant (WIPP). However, the WIPPP Land Withdrawal Act [FN24] limits the total radioactive inventory for all isotopes to 5.1 MCI [5.1 million curies]. The ATR reflector components would consume almost two-thirds [3.4 MCI] of the total TRU inventory allowable within WIPP, which is currently not acceptable. The ATR would also be required to submit a justification for meeting the 'defense-related' definition for approval by DOE. Finally, there is no shipping cask currently available due to the high gamma radiation levels from cobalt-60. Approximately 30 years is necessary for cobalt-60 to decay to levels acceptable to ship in the 72-B cask, and by that time, it is estimated that WIPP will be full and closed to additional shipments. The final potential disposal facility considered is Yucca Mountain. That facility's waste acceptance criteria only provides acceptance of SNF and high-level waste. The beryllium components do not meet either definition.

"At this time, 20 beryllium reflector blocks and 55 [outer shim control cylinder] OSCCs from previous [core internals change-out] CIC (including the most recent in 2005) are being stored in the east canal deep well section. The stackable storage grids have the capacity to store a total of 44 reflector blocks and 128 OSCCs. Adequate storage space exists for three more CICs or until 2050, assuming the current utilization rate. Even though storage capacity exists based on current schedule to 2040, special approval was required from DOE Headquarters to remove the most recent beryllium blocks and OSCCs from the reactor as 'newly generated waste' with no path forward for disposal. This approval was limited to the beryllium waste generated during the recent CIC and does not apply to beryllium to be removed in future CICs. Removal of blocks during future CIC may result in additional National Environmental Policy Act (NEPA) [FN25] actions such as preparation of an environmental impact statement.

"In addition, the remaining storage capacity in the ATR canal may become limited quicker if the anticipated new gas test loop is installed, as this is expected to burn more fuel and expend the reflector core faster than is currently utilized." [LEPP pg. 20]

Beryllium is a RCRA listed hazardous waste. [Waste Code Number P015 (40 CFR 268.40)] ATR's beryllium waste is then appropriately characterized as a mixed hazardous/ TRU radioactive waste. Storing the above mixed TRU beryllium waste in the ATR canal conflicts with Settlement Agreement with the State of Idaho discussed below. Storage beyond 90 days also violated RCRA.

"Along with beryllium blocks, other waste from past [core internals change-out] CICs stored in

the ATR canal does not have a clear path for disposal. For example, these items include cut fuel end boxes and in-core sections of in-pile tubes from past CICs. As mentioned in the previous section, material profiles for this type of waste RH-LLW [remote-handled Low-level waste] need to be developed and evaluated by possible disposal entities. ... If future CICs occur on a more frequent basis, canal storage capacity will decline more rapidly." [Advanced Test Reactor Life Extension Program Plan, Battelle Energy Alliance (BEA) March 2006, Idaho National Laboratory, USDOE, hereinafter referred to LEP, pg. 21]

"The Subsurface Disposal Area (SDA) of the Radioactive Waste Management Complex (RWMC), used for low-level waste (LLW) disposal, is scheduled for closure in 2009. This disposal area is the predominate disposal site for ATR LLW. Accelerated Idaho Cleanup Project (ICP) DD&D activities will generate significant quantities of LLW that may consume the remaining disposal capacity sooner than previously expected, leaving ATR with no disposal facility for its LLW.

"Currently, the ATR has a LLW storage capacity for 398 cubic meters (11 cargo containers). Waste is collected weekly from the ATR and placed in cargo containers. Weekly collections are essential to **control fire loading issues** with shipment of one cargo container every 6-8 weeks as typical. Storage capacity would be quickly met if no disposal capacity is available elsewhere. New storage areas would have to be established with appropriate safety documentation for excess waste storage." [LEPP pg. 19 emphasis added]

One cargo container (~36 cubic meters) every 6-8 weeks = ~326 cubic meters per year ATR LLW dumped at the RWMC. The above statement "**control fire loading issues**" suggests these waste are RCRA mixed waste in the waste category of "Ignitable Characteristic Wastes" Waste Code D001. [40 CFR 268.40]

In an effort to reduce SNF storage volume, DOE systematically cuts off the non-fissile top and bottom ("fuel end boxes") of the fuel elements. The "in-core sections of in-pile tubes" are part of the reactor core components and equally highly radioactive. This remote-handled (RH-LLW), as part of the SNF element and reactor core components are extremely radioactive and both should be appropriately classified as "Class C" or "Greater-than-Class C" Low-level Waste.

NRC regulations state: "Such [waste] must be disposed of in a geologic repository as defined in part 60 of this chapter unless proposals for disposal of such waste in a disposal site licensed pursuant to this part are approved by the [NRC] Commission." [10 CFR 61.55 and 61.56] Past and current dumping of this ATR Class C and/or Greater-than-Class C waste in the shallow burial RWMC SDA dump site would be a violation NRC regulations if it were an NRC licensed disposal site.

The SDA is currently undergoing Superfund cleanup where buried waste is being exhumed and shipped off-site. It's an outrage that DOE is at the same time illegally dumping more waste. The fact that DOE admits above that there is no path forward for ATR LLW is a clear indication that this is Class-C and/or Greater-than-Class-C LLW requiring a deep geologic disposal/repository, and that none exist off-site, because numerous NRC licensed LLW dumps are currently available for Class A and Class B LLW. The SDA would be in violation of Executive Order 11988 and NRC's Disposal site suitability requirements for land disposal that state in relevant part:

"The disposal site must be generally well drained and free of areas of flooding or frequent ponding. Waste disposal shall not take place in a 100-year flood plain, coastal high-hazard area or wetland, as defined in Executive Order 11988, ``Floodplain Management Guidelines." [10 CFR 61.50 (a)(5)]

The SDA lies in a regional depression some 40 feet below the nearby Big Lost River, and has flooded many times in the recent past.

"The 1995 Settlement Agreement between DOE, the U.S. Navy, and the State of Idaho [FN 26] requires that underwater storage basins be emptied and wet storage of SNF be discontinued after 2023, For purposes of the settlement agreement, the ATR canal is not considered a 'spent nuclear fuel storage basin.' The settlement agreement also requires that all SNF be shipped out of the State of Idaho (presumably to a federal repository) by 2035." [LEPP pg 22]

There is no apparent exception in the Settlement Agreement exempting the ATR Canal SNF and TRU waste inventory, and the State of Idaho would take issue with any DOE claim otherwise. Given that there is no "federal repository" for SNF and/or other high-level waste and Special Nuclear Material [LEPP pg. 23] that DOE now considers waste, there is no path forward for ATR SNF, MTRU, and Class-C and >Class-C LLW waste. This is also an apparent violation of DOE regulations and possibly RCRA prohibiting "newly generated waste" with no disposal path forward.

Resource Conservation Recovery Act Listed Hazardous Waste Generated at Advanced Test Reactor/Reactor Technology Center/Test Reactor Area (TRA) and Idaho Nuclear Technology and Environmental Center (INTEC)

Based on the Hazardous Waste Cross Reference Report, Idaho Department of Environmental Quality (ID4890008952) Reporting Period 1/1/01 to 12/31/01, Dated 3/11/02. Data below are excerpts for TRA and INTEC and is presented as it appeared in the original document including repetition of the same waste codes.

EPA Waste Codes 40 CFR 261 Subpart D	ATR/RTC/TRA (pounds)	INTEC (pounds)
D001 (pg.1-2) Characteristic Ignitable *	200	138.23
D002 (pg.2) Characteristic Corrosivity [sic] *	50	15.00
D003 (pg. 3) Characteristic Reactivity * + D004 (Arsenic)	144	
D005 Barium (pg.3)	44	22.00
D007 Chromium (pg.4)		31.00
D008 Lead + F003 Solvents * (page 4)		8.82
D011 Silver + D035 Methyl Ethyl Ketone (pg.5)		41.00
D028 1,2-Dichloroethane (pg.5)	80	9.00
D035 Methyl Ethyl Ketone	20	77.00
F005 Solvents * (pg. 6)		252.00
F003 Solvents * (pg. 7)		26.23
D036 Nitrobenzene	13	
D040 Trichloroethylene		26.32
U077 1,2 Dichloroethane (pg.7)	54	10.00
D002 (page 8) Characteristic Corrosivity	13	16,280.00
D004 Arsenic (pg. 9)	11	
D008 Lead	112	
D010 Selenium	10	

D011 Silver (pg. 9)	12	
P119 Ammonium vanadate		
P120 Vanadium pentoxide (Pg 9)		159.00
D010 Selenium (pg 10)	37	
D006 Cadmium		526.00
D007 Chromium (pg. 10)		371.00
D008 Lead (pg. 10)	112	
D007 (pg. 11)		1,488.00
D008 (pg. 11)	54	
D009 Mercury (pg. 11 12)	11	570.00
D011 Silver (pg. 12)		10.00
F003 Solvents * (pg.12)	25	
P010 (pg. 12)		12.00
D003 (pg. 13)		10.00
D004 (pg.13)	43	
D010 (pg. 13)		143.30
D011 (pg. 13)		9.00.
D043 Vinyl Chloride (pg. 14)		13.00
D011 (pg. 14)		9.00
D008 (pg. 14)	48	
D005 (pg. 14)	13	12.00
D008 (pg.14-15)	1,138	246.92
F003 Solvents * (pg. 15)	7.50	10.00
D006 (pg. 16)	281	845.00
D008 (pg. 17)	49	144.00
D009 (pg.17)		254.00
F005 * Solvents (pg. 18)	10	
D009		89.00
D008 (pg.19)	38,962	231.00
D009 (pg. 19)		387.00
D008 (pg. 20 -21)	284	186.00
D009 (pg. 21)		154.00
D011 Silver (pg. 22)	113	
F002 Solvents * (pg. 22)		22.04
D009 (pg. 22- 23)	1,868	1,939.00
D011 (pg. 24)	292	
D035 (pg.24)		9.00
F005 Solvents * (pg. 24)		46.00
D035 (pg. 25)		33.00
F002 Solvents * (pg. 26)		8.82
P030 Cyanides (pg. 26)		12.00
U210 Tetrachloroethylene	103	
U228 Trichloroethylene (pg. 27)	13	
D001 (pg. 27)	8.50	
D007 (pg. 28)		8.00
U134 Hydrogen fluoride (pg. 28)		8.00
D011 (pg. 28)		9.00
D008 (pg. 29)	48	
U134 Hydrogen fluoride (pg. 29)	9	331.00
U134 (pg. 30)	19	316.00
U134 (pg.31)		18,419.00

D008	(pg.32)		1,327.00
D006	(pg 33)	90	1,778.00
D009	(pg. 34)	396	
U134	(pg. 34)		5.95
U134	(pg. 35)		44.00
U134	(pg. 36)	9	
D008	(pg.36)	1,560	82.00
D007	(pg. 37)	387	
U134		15	
D008	(pg. 38)	6,081	10,959.00
D009	(pg.39)	10	
U134	(pg. 40)		52.00
D011	(pg.40)		121.00
U134	(pg. 41)	17	
F002 Solvents *			11.02
Totals in Pounds		52,875	58,355.99
Totals in Kilograms		23,983.57	26,469.69

* EPA Characteristic Wastes: "Certain wastes are hazardous if they are ignitable, corrosive, reactive or toxic."

D001; A solid waste that exhibits the characteristic of **ignitability**, is a category of hazardous waste in 40 CFR 261 Subpart D

D002; A solid waste that exhibits the characteristic of **corrosivity**, is a category of hazardous waste in 40 CFR 261 Subpart D

D003; A solid waste that exhibits the characteristic of **reactivity**, is a category of hazardous waste in 40 CFR 261 Subpart D

F001 and F002 are spent halogenated solvents

F003, F004, and F005 are spent non-halogenated solvents.

When hazardous material (hazmat) listing in the Cross Reference table is mixed with other hazmat, only the last is noted in the above table. Therefore, the above is only part of the picture.

Hazardous Waste Stored at RTC/TRA

The Hazardous Waste Cross Reference Report for 2001 also shows (in addition to the above) 7,495.5 pounds (3,399.88 kg) of hazardous waste "remaining" for final disposition that is presumed in storage. These quantities are included in the above table totals. EPA's Large Generator 90 day storage limits are 1,000 kg/month or 1kg/month for "acutely hazardous materials." [40 CFR 260.10, 261.31 and 261.33(e) Subtitle C] RTC/TRA uses the Nuclear Material and Inspection Storage (NMIS) facility to store this hazardous waste.

The Cross Reference Report for 2001 referenced here is available on Idaho Department of Environmental Quality (IDEQ) website in "pdf" format. The 2001 Cross Reference Report is the most recent one available at the time of this writing. Currently, IDEQ is only posting INL site-wide summary reports that do not show the individual INL operations itemized breakdown data.

"Oct. 10, 2011: Inspections conducted by the Idaho Department of Environmental Quality resulted in preliminary findings of 17 violations of underground petroleum storage tank requirements. Alleged violations included: failure to provide cathodic protection, failure to ensure proper operation of cathodic

protection, failure to install adequate overfill prevention equipment, failure to use an overfill protection system, and the failure to take necessary precautions to prevent overspill/spillage. A review was performed to assess all of the INL underground petroleum storage tanks for preliminary issues identified during the inspection. Corrective actions included installation of a high-level alarm on a tank at the Central Facilities Area and ordering additional high-level alarms for other petroleum tanks identified with inadequate overfill protection. An official report from DEQ is pending. (EM-ID—BEA-CFA-2011-0005).”²⁰⁷

“Nov. 18, 2010: It was determined that work orders for disposal of liquid natural gas tanks at the Central Facilities Area did not adequately identify the tanks or address steps or hazards associated with the work. Work was stopped on the tanks with elevated readings. There were no injuries, but a critique was held. (NE-ID—BEA-CFA-2010-0006).”²⁰⁸

The ATR has no Resource Conservation and Recovery Act (RCRA) permit required for operation

Despite these RCRA hazardous materials generated and stored at the Test Reactor Area the Idaho Department of Environmental Quality RCRA Work Plan contains no reference to Test Reactor Area or Advanced Test Reactor permits. This is a clear acknowledgement of non-enforcement of a major RCRA hazmat generator.²⁰⁹

The 2003 INL RCRA Work Plan covers permits for the Materials Fuel Complex (formerly called ANL-W) Experimental Breeder Reactor (ERB-II).[page A-1] So clearly there is no blanket exemption for reactors from RCRA, therefore the ATR is required to be, but has yet to be permitted.²¹⁰ There is however no mention of the INL Naval Reactor Facility that has several operating reactors likely because it is operated/managed out of DOE Pittsburg Naval Reactor Office. In the RCRA 2001 Cross Reference, NRF is listed as generating considerable quantities of RCRA listed hazmat.

“The May 2004 RCRA inspection [apparently the ATR was not inspected] resulted in a Notice of Violation and civil penalty of \$5,100 for two violations identified. No other Notices of Violation or findings of noncompliance resulted from other regulatory inspections. However, a Notice of Violation and civil penalty of \$162,500 was received in FY 2004 for five violations identified during a RCRA inspection conducted in FY 2003.”²¹¹

In the landmark Federal Court ruling in summary judgment, the Court held that : "(1) the most reasonable reconciliation of Resource Conservation and Recovery Act with Atomic Energy Act is that AEA facilities are subject to RCRA except as to those wastes which are expressly regulated by the AEA, i.e., nuclear and radioactive materials; (2) if security of nuclear material data would conflict with Resource Conservation and Recovery Act, defendant [DOE] administrative officials should apply for Presidential exemption from the Act for nuclear project, and where the Department of Energy had not applied for Presidential exemption, national security considerations were not to be considered by the

²⁰⁷ DOE-ID Bi-Weekly Summary; For the Period Sept. 27- Oct. 17, 2011

²⁰⁸ DOE-ID Bi-Weekly Summary; For the Period Nov. 15-Dec. 1, 2010

²⁰⁹ Idaho Department of Environmental Quality "Hazardous Waste Management Act/Resource Conservation Recovery Act (HWMA/RCRA) Work Plan for the Idaho National Engineering and Environmental Laboratory" (Revision Date - September 10, 2003)

²¹⁰ Robert Bullock, Manager of IDEQ hazardous waste permits email to Chuck Broschious 3/4/06 states "Chuck, the reactors are not currently regulated as Treatment Storage or Disposal Facilities."

²¹¹ BBWI Integrated Safety Management System, Annual Report, FY 2004, September 2004, INEEL/EXT-04-02262, FOIA doc # 45, page 32

court; (3) that DOE had national pollutant discharge elimination system permit for nuclear defense plant did not allow pollutant to discharge at various points, but, rather allowed pollutant discharges only in accordance with limitations and conditions of the permit; and (4) whether several locations at nuclear defense plant were point sources for pollution was question with competence of courts, and accordingly, deferral the Environmental Protection Agency would not be appropriate. Relief granted to plaintiffs.

"Atomic Energy Act provision did not vest Department of Energy with exclusive authority to regulate health and safety standards in operation of atomic energy plant in Oak Ridge, Tennessee, and accordingly, the Resource Conservation and Recovery Act is not inconsistent with the Atomic Energy Act in such respect. . . . Where Department of Energy and its Secretary acknowledge that they had neither and Environmental Protection Act permit nor state permit for treatment, storage or disposal of hazardous waste, plaintiffs, environmental groups, were entitled to relief, under the RCRA. " ²¹²

The Court further dismisses the use of "Site-Wide" RCRA Part A & B Permit as adequate because, "every identifiable point that emits pollution is point source which must be authorized" and monitored for compliance "in accordance with limitations and conditions of the permit. "Whether several locations at nuclear defense plant were point sources for pollution was question within competence of courts, and accordingly, deferral to the Environmental Protection Agency would not be appropriate." ²¹³

DOE's EIS states, "At INTEC, all [high-level-waste] HLW is also considered a mixed waste because in addition to radionuclides the HLW also contains hazardous materials. **Some of the hazardous materials, such as heavy metals, were present in the spent nuclear fuel.** Other hazardous materials were introduced during processing and decontamination activities. Examples include mercuric nitrate used as a catalyst to dissolve the fuel and various solvents. The mixed nature of this waste implicates additional management considerations and regulatory requirements." ²¹⁴ [emphasis added]

Spent Nuclear Fuel (SNF) is stored at RTC/TRA in the Advanced Test Reactor canal, Advanced Reactivity Measurement Facility, Coupled Fast Reactivity Measurement Facility, Materials Test Reactor canal. ²¹⁵

The Federal Facility Compliance Act of 1992

"**Section 2.** Inventory of Wastes. - The report required by paragraph (1)(A) shall include the following:

- A. description of each type of mixed waste at each Department of Energy facility in each State, including, at a minimum, the name of the waste stream.
- B. The amount of each type of mixed waste currently stored at each Department of Energy facility in each State, set forth separately by mixed waste that is subject to the land disposal prohibition requirements of section 3004 and mixed waste that is not subject to such prohibition requirements.
- C. An estimate of the amount of each type of mixed waste the Department expects to generate in the next 5 years at each Department of Energy facility in each State.

²¹² Legal Environmental Assistance Foundation, et.al. v. Hodel, US Department of Energy, No. CIV. 3-83-562, U.S. District Court, E.D. Tennessee, Northern Division, 4/13/84. Citing RCRA of 1976, Sections 3005, 3006, 6001, as amended, 42 USCA Sections 6925, 6926, 6961.

²¹³ 586 F. Supp. 1163 Legal Environmental Assistance Foundation, Inc. v. Hodel. Citing RCRA of 1976, Sections 3005, 3006, as amended, 42 USCA Sections 6925, 6926.

²¹⁴ 1999 DOE/EIS-0287D, page 1-9.

²¹⁵ 1995 DOE/EIS-0203F, page 3-6.

- D. A description of any waste minimization actions the Department has implemented at each Department of Energy facility in each State for each mixed waste stream.
- E. The EPA hazardous waste code for each type of mixed waste containing waste that has been characterized at each Department of Energy facility in each State.
- F. An inventory of each type of waste that has not been characterized by sampling and analysis at each Department of Energy facility in each State.
- G. The basis for the Department's determination of the applicable hazardous waste code for each type of mixed waste at each Department of Energy facility and a description of whether the determination is based on sampling and analysis conducted on the waste or on the basis of process knowledge.
- H. A description of the source of each type of mixed waste at each Department of Energy facility in each State.
- I. The land disposal prohibition treatment technology or technologies specified for the hazardous waste component of each type of mixed waste at each Department of Energy facility in each state.
- J. A statement of whether and how the radionuclide content of the waste alters or affects use of the technologies described in subparagraph (I)."²¹⁶

No current information is publicly available to authenticate compliance with the above Federal Facility Compliance Act requirements. EDI has filed FOIA requests for the information but extensively censored reports of our requests makes it impossible to fully characterize/ document current hazardous waste management at the ATR/RTC/TRA.

Nuclear Waste Policy Act (42 USC Section 10101 et seq.)

NWPA requires the DOE to dispose of this ATR high-level radioactive waste in a deep geologic repository, however, DOE arbitrarily reclassified this formerly high-level radioactive waste as "waste incidental to reprocessing." ATR irradiated Neptunium-237 target reprocessing at INTEC is basically the same as reprocessing Spent Nuclear Fuel; also see NRDC suit.²¹⁷

Because DOE deliberately failed to show the department's final high-level waste disposition plan the court ruled "However, none of these [DOE] actions are final as required by the Ninth Circuit in this case. If they become final, the NRDC retains the right to challenge them in a new lawsuit. However this lawsuit is governed by the ninth Circuit's decision that directed this [District] Court to 'dismiss this action.'"²¹⁸ DOE, through this legal technicality managed to obfuscate the legal requirements under the National Waste Policy Act.

²¹⁶ http://www.epa.gov/swerffrr/documents/federal_facility_compliance_act.htm#sec104

²¹⁷ Natural Resources Defense Council et al. v. Samuel Bodman Secretary Department of Energy, U.S. District Court for the District of Idaho, Case No. 01-CV-413 (BLW). On 3 March 2006 the Court ruled "The Natural Resources Defense Council (NRDC) has filed a brief describing various actions of the Department of Energy (DOE). However, none of those actions are final as required by the Ninth Circuit in this case. If they become final, the NRDC retains the right to challenge them in a new lawsuit. However this lawsuit is governed by the Ninth Circuit's decision that directed this Court to 'dismiss this action.'" In other words, by delaying its decision on how to dispose of its high-level waste, DOE is able to avoid a ruling.

²¹⁸ Case 1:01-cv-00413-BLW, 3/6/06, Judgment.

Clean Water Act (33 USC Section 1251 et seq.) ²¹⁹

DOE has thus far been able to avoid complying with the requirements of the Clean Water Act because EPA has incorrectly accepted the DOE argument that the wastewater DOE dumps into the Snake River Plain Aquifer is unrelated to dumping in the waters of the United States. ²²⁰

ATR waste water discharge to unlined percolation ponds allow ATR contaminants to migrate to EPA's designated Idaho sole source Snake River Plain Aquifer that then discharges to the Snake River. DOE has no Clean Water National Pollution Discharge Elimination System (NPDES) permit for the INL. ²²¹

ATR groundwater sample data documenting extensive contamination exceeds regulatory limits. ²²² Wastewater Land Application Permit (WLAP) violations at the TRA/ATR percolation ponds are as follows; Perched groundwater under TRA percolation ponds for example contain 12,200,000 pCi/L Cobalt-60 [EPA Maximum Concentration Level (MCL) is 100 pCi/L]; Cesium-137 at 21,000,000 pCi/L [MCL is 119 pCi/L]; Strontium-90 at 18,000 pCi/L [MCL is 8 pCi/L]. ²²³

Perched water samples at INTEC (that processes ATR wastewater) contain 1,100 Ci/L of Gross Alpha [MCL is 15 pCi/L]; Gross Beta at 590,000 pCi/L [MCL is 4 mrem/yr]; Strontium-90 at 136,000 pCi/L [MCL is 8 pCi/L]. ²²⁴

Federal Court ruled "Under the Clean Water Act, every identifiable point that emits pollution is point source which must be authorized by national pollutant discharge elimination system permit.... That Department of Energy had national pollutant discharge elimination system permit for nuclear defense plant did not allow pollutant to discharge at various points, but, rather, allowed pollutant discharges only in accordance with limitations and conditions of the permit." ²²⁵

Clean Air Act (42 USC Section 7401 et seq.) ²²⁶

ATR waste processing at INTEC Liquid Waste Management System (ILWMS) is in violation for not fully permitting the high-level waste evaporators that generate significant air emissions, also see Plaintiffs INTEC LWMS permit comments. ²²⁷ In 2003 INTEC atmospheric emissions were 6,020

²¹⁹ Also IDAPA 85.01.02 Water Quality Standards and Waste Water Treatment Standards.

²²⁰ "Clean Water Act extends federal jurisdiction over groundwater that is hydrologically connected to surface waters that are themselves waters of United States." Federal Water Pollution Control Act, Section 502(7), as amended, 33 USCA. Section 1362(7). Also see 142 F.Supp.2d 1169, Idaho Rural Council v. Bosma, No. CV-99-0581-S-BLW.

²²¹ In 2002 a permit was granted for INEEL INTEC Wastewater Land Application Permit No. LA-000130-03 Percolation Ponds [new 2002] Idaho Nuclear Technology and Engineering Center. [PER-104]

²²² See Snake River Plain Aquifer at Risk, EDI, 4/05 for contaminate migration flow rate data.

²²³ Record of Decision, Test Reactor Perched Water System, Operable Unit 2-12, INEEL, 12/92, page 14 & 15.

²²⁴ 2002 DOE/EIS-0287 page 4-52; & Environmental Compliance Inventory of the Idaho National Engineering Laboratory, INEL-96/0389, 12/96, pg. 2.4-19. Also see "Annual Groundwater Monitoring Status Report for Waste Area Group -2 (TRA) FY 2005, ICP/ext/-05-00967, that shows continued expedience of MCL levels under the ATR. The fact that contaminate levels are lower than previous monitoring findings is attributed to the ongoing migration of these contaminates into the underlying aquifer and thus diluted.

²²⁵ Legal Environmental Assistance Foundation, et.al. v. Hodel, US Department of Energy, No. CIV. 3-83-562, U.S. District Court, E.D. Tennessee, Northern Division, 4/13/84. Citing Federal Water Pollution Control Act Amendments of 1972 Sections 505, 509(b)(1), as amended, 33 USCA Sections 1365. 1369(b)(1).

²²⁶ Also see Idaho Administrative Procedures Act (IDAPA) 58.01.01.301.03 Title V Permitting

²²⁷ Environmental Defense Institute, Keep Yellowstone Nuclear Free, David McCoy, comments on INTEC Liquid Waste Management System permit application to IDEQ, EPA Office of Inspector General, and EPA Region 10,

curies and RTC/ATR were 1,180 curies.²²⁸ In 2000, the RTC/ATR released 1,802.69 curies. Included are 0.39 curies of iodines; 2.3 curies of mixed fission products.²²⁹ Radionuclides are so biologically hazardous that EPA regulatory limits are listed in pico-curies or one trillionth of one curie. These high emissions from RTC/ATR suggest liquid waste is first sent to the ATR cooling towers w/o treatment and the precipitates are then pumped to INTEC evaporators or the percolation ponds.

DOE acknowledges leaks in the ATR heat exchangers.

"The M-85 [primary coolant system] PCS heat exchanger developed a leak in the shell side. The leak was repaired, but further investigation utilizing non-destructive examination indicated pitting corrosion occurring in all the PSC heat exchangers...**The ATR PCS/Secondary Coolant System (SCS) heat exchangers are operating beyond 200% of their 20-year design life.**"²³⁰ DOE must not be allowed to claim regular replacement of ATR internal reactor core components as solving the problem of supporting coolant system aging and deterioration. The Primary Coolant Heat Exchangers are a documented example of "beyond design life." The Primary Coolant System piping, pumps and related components are subjected to the same radiation/toxic corrosion degradation as the heat exchangers because they are all directly tied together. Therefore, we can legitimately argue "beyond design life" for the entire primary coolant system that DOE has no intention of replacing because it would require a complete rebuild of the ATR.

"The ATR Ebasco Specification M-130 'ATR specification for Reactor Vessel' includes a section on Design life, which states the following: 'Normal 20 years for all metal parts exclusive of irradiation effects.'"²³¹

Also, the ATR cooling tower must be continuously monitored in addition to the ATR main stack for radioactive emissions.

DOE claims ATR continuous air monitoring is not required. "40 CFR-61 Subpart H requires emission points that release radionuclides into the air and have a potential effective dose equivalent (EDE) less than 0.1 mrem/yr to complete periodic confirmatory measurements (PCM) to verify low emissions. The ATR EDE is sufficiently low that a 40 CFR, Subpart H, continuous monitor is not required. Currently only PCMs are required...**Estimation** of ATR stack radionuclide emissions for compliance with 40 CFR 61 Subpart H is based on a variety of measurement/estimation methodologies."²³²

Yet, DOE acknowledges that, "The High Level Radiation Monitoring system is not working as intended. The local indicators are disabled, and the chart recorders are out of service and not repairable. This issue has been turned over to Plant Engineering. A review, including an Un-reviewed Safety Question is being done to determine if the system is needed...The existing hardware has had frequent failures and repair is uncertain with each failure, as there is no current supplier of spare parts."²³³

The National Emission Standard for Hazardous Air Pollutants (NESHAP) for Radionuclides (40 CFR 61.92) limit is 10 millirem/year whole body effective dose equivalent (EDE) or 0.010 rem EDE

11/25/05.

²²⁸ DOE/EIS-0373D page 3-26

²²⁹ DOE/EIS-0287 pg.4-30

²³⁰ Facility Certification Report No. 29, for ATR, 4/7/05, Page 26. FOIA Doc. # 50.

²³¹ Depperschmidt Memo, Attachment 2, Design document review for overall ATR design life. KYNF brief in KYNF v. DOE.

²³² Facility Certification Report No. 29, for ATR, 4/7/05, Page 17. FOIA Doc. # 50.

²³³ Facility Certification Report No. 29, for ATR, 4/7/05, Page 20 & 21. FOIA Doc. # 50.

and requires reporting on any emissions that are greater than 0.1% of the 10 mrem limit.²³⁴ NESHAP limits for radioactive iodine are 3 millirem per year.²³⁵ The high annual radioactive emissions from the ATR/TRA also clearly fall within the reporting requirement to disclose the EDE attributed to the ATR and NESHAP compliance.

Toxic contaminants released from INL in excess of criteria for air pollution emissions include benzene, beryllium, chlorine, and naphthalene. Despite this, "INL Site has not been required to apply for any IDAPA Toxic Permit to Construct Air Permits."²³⁶ A INL Title V Air Permit is on file but it is grossly deficient in identifying all the hazardous air pollutants from specific INL operations as required under Section 112 of the Clean Air Act and 40 CFR Part 63.

Safe Drinking Water Act (42 USC Section 300 F et seq.)

EPA designated Snake River Plain Aquifer as a sole source aquifer. Groundwater contamination from ATR waste discharges via unlined percolation ponds is huge (i.e. cesium-137 is 176,000 times over EPA limits). [12/92 ROD TRA Perched Water System Operable Unit 2-12, page 14 & 15] Snake River Plain Aquifer provides extensive water supply to domestic and commercial users via wells. Some 41 Idaho communities rely on the aquifer as their water source.²³⁷

Floodplain and Wetlands Requirements (10 CFR 1021 et seq.)

ATR/INTEC unlined old and new percolation pond discharges within the Big Lost River floodplain. Continued ATR/INTEC waste discharges to the new unlined percolation ponds that are above the existing perched water contaminate plumes will only facilitate the continued flushing/migration of contaminants deeper into the aquifer and eventually to the Snake River where the aquifer discharges.²³⁸ [Also see Section 5-I below]

Freedom of Information Act (5 USC Section 552 et seq.)

DOE has unreasonably redacted (censored) numerous crucial ATR safety analysis information requested by Plaintiffs under FOIA.²³⁹ An example of the censored document is the ATR Upgraded Final Safety Analysis Report, Chapter 15 that contains crucial Design Basis Review information on ATR safety system vulnerabilities.²⁴⁰

EDI filed a petition to DOE's Office of Hearings and Appeals challenging censorship, and their

²³⁴ 40 CFR Sec. 61.92 Standard: states " Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.

²³⁵ 40 CFR 61.102 Subpart I_National Emission Standards for Radionuclide Emissions From Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H: states: (a) Emissions of radionuclides, including iodine, to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr. (b) Emissions of iodine to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 3 mrem/yr.

²³⁶ 2005 DOE/EIS-0203-F-SA-02, page 49. Also see Idaho Administrative Procedures Act (IDAPA) 58.01.01.3301.03 Title V Permitting

²³⁷ "Snake River Aquifer at Risk", EDI Report, 4/05, page 2

²³⁸ "Snake River Aquifer at Risk", EDI Report, 4/05

²³⁹ Plaintiffs Appeal to DOE Office of Hearings and Appeals Case Number TFA-0128, 10/26/05.

²⁴⁰ Mark Sullivan Keep Yellowstone Nuclear Free Petition to DOE Office of Hearings and Appeals, 3/13/06.

final ruling states, "Release of the information at issue in the present case could allow malefactors to identify vulnerabilities of the ATR and to understand how to thwart the protective measure currently in place. Accordingly, disclosure of the information at issue risks allowing malefactors to circumvent DOE's efforts to comply with its mandate to provide secure and safe stewardship of nuclear and other dangerous materials."²⁴¹ **The real threat is not from "malefactors" as claimed, but from DOE's own continued operation of a decrepit 40 year-old reactor that is an accident waiting to happen.**

Nuclear Regulatory Commission (NRC) (10 CFR 830.204 et seq.) "Nuclear Safety Management" and NRC Guide 1.70, Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (NRC 1978).

DOE (10 CFR 280) specifies following the NRC Regulatory Guide 1.70 as the standard for DOE reactors yet they are being ignored by DOE in relation to the ATR. Also Nuclear Regulatory Commission restrictions prohibiting citing nuclear facilities on 100 year flood plains must be observed. [NRC 10 CFR 61.50] Also see Section 3-B #4 below.

"Following guidelines in 10 CFR-100, Regulatory Guide 1.145 (RG 1.145) (NRC 1982) and RG 1.4 (NRC 1974) the consequences were determined for both the exclusion boundary and the outer edge of the LPZ. **Since ATR is unique, not all guidelines were followed but where the guidelines were modified the reason for modification is discussed.**"²⁴² [emphasis added]

Price Anderson Act

According to Price/Anderson regulations, DOE must ensure that all major nuclear facilities have a Documented Safety Analysis, the foundation of the Authorization Basis for design, construction and operation of these facilities. This system is supposed to provide "defense in depth" and to envelope uncertainties associated with large nuclear facilities with the potential for catastrophic events, to allow for an adequate margin of safety. A key element in this system, is the documentation of the "unmitigated" risks/ consequences of a major accident/ event. As shown above, DOE's Safety Analysis is flawed.

A Preliminary Notice of Violation (PNOV) and associated Civil Penalty (CP) of \$41,250 were issued to INL contractor BBWI on January 20, 2004 by the DOE Office of [Price Anderson Amendment Act] PAAA Enforcement for a report of programmatic failures which occurred during FY 2003. The PNOV and CP were accepted by BBWI by letter dated Feb. 5, 2004."²⁴³

"During FY 2003, 540 issues were identified as PAAA non-compliances." Of these, "seventeen PAA non-compliances were entered into the Non-compliance Tracking Table (NTS) in FY 2003."²⁴⁴

²⁴¹ DOE Office of Hearings and Appeals, 3/16/06, Decision and Order.

²⁴² SAR-153, 8/3/10; page 15.12-11.

²⁴³ BBWI Integrated Safety Management System, Annual Report, FY 2004, September 2004, INEEL/EXT-04-02262, FOIA doc # 45, page 37.

²⁴⁴ INEEL Integrated Safety Management System Annual Report FY 2003, November 2003, page 65, INEEL/EXT-03-01146.

Section 3-B. DOE Regulations for Operation of Nuclear Reactors

1. 10 CFR Sec. 820.2 Definitions state, “DOE Nuclear Safety Requirements means the set of enforceable rules, regulations, or orders relating to nuclear safety adopted by DOE (or by another Agency if DOE specifically identifies the rule, regulation, or order) to govern the conduct of persons in connection with any DOE nuclear activity and includes any programs, plans, or other provisions intended to implement these rules, regulations, orders, a Nuclear Statute or the Act, including technical specifications and operational safety requirements for DOE nuclear facilities. For purposes of the assessment of civil penalties, the definition of DOE Nuclear Safety Requirements is limited to those identified in 10 CFR 820.20(b)...”²⁴⁵

The DOE has failed to enforce the above standards or the NRC regulations (see below) which the DOE has adopted for its programs and which include ATR. To the extent that the ATR is not in compliance with above 10 CFR 820.2 and with the Safety Analysis Report, DOE is failing to enforce nuclear safety regulations. The U.S. General Accounting Office 1999 report offers extensive corroboration of DOE lack of enforcement of its nuclear operations.²⁴⁶ Recognizing growing Congressional and public concerns on lax DOE enforcement of its nuclear operations, DOE’s Office of Environmental Management issued a report compiled by its Advisory Committee on External Regulations of DOE Nuclear Safety that recommends a detailed plan for a broad range of external regulation.²⁴⁷

2. Current 10 CFR 830 Subpart B Safety Basis Requirements (CFR 2002a). 10 CFR 280 specifies following the NRC Regulatory Guide 1.70 as the DOE standard (see #4 below). This report provides the status of the Department of Energy (DOE) Implementation Plan dealing with Operational Readiness Reviews (ORRs) in response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 92-6. http://www.deprep.org/1995_2/tb95n01c.htm

3. Startup and Restart of Nuclear Facilities. February 2005 Major document about Operational Readiness Review procedures.²⁴⁸

4. Title 10, Part 70 (70.52) of the Code of Federal Regulations (CFR) requires “all persons in the United States” (with exceptions) to report all inadvertent criticalities to the NRC within 1 hour. Even though DOE facilities are exempt from following 10 CFR 70, DOE Order 5480.4, “Environmental Protection, Safety, and Health Protection Standards,” references 10 CFR 70 for good practice and general information purposes. The intent of 70.52 requires facilities to report all criticalities that occur outside the calculated ECP [Management Control Procedure] limits. Operators of DOE reactor facilities should review their criteria for reporting missed ECPs to determine whether the occurrences are indeed “off-normal” events, and therefore, reportable to the DOE.²⁴⁹

5. Nuclear Regulatory Commission Regulatory Guide 1.70, Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (NRC 1978) that DOE applies to its nuclear reactors.

²⁴⁵ Title 10 Energy, Chapter III, Department of Energy, Part 820, Procedural Rules for DOE Nuclear Activities, Subpart A General, Section 820.2 Definitions.

²⁴⁶ Department of Energy, DOE’s Nuclear Safety Enforcement Program Should be Strengthened, U.S. General Accounting Office Report to Chairman, Committee on Commerce, House of Representatives, June 1999, GAO/RCED-99-146.

²⁴⁷ Improving Regulation of Safety at DOE Nuclear Facilities, 12/95, Advisory Committee on External Regulations of DOE Nuclear Safety, U.S. DOE Office of Environmental Management. <http://web.em.doe.gov/acd/finrept.html>

²⁴⁸ http://www.llnl.gov/es_and_h/hsm/doc_51.04/doc51_04.pdf

²⁴⁹ <http://www.eh.doe.gov/publications/safetynotices/sn9206.html#sec6>

6. DOE Order 5480.21 (DOE 1991b) together with 10 CFR 830 (2002a) have clear requirements for reporting and performance criteria for nuclear reactors.
7. DOE Order 414.1(a); “Quality Assurance.”
8. DOE/RW-033P; “Radioactive Waste Management.”
9. DOE Order 420.1A; “Facility Safety.” Section 4.4, and DOE Guide 420.1-2.²⁵⁰
10. DOE Order 433.1 “Maintenance Management Program for DOE Nuclear Facilities” (Attachment 1, page 6 item m), [see FOIA doc # 48]
11. U. S. DOE “Natural Phenomena Hazards Design and Evaluation Criteria for DOE Facilities; DOE-STD-1020-2002, January 2002. This sets forth Department’s current seismic design/evaluation criteria for its facilities.²⁵¹
12. U.S. DOE, “DOE-ID Architectural Engineering Standards, Revision 29, September 2002.”²⁵²

Finally, DOE’s Office of Nuclear Energy (DOE-NE) has provided guidance to all of DOE-NE reactor facilities to ensure that two independent ECPs are calculated prior to startup. All DOE reactor facilities should ensure that (1) proper procedures exist for calculating and transmitting the ECPs (and the tolerance limits) to the operators, (2) uncertainties are estimated and accounted for, and (3) the recent guidance from DOE-NE has been implemented.

Section 4:

Lack of Compliance with DOE Operating Regulations at ATR

DOE Independent Oversight Inspection of Environmental, Safety, and Health Program at Idaho National Laboratory Advanced Test Reactor June 2005, DOE Office of Security and Safety Performance Assurance Site Specific Findings cite numerous deficiencies at the ATR.

“1. Analysis of potential radiological hazards associated with non-uniform radiation fields and glove-box failures has not been sufficiently rigorous to ensure that these hazards are adequately controlled. [Page 17]

2. ATR does not have a process for identifying controls for non-radiological hazards for RTCs (Reactor Technology Complex formerly called Test Reactor Area) entering spaces to perform surveys. [Page 18]

3. ATR has not established appropriate controls to ensure that all workers are promptly notified of fire alarms in areas where the alarms cannot be heard. [Details on Page 21]

4. INL has not ensured that clear and unambiguous requirements for confined spaces are consistently applied at ATR to minimize the risk to workers, consistent with the intent of OSHA regulations. [Page 23]

5. [Battelle Energy Alliance] BEA has not implemented a fully effective program of ATR assessment activities with sufficient scope and rigor tailored to ongoing activities, conditions, and past

²⁵⁰ See FOIA doc # 48

²⁵¹ See October 2003 ABS Consulting, FOIA document 51 pg.6-1, and ABS Consulting FOIA doc # 52, and Engineering Design File EDF-5614, and [INTEROFFICE MEMORANDUM 4/7/05 FOIA DOC # 49]

²⁵² October 2003 ABS Consulting, FOIA document # 51 pg. 6-1

performance to ensure that ES&H performance is consistently and accurately evaluated. [Page 31]

6. BEA has not consistently implemented its corrective actions program at ATR in a manner that ensures that the ES&H deficiencies are appropriately documented, categorized, and evaluated in a rigorous and timely manner, with causes, extent of condition, and appropriate recurrences controls identified. [Page 34]

7. INL established and ID approved a [Un-reviewed Safety Question] USQ procedure that is not fully consistent with the intent of 10 CFR 830 requirements for addressing. [Page 37]

8. The [Design Basis Recommendations] DBR plan is: (1) not complete in its scope or adequately defined; (2) not supported by sufficient and appropriated resources, and (3) not appropriately focused to provide a higher-level evaluation for safety systems' ability to perform their safety functions prior to an in-depth DBR. [Page 46]

9. BEA has not ensured that gaps identified by DBR process are entered into the USQ process in a timely manner in accordance with 10 CFR 830 requirements.” [Pg. 48] ²⁵³

The DOE Office of Independent Oversight and Performance Assurance (OA) performed an inspection of the ES&H and Emergency Management programs at INEEL during August and September of 2003. The ES&H portion of the inspection evaluated four related aspects of the [Integrated Safety Management] ISM program: Implementation of selected ISM guiding principles, including efforts to address the new 10 CFR 830, Subpart B, requirements for design safety reviews for nuclear facilities and implementation of suspect/counterfeit items requirements.

The inspection identified the following program weaknesses applicable to BBWI: Weaknesses in ATR design analysis raise concerns whether the systems designed to mitigate loss-of-coolant accidents adequately protect against all potential accident scenarios. [pg. 71] Some potential accidents and accident phenomena have not been adequately analyzed and documented to provide assurance that Advanced Test Reactor (ATR) safety systems are capable of mitigating loss-of-coolant accidents in accordance with the ATR updated final safety analysis report (UFSAR). [Pg.105- OA-2003-ESH-05]

The U.S. Department of Energy (DOE) has not supported and BBWI has not implemented an effective configuration control program to ensure that the ATR design meets all technical and procedural requirements as required by PRD-115, “Configuration Management.” [Pg. 105–OA-2003-ESH-06]

BBWI has not established a technically adequate surveillance program for testing the operability of the ATR firewater pumps as required by technical safety requirement (TSR) limiting conditions for operations (LCO) 3.2.1.2, surveillance requirement 4.2.1.2.8, and UFSAR Chapter 14. [Pg. 105–OA-2003-ESH-07]

Establish and implement a plan to confirm the adequacy of the ATR safety design. [pg. 106–OA-2003-OFI-ESH-13]

1996, February 22; Safety Analysis of the ATR found breaks in the coolant piping and fuel damage to be “anticipated” events but that allowable exposure limits for workers would not likely be exceeded and that off-site exposures would also not likely be exceeded. 254

A 1994 Defense Nuclear Facility Safety Board (DNFSB) report adds to the history of negligence at the ATR. Pg. 4– “The EG&G Radiological Control Manager cited as an example of the success of his

²⁵³ http://www.id.doe.gov/eser/Reference%20Documents/SharedReferenceLibrary/Safety/FY2003_ISMS_Annual_rpt.pdf

²⁵⁴ http://www.oversight.state.id.us/ov_library/All_PDFs/OP_Air_Emissions_Report.pdf

As this report shows, DOE only has to show process and not monitor for radioactive **emissions from ATR/TRA**.
<http://www.deprep.org/1994-2/tr94129b.pdf>

[as low as reasonably achievable] ALARA program an instance where the Site (EG&G) ALARA Committee had discovered inadequate engineering to reduce exposure for work to be done at the Advanced Test Reactor (ATR) during a maintenance outage. The ALARA Committees actions reportedly resulted in reduction of the dose estimate from 74.3 to 14 person-rem. While it is commendable that this significant dose savings was identified by EG&G personnel, the Radiological Control Manager had not recognized nor taken corrective actions relative to why the reduction in dose had not been engineered at an earlier point in the process. In fact, when questioned on this point, the Radiological Control Manager initially stated that as long as such problems were corrected at any point by the ALARA process there were no deficiencies to be corrected. ATR additional discussions the Radiological Control Manager concluded that additional investigation was warranted.”²⁵⁵

Section 5

5-A. Seismic Concerns

5-A-1 ATR Seismic Vulnerabilities

Mark Sullivan submitted, as counsel for Keep Yellowstone Nuclear Free, formal comments to DOE on the Proposed Consolidation of Nuclear Operations Related to the Production of Radioisotope Power Systems (August 29, 2005, and December 21, 2005) that identifies major Advanced Test Reactor (ATR) vulnerabilities. These comments are based on Freedom of Information Act reports received by EDI and KYNF that document the extent and severity of the ATR seismic and loss-of-coolant hazards, and that are in **addition** to the information presented in this report.

Sullivan’s 12/21/05 EIS comments conclude; “ KYNF, EDI, and the rest of the public are operating in the dark, with access only to the bits and pieces of information that the DOE has so far released. Nonetheless, what little information we have obtained is alarming. The DOE-generated reports described above reveal a facility that is highly vulnerable to seismic activity, and in a badly deteriorating condition, with chronic problems with control rods, the primary and secondary coolant system, electrical switchgear, backup generators, and accident monitors, among other things. It is clear the ATR today requires, at a minimum, the replacement of its primary and secondary cooling systems, replacement of its emergency firewater injection system, replacement of its switchgear, the reconstruction of numerous support walls within both the ATR and outlying TRA buildings, replacement of accident monitoring systems, new fire sprinklers, a new smoke detection system, and new Molytek recorders. Furthermore, there is no telling what deficiencies and vulnerabilities will be uncovered if the thus-far redacted or withheld documents are released. Nor can it be known what deficiencies will be found if funding is provided and the RTC NPH Assessment Plan is finally carried out. It is, however, quite clear that as more systems deteriorate by virtue of the “pitting” and “corrosion” that plagues the ATR’s most critical systems today, the cost of replacing them – if possible at all – will skyrocket.

“The DEIS failed to accurately depict the deteriorating physical condition of the ATR, or to describe improvements that DOE’s own consultants have concluded must be made to the ATR for it to continue to operate for the life of the Proposed Action – which, as proposed, would require the ATR to

²⁵⁵ Defense Nuclear Safety Board reports dated September, 16 1994; May 23, 1995; June 23, 1995; October 16, 1995, chronicle major ATR safety system deficiencies. See Attachment A of this report for the text of these DNFSB reports. This documents historically how long these ATR system hazards have been known and yet in 2006 all of these same ATR safety system deficiencies have not been updated.

operate until it is approaching 100 years old, well beyond its originally projected life expectancy. The DEIS similarly fails to accurately depict seismic vulnerability of the facility, in particular its critical safety systems. The costs and environmental impacts of necessary equipment repairs and replacements, and seismic upgrades necessary to ensure the safety of the ATR, must be described in the DEIS, and compared to the costs, impacts and benefits of other reasonable alternatives to the Proposed Action, including building a new reactor, either at INL or – more appropriately – at another facility.”²⁵⁶

5.A-2 Supplemental ATR Seismic Review

The ARES Consulting Services for the Advanced Test Reactor Seismic Probabilistic Risk Assessment Final report states; “A shielding wall constructed of concrete block is located in the bypass demineralizer area. Primary Coolant System (PCS) piping is located behind this wall. Reach rods for the bypass demineralizer valves pass through the wall. **Failure of this wall could result in a loss of primary coolant.** The concrete block shielding wall is constructed of solid concrete block units. It is nominally 8-inches thick, 8-feet high, and approximately 73 feet long...**Horizontal cracking will occur near mid-height at relatively low seismic input level,** after which it will behave as two rigid bodies pivoting about the top and bottom supports and the mid-height crack...The maximum permissible displacement for the wall was assumed to be 2 inches, **at which failure of the PCS piping and damage to the valve reach rods might occur...The shielding block wall probably cannot be shown to satisfy [Performance Category] PC-4 seismic criteria if the assumed failure displacement noted above is appropriate.**”²⁵⁷ [emphasis added]

The DOE April 2005 ATR Facility Certification Report states; “Although the non-nuclear qualification testing of the control rods was completed successful, **subsequent to this testing the southeast safety rod failed to withdraw.** The drive package was removed and the safety rod was manually withdrawn using a torque wrench until an apparent solid stop was hit. Several attempts were made and the rod could not be manually withdrawn. The position of the stop did change indicating that it was likely debris between the safety rod (SR) and inner or outer snubber tubes or between the SR and the inpile tube...**It is speculated that the debris was either smashed up or fell into the lower portion of the snubber tube...The High Level Radiation Monitoring System is not working as intended. The local indications are disabled, and the chart recorders are out of service and not repairable...There is a plant upgrade that has been stopped.**

“The C/2 N-16 tube has historically failed two to four years following the [Core Integral Change-out] CIC. This apparent design flaw with the C/2 N-16 tube has not been investigated and corrected so it can be expected to fail two to four years from now.”²⁵⁸ [emphasis added]

“ABS Consulting letter to S. K. Penny at Bechtel, Subject Report on Supplemental Seismic Review of Selected Structures, Systems, and Components” states “a number of potential seismic issues were identified dealing with the primary system pressure boundary integrity, the fire protection system ability to function as a [emergency core coolant system] ECCS system in the event of a [loss-of-coolant-accident] SBLOCA and other miscellaneous equipment associated with the emergency AC and DC

²⁵⁶ KYNF EIS comments are available on EDI website or www.yellowstonenuclearfree.com

²⁵⁷ Applied Research and Engineering Services (ARES) November 29, 2004 letter to Keith Penny Bechtel BWXT Idaho, Consulting Services for the Advanced Test Reactor Seismic PRA Final, page 6. FOIA doc. #53.

²⁵⁸ Facility Certification Report No. 29 for the Advanced Test Reactor to be implemented during Cycle 134B-2 and continuing with subsequent cycles under Technical Safety Requirements (TSR) 186, Revision 14, April 7, 2005, page 3, 20 and 26. FOIA Doc. # 50.

electrical power systems.” [page 1] This is a crucial statement because it acknowledges that the “fire protections system” = “emergency core coolant system.”²⁵⁹

This document also acknowledges that, “[T]he deep well pump house that supplies water for the ECCS built of concrete blocks will collapse in an design basis earthquake rendering water system inoperable.” [page 5]

Over all, this report shows that ATR cannot meet PC-4 requirements. One of the big issues is that much of the ATR and support buildings have unsupported masonry concrete block walls that cannot survive a major earthquake and their failure will compromise the whole ATR operation.

DOE refuses to release the 2005 ATR Seismic Qualification Report that reportedly shows the ATR's ability to sustain a Design Basis Earthquake Performance Category (PC-4) earthquake and the current soil spectra amplification of two times the rock acceleration. "The current schedule for completing the[ATR] Design Basis Reconstitution (DBR) [Upgrades] is 2011 is not timely considering the number and importance of the design basis issues that were identified by OA in 2003." ²⁶⁰

This ABS report also lists the ATR Bypass Demineralizer Line I-42, Support of the Cation and Anion Tanks of the Bypass Demineralizer System, Un-interrupted Power Supply, Degassing Tank, Water Storage Tank 719C, as not meeting the PC-4 requirements. [FOIA doc. # 52] ABS Consulting "Seismic Review of Selected ATR Piping Systems", October 2003 notes a compelling list of non-compliant ATR systems that do not even meet PC-3 criteria. [ES-2]

The Uniform Building Code numbers differ from DOE performance categories (i.e. PC-4, PC-3 etc.) And zones numbers used in US Coast and Geodetic Surveys, don't line up with either, necessarily. One 1968 Seismic Risk Map for the US had zone 0 through zone 3, with San Francisco and the INL in zone 3, but these risk maps keep evolving. And future changes to DOE standards to have them created by civil engineering are expected to replace the performance category naming with a different system.

DOE criteria in DOE standards put ATR at PC-4, but DOE wants instead the lesser PC-3 to be ATR's classification. The result has been that DOE won't say what DOE's Performance category is for the ATR. The contractor then must use phrases like “the structure was evaluated to PC-4” rather than “the PC-4 structure was evaluated to PC-4 criteria.” ATR is rated for 250 MW thermal, and is a DOE category A reactor and a DOE Hazard Category I facility. And note, the fission product inventory of 150 MW operation may be as large as the fission product inventory from 200 MW operation – it depends not only on the power level but also on how low the fuel has been operated. It just isn't a meaningful cutoff to have the DOE standard distinguish between a reactor running at 100 MW vs 200 MW, and that DOE knew ATR typically operated under 200 MW and DOE put the 200 MW criterion in the DOE 1021 standard expecting that this would preclude ATR from being PC-4.

DOE-STD-1021: Performance Category 4: An [structures, systems, and component] SSC shall be placed in preliminary Performance Category 4 (PC-4) if it is a "safety-class" item as defined in STD-3009-94 (CHG-1) and Section 2.3, above, and if its failure during an Natural Phenomena Hazard (NPH) event could result in off-site release consequences greater than or equal to the unmitigated release from a large (>200 MWt) Category A reactor severe accident.

Regarding the 1995 operational readiness (OR) for the firewater system seismic problems, this

²⁵⁹ ABS Consulting letter from Robert Campbell to S. Keith Penny Bechtel BWXT Idaho, Report on Supplemental Seismic Review of Selected Structures, Systems and Components. FOIA Doc. # 52.

²⁶⁰ Independent Oversight Inspection of ES&H Program at INL ATR, 6/05, pg. 45

was for a specific deficiency, a specific problem regarding pipe supports that the contractor had identified during seismic consultant walk-downs in the early 1990's or 1989 and had not fixed, and that the Defense Nuclear Facility Safety Board (DNFSB) team noticed that it had not been fixed – so suddenly after languishing for years, the problem was identified and quickly fixed.

Also not expressed was that the DNFSB also reviewed single failure criterion and the safety category classifications and maintained that both, not just one, of the emergency coolant pumps and its power supplies must be designated with the highest safety equipment classification – that is called “safety related” for ATR, or called “safety class” in other lingo. And this ties into fact that the safety related power for one of the emergency pumps is a poorly performing diesel generator and the battery backup for this pump has never been funded.

DOE refuses to release the 2005 ATR Seismic Qualification Report that reportedly shows the ATR's ability to sustain a Design Basis Earthquake Performance Category (PC-4) earthquake and the current soil spectra amplification of two times the rock acceleration.

It is the small loss of coolant accident (LOCA) vulnerability, the weakness in ATR primary coolant piping inspection programs and staffing levels (it is these pipe breaks that cause a LOCA), chronic problems in emergency power, problems with the emergency firewater injection system, lack of containment, and the 2003 OA discussion of weaknesses in the ATR design analysis for safety systems, inadequate analysis of accident phenomena. These are the problems that pose off site risk from an accident. The lack of DOE oversight and the fact that problems don't get adequately fixed when they do get identified.

Backlogs in maintenance are revealing but don't express the real squeeze on engineering support and money for maintaining the facility. According to Dave Richardson TRA/TRU Operations Manager, "ATR has about 75 man-years of maintenance backlog **without** design basis reconstitution [facility construction upgrading]." As of 3/05 ATR contractor (BEA) was still negotiating with DOE for "...funding for the seismic evaluation at the ATR of \$2M." ²⁶¹ Clearly, once the 2005 ATR Seismic Performance Criteria, that evaluates if ATR can sustain a Performance Category PC-4 design basis earthquake, is included, the upgrading construction costs will increase exponentially to the point that shutdown will be the only reasonable option. However, these issues have been known by DOE policy makers for decades and have yet to prevent their continuing intent to continue ATR operations.

The emergency response 1995 DNFSB audit and the 2003 OA point to weaknesses in emergency response capability.

DOE's 2000 PEIS offers an extensive analysis of a major ATR loss-of-coolant accident. [See Section 5-H below] However when one looks at the 2005 EIS, as opposed to the 2000 PEIS accident analysis, it is difficult to understand the results for ATR accident consequences. For example, Table C-13 shows the “unmitigated evaluation basis earthquake having a 0.27 rem dose to the maximally exposed individual, but only a 0.04 rem dose for the beyond evaluation basis earthquake which by the description of events seems that it should yield the higher dose. DOE is saying that there's a lower consequence for the bigger earthquake. And the fire results are similar.

□ □ An unmitigated evaluation-basis earthquake (0.3-g acceleration), would cause failure of the HVAC, fire safety equipment, non-safety-class ductwork, and internal non-safety-grade structures, but would not destroy the structure shell itself. The estimated frequency of this accident is 5×10^{-4} per year.

□ □ A beyond-evaluation-basis earthquake (0.5-g), with all the same assumed failures as the

²⁶¹ Meeting on Safety of Reactor and Nuclear Facility Operations, March 1-3 2005, National Institute of Standards and Technology, Summary Report, http://www.ornl.gov/nuclear_operations/2005-03-01/.

evaluation basis earthquake but in addition, a 50-percent degradation in high-efficiency particulate air (HEPA) filter removal efficiency. The estimated frequency of this accident is 1×10^{-4} per year.

DOE's PEIS states "**Target Irradiation**—For ATR target irradiation accidents, the annual increased risk of an latent cancer fatality (LCF) to the offsite maximally exposed individual (MEI) and a noninvolved worker associated with plutonium-238 production would be 3.0×10^{-8} and 3.0×10^{-7} , respectively. The annual risk in terms of the increased number of LCFs in the surrounding population would be 2.6×10^{-3} ." ²⁶²

So, it includes the risk of target irradiation – that means it's really on the table. And what is interesting is that the 2000 EIS estimate only includes a large Loss-of-Coolant Accident (LOCA) – it does not include events that progress in a different and more severe manner. The EIS authors simply thought the large LOCA was bounding in consequence and that they used an accident frequency that was conservatively high. They did not include seismic risk or other severe accidents. And since the EIS addresses 0.5g events, then why doesn't the target irradiation risk evaluation do so also?

The 0.5g seismic event would be problematic for DOE to address regarding ATR. DOE is going to back-peddle rapidly because there was no requirement or really even a risk basis to assess a 0.5g event and there are available seismic hazard evaluations less conservative than the seismic g-levels and corresponding annual probability of occurrence than was used in the EIS.

Therefore, we challenge the EIS adequacy and consistency. ATR seismic performance assessment (documentation to show it that equipment withstands an earthquake of the size more recently available) and equipment qualification status is weak. So, questions along this line are going to cause some problems for DOE.

The DOE lacks consistency and reveals a weak analysis of the seismic hazards and the ability of ATR equipment to withstand seismic events.

Engineering Design File 4334 dated 1/30/03, states; "The ATR firewater supply system is a multipurpose system. One of the functions of the system is to supply water for the EFIS for [loss-of-coolant-accident] LOCA.

"The ABS consultants concluded the supports for the cation and anion tanks in the ATR bypass demineralizer system would not resist the loads generated by a design basis earthquake [DBE]. Failure of these supports could result in a more severe seismic LOCA at a higher frequency than addressed in the safety basis (SE-2003-155). A plant modification was completed to adequately support the tanks for a design basis earthquake." The DBE has since been revised upward to include the seismic soil amplification factor of 2.

"The ABS consultants identified the supports for the [Primary Coolant System] PCS degassing tank (670-M-13) needed further evaluation. A previous analysis was reviewed and with the completion of additional analyses, it was concluded the supports would not resist the loads generated by a design basis earthquake. Failure of these supports could result in a more severe seismic LOCA at a higher frequency than addressed in the safety basis (SE-2003-171). A plant modification was completed to adequately support the tank for a design basis earthquake." Again, the DBE has since been revised upward to include the seismic soil amplification factor of 2 times rock acceleration. ²⁶³

"As noted in SE-2003-126, the additional time delay [of the emergency firewater injection system] would worsen the consequences of two accidents discussed in the [upgraded final safety

²⁶² 2000 DOE/PEIS-0310F, Chapter 4 page 4-10 and 4-11.

²⁶³ Engineering Design File 5622, page 15

analysis report] UFSAR. The Condition 3 (a 3-in diameter coolant pipe break) LOCA with failure of the LOCA pump shutoff engineered safety feature (ESF) to trip all of the operating primary coolant pumps (PCP) (SAR-153) Section 15.6.5.2) and the Condition 4 (3-in. diameter) LOCA with failure of one PCP check valve (SAR-153 Section 15.6.5.4) were adversely affected."²⁶⁴

"As reported in the [un-reviewed safety question] USQ SE-2003-126, evaluation, the time delay in water injection could lead to complete draining of the surge tank for this event so the consequences of the event would be worse than presented in the safety basis."

"The testing and modeling substantiated the basic concern of the USQ evaluation the [Emergency Firewater Injection] System could be over-taxed such that delivery rates to the reactor vessel were less than predicted." [page 13]

"For this seismic case, the total EFIS flow rate was only slightly above the acceptance criterion. The operation of the feed water pump may adversely delay firewater pump starts since the bailey valve and feed water pump will attempt to maintain normal system pressure." [pg. 14]

"For the design-basis LOCA with simultaneous fire suppression demand, the feed water pump is operating outside of the vendor pump curve [beyond pump rated capacity]. For the seismic case, both the 619-12 firewater pump and the feed water pump are assumed failed due to loss of AC power, and the overhead tank alone provides the flow rate. However, the inventory of the overhead tank is limited and the previously discussed issues concerning firewater pump start times are not completely resolved when only the overhead tank is modeled."

"Collapse of masonry buildings could lead to fire suppression system piping failures outside the safety related boundary. Since TRA-670 is supported to bedrock, differential movement between the building and the underground piping could lead to piping failures." [pg15]

"The LOCA calculations supporting the ATR safety basis show that the EFIS flow rate is initially high 2,050 gallons per minute (gpm), but then decreases rapidly as the EFIS pressurizes the [primary coolant system] PCS. Within one or two minutes the EFIS flow equilibrates such that the EFIS flow rate equals the break flow rate at a constant system pressure. EFIS and break flows are typically less than 1,200 gpm for the current safety basis EFIS model with a source pressure of 63 pounds per square inch (psi) at the firewater pump outlet. With a source pressure about two times higher in pressure than currently assumed, the total EFIS flow rate would be expected to be less than the 1,800 gpm (total of both upper vessel and bottom head EFIS) after the flows and pressures stabilize. With the total EFIS flow rate at 1,800 gpm the bottom head EFIS flow rate would be significantly less than the 1,600 gpm test flow rate." [In other words, even DOE's modeling show that a loss-of coolant accident (LOCA) will cause the reactor core temperature to rise ("thermal limits") with the result of steam pressure in the core that the EFIS will only be able to supply about half the required coolant water to the reactor core.]

"Similar to previous seismic LOCA analyses, [reactor core] thermal limits were approached twice during this event. The first approach to limits occurred as the [primary coolant pump] PCPs coasted down (due to loss of AC power), and the second occurred after the DC power supply for the M-11 emergency coolant pump was depleted (30 minutes into the accident), causing ECP M-11 to coast down." [page 20]²⁶⁵

²⁶⁴ This refers to SAR-153 Section 15 that DOE has denied under FOIA.

²⁶⁵ Engineering Design File 4334 dated 1/30/03, approved 3/15/04, FOIA Doc No 54 "Summary of Resolution of Advanced Test Reactor Un-reviewed Safety Questions SE-2003-126, SE-2003-145, SE-2003-155, SE-2003-156, and SE-2003-171.

Engineering Design File 5622 FOIA Doc # 56 (dated 1/30/03) Approved 3/14/05
"Interim Seismic Probabilistic Risk Assessment for the Advanced Test Reactor"²⁶⁶

Despite the revealing deficiencies quoted below, DOE (in classic DOE self-serving risk assessment style) chose to ignore many fundamental system flaws (listed below) from the assessment and issue an "acceptable" finding on page 40.

"[T]he reactor makeup [coolant water] inventories would not support a 24 hour mission time, particularly for large or small [loss-of-coolant-accident] LOCA events. Therefore, the fragility of commercial power was evaluated and commercial power is assumed to be non-recoverable for 72 hours if commercial power is lost." [pg. 13]

"As in the original seismic event tree, the 670-M-42 and 670-M-43 enterprise diesel generators are assumed to have a low seismic capacity and are not included in the model. In this current model, the 674-M-6 diesel generator is not assumed to be capable of starting rapidly enough to support emergency pump operation following a seismic event, and long term running capability is severely limited by the TRA-776 fuel oil day-tank [sic]. Therefore, currently the 674-M-6 diesel generator has not been included in the model."

Systems having a high probability of failure are not included in the current seismic [probabilistic risk assessment] PRA model including the pressurizing pumps that are provided makeup from the [low-pressure demineralized water] LDW system, and the LDW purge system, which uses a valve with no preventive maintenance to assure the valve may be opened."

"Other reactor scram parameters would occur following a significant ground motion, and do not provide the protection of [reactor] fuel thermal margins that the seismic reactor trip provides.... Failure of this function is assigned to plant damage state P4 [highest category]." The severity of the reactor fuel damage in an accident is considered in setting the plant damage state "P" category level. This is completely separate from the seismic Performance Category of PC-4. [page 14]

"ANSI/ANS-58.21-2003 discusses typical assumptions for LOSP events, that when commercial power is lost, it is assumed to be failed for 72 hours and not recoverable during this period."

"Failure of the [loss-of-coolant-accident / engineering safety features] LOCA ESF is assumed to result in surge tank draining and inadequate thermal margins [to reactor core]. Failure of the LOCA ESC is assumed to result in [reactor] fuel damage, and is delineated under plant damage state PLFD, the same plant damage state used for failure of emergency flow **within 30 minutes.**" [emphasis added] [page 15]

" Emergency Firewater Injection: The failure of the emergency firewater injection system within 2 hours of the event is modeled. The fragility of the underground and above ground system is represented by the fragility of the overhead tank (see table 3, item 19). This fragility is modified from the original fragility by adjusting for increased soil amplification. Formerly, soil amplification above rock was a factor of 1.5, and is now approximately a factor of 2.0. Should masonry block buildings fail, damaging firewater sprinkler piping risers, and operator action would be required to isolate the ATR firewater loop from the RTC fire water loop." It is extremely significant that DOE is now acknowledging seismic soil amplification of 2.0 at the ATR and also reliance on "operator action" to mitigate is hugely problematic given documented lack of experience and training of ATR operators.

²⁶⁶ Engineering Design File 5622 FOIA Doc # 56 (dated 1/30/03) Approved 3/14/05 "Interim Seismic Probabilistic Risk Assessment for the Advanced Test Reactor"

"Failure of the [emergency firewater injection system] EFIS injection system within 2 hours of reactor shutdown would be an early [reactor] fuel damage event that may not meet Condition 4 ATR Protection Criteria." [emphasis added] [page 16]

"During reactor shutdown with the firewater system isolated by manual valves, firewater system makeup to the vessel cannot occur without opening the isolation valves manually. The shutdown PRA in Thatcher et al. (1994) reviewed shutdown operations experience and found that 52% of shutdown operation with the reactor fueled had EFIS with manual isolation valves closed [when they should have been open]. If no [primary coolant system] PCS pipe break occurred, there would be several hours before the irradiated fuel could be uncovered. Operator response to open the isolation valves and actuate EFIS would have to be more rapid should pipe breaks occur, but would still allow more than 30 minutes for response." [In more than half of the ATR shutdowns operators failed to open the EFIS valves, which is representative of how unreliable operator actions are to manually open remote valves and prevent a meltdown when other emergency systems fail.] [Page 18]

"Depending on firewater usage and isolation of no-essential demands, above-ground firewater inventory may be depleted after 2 hours. Operator action is required to start the backup diesel (if commercial power is lost), start the deep-well pump, isolate non-essential demands, and align a flow path from a deep-well to the reactor core or TRA-681 storage tank...There are 10 manual valves that are required to be manipulated...to avoid equipment failure." [PRA model including the pressurizing pumps that are provided makeup from the [low-pressure demineralized water] LDW system, and the LDW purge system, which uses a valve with no preventive maintenance to assure the valve may be opened." [page 20]

"Current analyses for a seismic event with seismically-induced [primary coolant system] PCS leakage (or letdown flows due to open valves PCV-1-1 and LCV-1-3C indicate that for failures occurring on the ATR firewater loop, there may not be time to isolate firewater lines and EFIS supply to the reactor core may be insufficient to protect the core." [page 22-23]

Un-reviewed Safety Question, 6/10/04, states; "An identified deficiency in the interim seismic [probabilistic risk assessment] PRA model is in regard to the assumption in the model that off-site commercial power could be recovered; a review of other seismic PRAs shows that other PRAs do not assume that recovery of commercial power is possible. Inadequacies in the original seismic PRA model coupled with inadequate development of an interim seismic PRA including assumptions regarding recovery of off-site commercial power prior to exhausting above ground emergency makeup inventories are the subject of this Un-reviewed Safety Question."²⁶⁷

Section 5 – B Lack of Containment

The ATR and other reactors at TRA are housed in industrial steel framed and paneled steel/aluminum skinned (roof and walls) buildings that do not meet the "containment" criteria required by the Nuclear Regulatory Commission (NRC) for nuclear reactors (i.e. sealed concrete dome-type over-structure).

Even the NRC predecessor, the Atomic Energy Commission (AEC) required that every reactor be housed inside a large superstructure called "containment." Its thick concrete walls serve as a leak-tight barrier against the accidental release of radioactive materials from the plant. In the event of a pipe

²⁶⁷ Un-reviewed Safety Question, 6/10/04, Advanced Test Reactor, ATR Seismic Safety Basis Determination # TRA-USQ-2004-214, FOIA doc # 26]

rupture in the reactor's cooling system, steam and hot water from the reactor would be dumped into the containment chamber. Radioactive gases that are released from the reactor also remain safely confined in the sealed containment superstructure.

DOE acknowledges that even during normal ATR operations, "Review of the recent annual building leak-rate indicated that leakage was above the 125% acceptance line."²⁶⁸ **Clearly, the ATR has no "containment/confinement."**

Section 5 - C Accidents

"Final Programmatic EIS, 12/00, Appendix I Evaluation of Human Health Effects from Facility Accidents, includes ATR (Section I.1.1.1) Design Basis Accident states, "The accident analysis postulated that the plutonium-238 at risk [for release to the environment] in targets during ATR accidents is...1,429 grams (3.144 pounds) for the annual production rate of 5 kilograms (11 pounds) per year." That is ~ 108 curies of Pu-238/241. [page I-5]²⁶⁹

Section I.1.1.1.2 Severe Reactor Accident, Table I-4 ATR Large-Break Loss-of-Coolant Accident Source Term (page I-6) states "The large-break loss-of-coolant accident postulated for the ATR is a severe reactor accident. This event would result in a decrease in the primary coolant inventory of ATR. As treated in the ATR 'Upgraded Final Safety Analysis Report' the large-break loss-of-coolant accident compared with other initiating events because 100 percent core damage is estimated to occur. The radiological analysis of the large-break loss-of-coolant accident shows that an ATR core inventory of 1.11 giga-curies at reactor scram conditions releases an available source term of 175 mega-curies [175 million curies] (LMIT 1998). The emergency fire water injection system is assumed to pump water through the break into confinement, until shutoff level is reached, about 33 hours after the break. Within that period, about 65% of the available source term or 113 mega-curies [113 million curies] will have been released as the early release source term. Following the termination of emergency fire water injection system flow at 33 hours, the confinement leak rate is assumed to drop to the design value of 10 percent per day, resulting in a release of the remaining 62 mega-curies as the late-release source term, ending about 85 hours after the loss-of-coolant accident."

Section I.1.1.1.2 Severe Reactor Accident, Table I-4 ATR Large-Break Loss-of-Coolant Accident Source Term (page I-7) Environmental Release (only those isotopes DOE thinks are "harmful" (curies versus Plutonium-238 Production Rate (5 kilograms/yr) total that EDI manually added up is which an astounding 37,643,000 curies.

Explosion phenomenon

"The postulated mechanism for the vapor explosion is that the rapid power rise in the fuel plates causes melting and high temperatures in the fuel core of the plates, which results in jets of high temperature molten material being ejected through the weakened cladding into cold coolant channels. The high temperature material breaks up into small droplets in the coolant, and the resulting large surface area provides for a very rapid generation of steam known as a steam explosion. The normal pressure limiting mechanisms such as ESF's, relief valves or other means of transferring water out of the reactor vessel are unable to respond fast enough to accommodate the rapid steam generation and therefore, very high transient pressures may result in reactor vessel damage."

²⁶⁸ Facility Certification Report No. 29 for the ATR, 4/7/05, page 33. FOIA Doc. # 50.

²⁶⁹ 2000 DOE/EIS-0310, Appendix I.

“The analyses calculated that the consequences of this very low probability event are a very rapid positive ramp insertion [power spike] of reactivity (nearly equivalent to a 0.90\$ [sic] step) which results in a peak transient power of about 900 MW in 62 ms [mili-seconds].”²⁷⁰ Normal ATR power level is 250 MW or 3.6 times the power capacity and more rapidly than automatic/manual control mechanisms could mitigate.

DOE is well aware of this explosion hazard. “Destructive reactivity transient tests (SPERT-ID) and the SL-1 accident (AEC 1962) [that killed 3 SL-1 reactor operators] have indicated that a vapor explosion is a possible phenomenon for severe reactivity transients in plate-fueled reactors.”²⁷¹

ATR/TRA accident history back decades; This report only lists events from 1991 to 1999. Between 1991 and 1999, ATR and ATR Critical Reactor experienced 11 emergency shutdowns “scrams” due to system failures that are indicative of reactors operating beyond their design life. These system failures will only increase with each day the ATR/TRA continue to operate. One death and dozens of worker exposures have occurred at INL during this period of documented grossly deficient operational management.²⁷²

“The only explosive or pyrophoric hazards identified for the ATR facility are associated with the severe accident scenarios in which hydrogen gas is released.”²⁷³

DOE-Idaho Bi-Weekly Operations Summary Issued Feb. 8, 2006, For the Period of Jan. 23-Feb. 6, 2006 states that on "Jan. 24 2006: During a planned modification of a computer control system cabinet at the Advanced Test Reactor on Jan. 20, facility personnel found some of the bolts anchoring the cabinet could not be completely installed, as required. Inadequate anchoring of the cabinet could cause it to tip or slide, and potentially cause an increase or decrease in the Advanced Test Reactor’s primary coolant system pressure. The reactor was in a routine shutdown at the time of the discovery of the problem, which was addressed prior to its restart. (NE-ID--BEA-ATR-2006-0002)

DOE fines LMITCO \$55,000 in Notice of Violation of Price Anderson Act resulting from Advanced Test Reactor Critical Facility disabling of the seismic scram subsystem and falsification of records discovered in October 1997 and continuing into 1998.

Another 8/4/98 Notice of Violation (\$125,000 penalty) was issued for failure to maintain radiation monitoring equipment when six Test Reactor Area workers were exposed to radiation requiring a three week shutdown for building decontamination. This NOV states; "repetitive noncompliance with the Quality Assurance Rule (10-CFR-830.120) ... that resulted in six occurrences where radiation monitoring instruments required by the facility Safety Analysis Report (SAR) were found to be inoperable. The occurrences included (1) an inoperable stack monitor at the Idaho Chemical Processing Plant; (2) operability of a Criticality Safety Alarm System that was questionable because of inadequate calibration and repair activities at the Nuclear Material Inspection and Storage (NMIS) facility; (3) removal of the Test Reactor Area stack monitors for service without required notification to operations management; (5) inadequate maintenance of filters that caused radiation monitoring instruments at the Material Development facility to be out of compliance with operability requirements; and (6) discovery of several radiation alarm monitors where the alarm function was not operable at the Advanced Test

²⁷⁰ Chapter 15.12 – Severe Accident Analysis – Upgraded Final Safety Analysis Report for the Advanced Test Reactor, 8/3/10, pg. 15.12-9.

²⁷¹ Ibid.

²⁷² See Attachment C below (ATR) and (TRA/RTC);

²⁷³ SRA-153 Executive Summary page 8

Reactor."

Another Notice of Violation NOV (\$25,000 penalty) was also issued against MAC Isotopes that uses the Advanced Test Reactor for two Severity Level II violations. [1998 Annual Report Price-Anderson, Nuclear Safety Enforcement Program, USDOE January 1999]

Section 5 – D Potential for Core Meltdown.

The ATR, started operating in 1967, is already long past its design life and the reactors coolant systems are by definition extremely vulnerable to any seismic events or other system failures (emergency power backup) that could “cascade” into an “excursion/melt-down” event. See 1998 July 21; Advanced Test Reactor Critical Facility emergency shut down when an unplanned **power excursion** resulted when the control cylinder withdrawal failed to operate.²⁷⁴ The Advanced Test Reactor Critical Facility is low-power reactor and co-located with the ATR.

Engineering Design File No. 5614 March 20, 2005 states that in the event of commercial power outage, “On-site raw water supplies, however, are not sufficient to last until commercial power can be reasonably assumed to be restored. Therefore, uninterrupted [Emergency Firewater Injection System] EFIS delivery to the ATR vessel is not ensured following a seismically induced loss of coolant accident (LOCA).”²⁷⁵ This is due to limited surface coolant water storage tank capacities and backup power diesel generators limitations to supply power to deep well pumps.

The EFIS is expected to function as an Emergency Core Coolant System in the event of a loss-of-coolant accident (LOCA).²⁷⁶ As explained previously the EFIS may not be available due to truncation of its pipe lines which could occur from a low-level seismic event at the vulnerable masonry building sites through which piping runs.

Engineering Design File -5614 further states, “Identified several structures, systems and components (SSC) that could be vulnerable to failure during Performance Category 3 (PC-3) and/or Performance Category 4 (PC-4) seismic events these include: several small primary coolant system (PCS) lines; the bypass demineralizer shielding block partition wall, and several older masonry block buildings (e.g., TRA-619) that have not been shown to have adequate reinforcement. These potential failures could contribute to an increase in the LOCA leakage currently analyzed in the safety basis and unexpected firewater system losses (pumps and/or pipe breaks) that could challenge the ability of the EFIS supply to deliver the minimum required EFIS flow rate to the ATR vessel assumed in the safety basis (INEEL 2005a).” [pg.3]

“TRA-USQ-2004-413 ATR Seismic Primary Coolant Break Size Contribution from Letdown Valves “was not previously seismically qualified. Additional inventory loss due to continued PSC letdown was not modeled in the safety basis analyses and would result in the equivalent break area being greater than analyzed for a seismically induced LOCA (INEEL) 2005b).” [page 4]

²⁷⁴ See Attachment on TRA accidents. Also see Union of Concerned Scientists October 1971 Report. Between 1954 and 1967, TRA’s Materials Test Reactor and Engineering Test Reactor had at least 5 meltdowns.[Citizens Guide to INL pg 191 that lists DOE/ID accident reports]

²⁷⁵ Engineering Design File No. 5614 March 20, 2005 Summary of Interim Safety Basis Supporting Advanced Test Reactor Operation Pending Full Resolution of Unreviewed Safety Questions TRA-USQ-2004-214, TRA-USQ-2004-396, page 3 [FOIA doc #55]

²⁷⁶ ABS Consulting FOIA doc 52

“Failure of the EFIS or EFIS Supply to continuously provide the minimum required flow rate to the reactor vessel would ultimately lead to worse consequences than currently presented in the [Safety Analysis Review] SAR.” [page 5]

“2.2.2.2 Seismic Support Building (Firewater System) Vulnerabilities Evaluation; The firewater system provides the water supply and injection for the ATR [Emergency Fire Injection System] EFIS and for fire suppression throughout the [Reactor Technology Complex] RTC site area. Many of the older buildings at RTC are built of masonry block and are susceptible to failure during a PC-3 or PC-4 seismic event. The firewater water system piping in buildings that fail is also expected to experience at least partial failure. The resulting breaks in the firewater system piping reduce both the flow rate and the total water inventory available for accident mitigation. Rowsell (2005a) documents an analysis of the firewater supply system assuming severe failures in the firewater piping. The analysis assumes >70% of the total susceptible break area is exposed.”²⁷⁷

“Engineering has been working to solve the Seismic PRA USQ and new seismic concerns identified from a recent walk-down (ARES 2004). Because of this work, a recent walk-down and review by seismic engineers of the firewater piping in the RTRA-671 cooling tower pump house revealed that the firewater supply piping in the building is not well supported. Isolation of the building, using existing valves would isolate a portion of the ATR firewater loop. This is a 12-inch diameter firewater pipe that supplies water for the cooling tower deluge system and fire suppression systems in the TRA-671 building. Based on the Rowsell (2005a) analysis, an additional large leak in the firewater system piping in TRA-671 would be outside of the analysis.

This issue must be addressed prior to reactor operation. The firewater piping in the TRA-671 building must be isolated from the firewater supply system during reactor operation until the piping can be seismically supported and qualified.” [emphasis added] EDF-5614 page 8]

“The ATR PCV-1-1 and LCV-1-3C let-down valves are automatically controlled by the [Distribution Control System] DCS, which is not seismically qualified. The current seismic LOCA scenarios analyzed and presented in the [Safety Analysis Review] SRA do not include additional inventory loss due to continued [Primary Coolant System] PCS letdown. Therefore, failure of the letdown valves could result in a more limiting seismically initiated LOCA (increased overall inventory loss) than was analyzed in the safety basis (INEEL 2005b).” [EDF-5614 page 14]

FOIA document received Un-reviewed Safety Question Report "USQ Process, Potential Inadequacy in the Safety Analysis (PISA) Form, TRA-670, RTC-USQ-2005-197, M-11 Emergency Coolant Pump Flow Measurement and Uncertainty." states on page 3 “The ATR total core power of 150 MW and the maximum effective plate power for any inner fuel plate of **347 MW** which is over the ATR design parameters of 250 MW.” Uneven power levels can exacerbate coolant malfunctions that can cause cascading system failures.

FOIA document (#49) documenting that ATR must not be run at high power (high-temperature). RTC-USQ-2005-173 states “ Impact of potential Leakage on Fuel Element Thermal-Hydraulic Conditions Prior to Reactor Vessel Venting. Supporting analysis is documented in Polkinghorne (2005). Interim operating restrictions associated with the PISA limit ATR core power to 150 MW and include requirements to initiate EFIS and open the reactor vessel vent valves within 30 minutes of a loss of forced flow.” [FOIA item # 49 page 7] This clearly suggests that the safety systems

²⁷⁷ Engineering Design File-5614 page 8

are uncertain and management thus ordered the power level be reduced to 150 MW down from its design level of 250 MW.

Section 5 – E Age of Facility and Lack of Modern Safety Features.

DOE's own Configuration Management requires that a nuclear facility, in its current configuration (including all modifications), comply with all applicable structural, seismic, and operational component regulations.

The ATR's Emergency Firewater Injection System (EFIS) deficiencies have been documented by DOE for over a decade, yet, this major problem has NOT been corrected. [See Attachment A DNFSB reports] The ATR/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 in 1967 in accordance with national building code standards applicable at that time, but it was not even built to 1967 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).²⁷⁸

INL July 7, 2005 Memorandum states, "The [Probabilistic Risk Assessment] PRA model assumed that long-term EFIS will be provided through post-seismic event restoration of commercial electrical power. On-site raw water supplies, however, are not sufficient to last until commercial power can be reasonably assumed to be restored. Therefore, uninterrupted [Emergency Firewater Injection System] EFIS delivery to the ATR vessel was not ensured following a seismically induced loss of coolant accident (LOCA)."²⁷⁹

TRA-USQ-2004-396 states: "The ARES report identified several structures, systems, components (SSCs) that could be vulnerable to failure during Performance Category 3 and/or Performance Category 4 seismic events. These potential failures would contribute to other an increase in the net [Loss-of -Coolant-Accident] LOCA break size currently analyzed in the safety basis and unexpected firewater system losses that could challenge the ability of the EFIS Supply to deliver the assumed EFIS flow rate to the ATR vessel." [FOIA item # 49 page 5] In other words, an earthquake (even at the Category 3 level) can cause building failure resulting in major ATR reactor safety systems to fail.

TRA-USQ-2004-413 states; "The current seismic LOCA scenarios analyzed and presented in the SAR do not include additional inventory loss due to continued PCS letdown. Therefore, failure of the letdown valves could have resulted in a more limiting seismically initiated LOCA (increased overall inventory loss) than was analyzed in the safety basis." [FOIA item # 49 page 5]

TRA-USQ-2004-385 states "ATR surge Tank Level Instrument Limiting Control Settings. TSR-

²⁷⁸ 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.

²⁷⁹ TRA-USQ-2004-214] [4/7/05 Memo to S.K. Penny from J.C. Chapman, FOIA item # 49 page 5.

186 LOC 3.3.4 includes a limiting condition for operation regarding primary coolant system surge tank level. The USQ discovery was that a significantly greater instrument uncertainty can be introduced by differences in the temperature between water in the surge tank and water in the reference leg for level measurement.” [FOIA item # 49 page 6]

RTC-USQ-2005-173 states “ Impact of potential Leakage on Fuel Element Thermal-Hydraulic Conditions Prior to Reactor Vessel Venting. Supporting analysis is documented in Polkinghorne (2005). Interim operating restrictions associated with the [Potential Inadequacy in the Safety Analysis] PISA limit ATR core power to 150 MW and include requirements to initiate EFIS and open the reactor vessel vent valves within 30 minutes of a loss of forced flow.” [FOIA item # 49 page 7] [This clearly suggests that the safety systems are uncertain and thus the power level must be reduced to 150 MW down from its design level of 250 MW.]

RTC-USQ-2005-197 M-11 “Emergency Coolant Pump Flow Measurements and Uncertainty. Recent examination of the M-11 flow showed a concern that the M-11 flow when combined with possible uncertainty might be slightly less than the analytical valve used in the analysis. Until a thorough review is conducted the same interim controls as required by RTC-USQ-2005-173 will be required.” [FOIA item # 49 page 7]

Loss-Of-Coolant Primary Coolant Pump Shutoff System changes to TSR LCO 3.2.3.3 Bases. TSR186 Bases were revised to include discussion of potential pump cavitation [sic] conditions (Harwood 2005).” [FOIA item # 49 page 7]

The statements below further document the age/radiation related distortion of the ATR test lobes. The significance of this distortion is that it can compromise the safe operation of the ATR reactor. “Experiment Experience Concerns (during the period covered by the Facility Certification Report); In July 2003, there was difficulty removing the AFC basket. The first four baskets were sized without adequate clearance. The MICE experiment experienced Hafnium release during transfer from the reactor to the canal and a stuck basket. Significant difficulty was experienced in removing the [Advanced Fuel Cycle] AFC basket and MICE experiment, and prior to 2002, there had been significant difficulty removing the dummy experiment that was initially installed in one of the Irradiation Test Vehicle (ITV) in pile tubes. This experience indicates that experiment programs, based on plans to remove and re-insert experiments for repeated irradiations, need to carefully assess possible material/configuration changes that result from extended irradiation periods. This experience also re-emphasizes the importance of experiment programs providing acceptable backup tests when utilizing flux trap irradiation positions. The CANIS and LSA Cobalt Experiment Safety Analysis (ESAs) that [Senior Operations Review Committee] SORC has recommended upgrading format and review to current standards. [Issue Communication and Resolution Environment] (ICARE 12104, and Improvements to the process to evaluate in-pile tube flux trap cascading are needed ICARE-24575).”²⁸⁰

“TRA/RTC fire water piping enters Buildings 607, 632, and 652. These buildings were observed to have exterior and interior walls constructed of concrete block masonry. Drawings of masonry buildings could not be obtained in the seismic [Probabilistic Risk Assessment] PRA. Consequently, the masonry walls were assumed to be un-reinforced. Such walls have failed in past earthquakes. The masonry walls for Buildings 607, 632, and 652 and any other buildings with un-reinforced masonry

²⁸⁰ Interoffice Memorandum, April 7, 2005, To; S. K. Penny From J.C. Capman, Subject; Reactor Technology Complex Nuclear Engineering Review of Advanced Test Reactor Facility Certification Report. FOIA Doc. # 49, page 7 and 8.

walls, are considered to be potentially significant seismic vulnerabilities. It is recommended that an additional search for drawings of the masonry buildings be performed to confirm that the walls are unreinforced. Inadequate seismic performance of the masonry walls could compromise integrity of the TRA fire water system in two manners: 1.) Wall cracking or collapse could result in failure of attached piping supports, leading to failure of the brittle mechanical joints, and 2.) wall collapse could directly impact piping, leading to its failure. Analyses have not been conducted to determine the number of fire water line breaks that could be tolerated before the system would be unable to deliver sufficient water to cool the core in the event of a LOCA. It cannot be concluded at this time that TRA fire water system can satisfy PC-3 or PC-4 seismic criteria with respect to interaction with the masonry walls.”²⁸¹

“Sources of fire water included the water storage tanks and fire pumps. As noted in Section 2.1.2, raw water storage tank MTR-719C is unanchored and considered to be seismically vulnerable. This tank probably cannot be shown to satisfy PC-3 or PC-4 seismic criteria.

“The existing seismic evaluation of the TRA overhead water storage tank support tower (Reference 12) suggests that PC-4 seismic criteria could be satisfied for the PC-4 design basis earthquake DBE ground response spectrum at rock, **but not the spectrum at the soil surface.**” This report summarizes the Structure, Systems and Components (SSC) inadequate to meet seismic PC-3 or PC-4 criteria: 1.) The masonry wall at the demineralization bypass valve station; 2.) Grouted fire water piping penetrations entering Building 670; 3.) TRA masonry walls; 4.) Buried fire water piping; 5.) NR makeup tank supports; 6.) Vibration isolators for the Enterprise diesel generators; 6.) support system for the exhaust silencers of the Enterprise diesel generators; 7.) Detailed soil-structural interaction (SSI) of Building 670; 8.) Update of seismic fragilities for the seismic PRA.” [page 5-4]²⁸²

Safety Systems of the Advanced Test Reactor Loss of Coolant Accident – Primary Coolant Pump Shutoff System states: “During a [loss of coolant accident] LOCA, the rapidly decreasing system pressure (with core decay heat still significant) results in rapidly deteriorating thermal margins. To maintain acceptable thermal margins, a significant amount of primary coolant system (PCS) flow (greater than emergency flow) is required following the reactor scram. The decrease in PCS pressure results in PCP cavitation [sic], but the pump flow is sufficient to maintain adequate thermal margins. Low primary system pressure allows the air volume in the surge tank to expand into the PCS piping. This air has the potential to degrade the flow from the operating emergency coolant pump.” [page 4]

“These analyses suggest that degradation of [emergency coolant pump] ECP flow due to surge tank air migration is unlikely, but they are not of sufficient depth, nor sufficiently unified to draw any firm conclusions. It is not quantifiably certain, but it seems likely that ECP flow will be lost due to near or sub-atmospheric suction head before air binding becomes an issue.” [page 10]

“The pumps have not been evaluated for continuous operation at extremely low suction heads, and it is possible that pump damage could occur further breaching the PSC and exacerbating the event if left running.” [page 11]²⁸³

ATR's safety problems and the hiding of these problems from the public raise questions about DOE's choice of INL to be the lead laboratory for the development of commercial nuclear power in the

²⁸¹ Seismic Review of Selected Advanced Test Reactor Piping Systems, October 2003, ABS Consulting, page 3-6. FOIA doc # 51.

²⁸² Seismic Review of Selected Advanced Test Reactor Piping Systems, October 2003, ABS Consulting, page 3-7] [FOIA doc # 51.

²⁸³ Safety Systems of the Advanced Test Reactor Loss of Coolant Accident – Primary Coolant Pump Shutoff System, June 2005, USDOE Idaho Operations Office, FOIA Document # 42.

US. [See Attachment listing of Notices]

“INEEL Integrated Safety Management System, Annual Report FY-2003, November 2003, INEEL/EXT-03-01146” states the following [page 61 to 62]:

Section 4.5 Events; FY-2003, 105 occurrences that include 12 Unusual Occurrences (10 at INTEC and TRA), Two Emergency Occurrences, and 91 Off-normal occurrences. This is an increase from FY-2002 at TRA. “Violation of Inadequate Procedures” increased from 18 in 2002 to 26 in 2003. “Near Misses” increased from 13 in 2002 to 19 in 2003 (four of which were at TRA). There were 15 Lockout/Tagout Occurrences that includes 5 involving “hazardous energy.” Work Control Occurrences increased from 59 in 2002 to 71 in 2003 (includes 32 worker injuries).

ATR Planning Assessment Team, 22/13/04, Report to Elizabeth Sellers, Manager of Idaho Operations Office. Despite every page having redactions, page 10 states: “Neither [Office of Nuclear Facilities Management] NE-ID nor NE-HQ line management has procedures in place to conduct in-depth vertical slice reviews of the complex ATR safety systems to assess their current compliance with the [Safety Analysis Report] SAR.” [FOIA Doc # 43]

BBWI Integrated Safety Management System, 2004 Annual Report states; “The May 2004 RCRA inspection resulted in a Notice of Violation and civil penalty of \$5,100 for two violations identified. No other Notices of Violation or findings of noncompliance resulted from other regulatory inspections. However, a Notice of Violation and civil penalty of \$162,500 was received in FY 2004 for five violations identified during a RCRA inspection conducted in FY 2003.” [page 32] “The DOE Office of Enforcement did not conduct any investigations of non-compliances reported during FY-2004. However, a Preliminary Notice of Violation (PNOV) and associated Civil Penalty (CP) of \$41,250 were issued to BBWI on January 20, 2004 by the DOE Office of [Price Anderson Amendment Act] PAAA Enforcement for a report of programmatic failures during FY 2003. The PNOV and CP were accepted by BBWI by letter dated 2/5/04.” [pg. 37]

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Aging of ATR Equipment is a Significant Safety Issue

DOE's 2005 ATR Certification Report states the following problems:

1. ATR M-10 Emergency Pump lacks "reliable battery backed power supply" that caused its failure three times in recent years. [page 30]
2. The 674-M-6 diesel generator did not start automatically, nor would it start upon subsequent manual commands during a 11/02 commercial power outage that caused the ATR to Scram. Also during that event, several manual and automatic plant systems and components failed to function as designed including the commercial feeder breakers in TRA-609 failed to close upon demand, thus further impeding recovery efforts.[pg 30]
3. Failure of the TRA-609 switch gear to properly operate was due to the fact that no preventative maintenance was being performed on this switchgear. These "Agastat" relays are at least 20 years old; the oldest is 26 years old.
4. The Molytek recorders (used to monitor Reactor Shutdown Systems) should be replaced with newer state-of-the-art instrumentations but "little progress has been made to date" for upgrades.
5. National Fire Protection Association required fire dampers to be inspected every five years however "The dampers in the ATR were designed and installed under a different version of the code and

²⁸⁴ BBWI Integrated Safety Management System, Annual Report, FY 2004, September 2004, INEEL/EXT-04-02262, FOIA doc # 45.

were not made to be inspected and some dampers were found to be installed backward." [page 31]

6. Deep Well pump # 3 can only be run using a portable diesel generator. Additionally, only having one deep-well on diesel power does not provide any redundancy. [page 32]

7. Electrical upgrades at RTC/ATR have failed due to moisture from blowing snow. When the switchgear detected the fault it did not properly isolate the fault due to an erroneous set-point which caused a main feeder to trip. "A significant amount of the switchgear is well beyond its design life. This includes the 50-year-old switchgear in building 609 and the 40 year-old E-3 switchgear in the ATR. This old switchgear has been troublesome at times and will continue to be vulnerable to failure with few spare parts available. This switch gear needs to be replaced." [page 32 & 33]

8. The ATR In-vessel Post Accident Monitoring System "in-tank hardware will start to fail in the near future, replacement of the system should be considered." [pg. 34]

9. The thimble purge system HVE-23 has shown degraded flow through the thimbles which could cause failure of the nuclear instruments. [page 36]

10. "The ATR warm waste pumps and motors are aging. They are beyond their design life and few spares are available." [page 37]

11. "The raw water overhead tanks needs to be refurbished... This project has not been funded and still needs to be completed." [page 37]

12. "The HDW-M-33 heat exchanger is exhibiting signs of possible loose brackets or tubing and substantial build up of corrosion products... The heat exchanger should be replaced."

13. "The TRA-605 warm waste treatment facility control system is no longer reliable." [page 37]

14. "The Utility [un-interruptible power system] UPS is aging and no longer supported by the vendor." [page 37]

15. Replacement upper Emergency Fire Injection System EFIS level control valves "were not built to American Society of Mechanical Engineers Section III Code and should be replaced. [page 38]

16. The 619-12 electric fire water pump failed and the cycle was completed with a funning diesel firewater pump. Even after repairs to the shaft, the pump again failed the following run. [page 38]

17. A limited upgrade was performed on the Reactor Data Acquisition System (RDAS) but not the VAX computer. [page 38]²⁸⁵

March 2004 Idaho National Engineering Lab/Advanced Test Reactor NE-ID--BBWI-ATR-2004-0004 Core Feedback During Loss of Commercial Power Update issued 08/18/2005

Occurrence Report No. 13, USQ No. RTC-USQ-2005-336, Discovered: June 15, 2005, 1610: The ATR SINDA-SAMPLE code models the variation in flow rate in the hot fuel plate analysis. The model development did not explicitly address some pertinent sources of uncertainty and therefore may not be conservative.

Occurrence Report No. 14, USQ No.: RTC-USQ-2005-248, Discovered: May 4, 2005, 1630: The derivation of the analytical limit set-point and response time are not consistent with the methods used in the radiological consequence analyses presented in SAR-153, Section 15.7 and 15.12. The methodology used for the derivation of the set-point could allow higher off-site doses than predicted by the radiological consequence analyses. Since these radiological consequence analyses are the basis upon which DOE approved operation of the ATR, the discrepancy represents a potentially inadequate safety analysis.

²⁸⁵ Facility Certification Report No. 29 for the ATR, 4/7/05. FOIA Doc. # 50.

Section 5 - F ATR Review by Other Agencies

5-F-1 Environmental Protection Agency Office of Enforcement and Compliance Assurance (OECA)

EPA's OECA issued a finding that was a response to Environmental Defense Institute and David McCoy 1/29/03. Below is EDI's response to that finding.

DOE is exempted from mixed waste under the Atomic Energy Act (AEA) only by Presidential Order, or for "special nuclear material" (bomb grade plutonium/highly enriched uranium).²⁸⁶ EPA however incorrectly claims, "The applicable regulation, 40 CFR Section 63.680(b)(2)(ii), exempts 'radioactive mixed waste managed in accordance with all applicable regulations under the Atomic Energy Act (AEA) and the Nuclear Waste Policy Act INWPA authorities.' Thus, the off-site mixed waste identified by EDI in its October 31, 2001 petition would not be subject to the Subpart DD standards if the waste received is mixed waste managed in accordance with AEA and NWPA."²⁸⁷ Although technically correct, EPA fails to cite the other relevant AEA language (i.e., Presidential Exemption requirement) that DOE has not received.

DOE's Idaho HLW & FD EIS states, "At INTEC, all HLW is also considered a mixed waste because in addition to radionuclides the HLW also contains hazardous materials. **Some of the hazardous materials, such as heavy metals, were present in the spent nuclear fuel.** Other hazardous materials were introduced during processing and decontamination activities. Examples include mercuric nitrate used as a catalyst to dissolve the fuel and various solvents. The mixed nature of this waste implicates additional management considerations and regulatory requirements."²⁸⁸

"Over the past 60 years U.S. nuclear weapons facilities have generated some 100 million gallons of high-level waste (HLW). This HLW sits in more than 200 underground storage tanks at three DOE sites: the Hanford Reservation in Washington, the Idaho National Laboratory (NL) and the SRS in South Carolina. These sites are located near or adjacent to drinking water resources, including the Savannah River in South Carolina, the Snake River Aquifer in Idaho, and the Columbia River in Washington. Over one million gallons of HLW have leaked from these storage tanks into the environment. To address the need for long-term disposal of HLW (and the disposal of commercially generated spent nuclear fuel), on 1982 Congress passed the Nuclear Waste Policy Act (NWPA) 42 USC Section 10101 et seq., which requires the DOE to dispose of this HLW in a deep, geologic repository."²⁸⁹

SNF is stored at RTC/TRA in the Advanced Test Reactor canal, Advanced Reactivity Measurement Facility, Coupled Fast Reactivity Measurement Facility, Materials Test Reactor canal.²⁹⁰

As for the Nuclear Waste Policy Act, the fact that NRDC v. DOE suit went all the way to Circuit Court of Appeals and then only dismissed (3/6/06) because DOE deliberately did not finalize its

²⁸⁶ Legal Environmental Assistance Foundation, et.al. v. Hodel, US Department of Energy, No. CIV. 3-83-562, U.S. District Court, E.D. Tennessee, Northern Division, 4/13/84. Citing RCRA of 1976, Sections 3005, 3006, 6001, as amended, 42 USCA Sections 6925, 6926, 6961.

²⁸⁷ Office of Enforcement and Compliance Assurance Finding, Signed by Michael S. Alushin, Director of Compliance Assessment and Media Programs Division Office of Compliance, 1/29/03.

²⁸⁸ 1999 DOE/EIS-0287D, page 1-9.

²⁸⁹ Laurence ("Laird") Lucas local council for Plaintiffs NRDC and SRA in 8/5/05 court filing Case No. 01-CV-413-S-(BLW).

²⁹⁰ 1995 DOE/EIS-0203F, page 3-6.

disposition for mixed high-level waste (HLW) says it all.²⁹¹ On 3 March 2006 the Court ruled "The Natural Resources Defense Council (NRDC) filed a brief describing various actions of the Department of Energy (DOE). However, none of those actions are final as required by the Ninth Circuit in this case. If they become final, the NRDC retains the right to challenge them in a new lawsuit. However this lawsuit is governed by the Ninth Circuit's decision that directed this Court to 'dismiss this action.'" In other words, by deliberately delaying its final decision on how to dispose of its high-level waste, DOE is able to avoid a court ruling.

"The U.S. Court of Appeals for the Ninth Circuit subsequently reversed the District Courts' decision, and put the legality of DOE's waste reclassification action off for another day. Contemporaneous with the Ninth Circuit's review of the Idaho Federal District Court's decision, DOE sought to have the District Court decision legislatively reversed by Congress. DOE succeeded in part with this effort in Section 3116 of the FY 2005 Defense Authorization Act. This legislative reversal provides the Energy Secretary with the authority to make incidental waste determinations, for the most part long standards somewhat similar to those found in DOE's Order 435.1. Congress granted DOE this reclassification authority in the states of South Carolina and Idaho but not in Washington."²⁹²

As of this writing, DOE has not made a formal decision on the disposition of its mixed high-level waste (HLW) that was the subject of the above litigation. What is not in dispute is the fact that this is mixed hazardous and radioactive waste that by definition falls under RCRA regulation even under DOE Order 435.1 that wants to classify it as mixed transuranic waste that will be interned at the Waste Isolation Pilot Project geologic repository in New Mexico.²⁹³ This waste also contains constituents from reprocessing ATR SNF due to its being "high-value" highly-enriched uranium fuel.

DOE refuses to acknowledge spent nuclear fuel (SNF) shipped to INL from numerous Navy yards on each coast,²⁹⁴ and interned in cooling pools waiting decay of short lived isotopes, processing for dry storage and interim "Independent Spent Fuel Storage Instillation" (ISFSI) at INTEC for final disposition in a deep geologic repository. Plus SNF from TMI in Pennsylvania and Fort St. Vrain in Colorado, Peach Bottom, and scores of foreign research reactor SNF (under the Non-proliferation treaty) ended up at INL. DOE's Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Programs Final EIS, describes how consolidation of SNF with stainless steel/zirconium cladding will be shipped to INL and aluminum clad SNF was shipped to Savannah River Site.²⁹⁵ Mixed waste generated by reprocessing SNF and/or processing for dry interim storage at INL ISFSI was not included in EPA's review.²⁹⁶ Off-site mixed waste shipments to INL include Sandia National Laboratory and Paducah.²⁹⁷

The Clinton Administration shut down all SNF reprocessing in 1992, however DOE recently indicated their intent to restart limited reprocessing. Only a small percentage of the "high-value" SNF at INL would be candidate for reprocessing, which means all the rest of SNF is mixed high-level radioactive waste requiring treatment, storage and disposal. EPA simply ignores this reality.

²⁹¹ See Natural Resources Defense Council et al. v. Samuel Bodman Secretary Department of Energy, U.S. District Court for the District of Idaho, Case No. 01-CV-413 (BLW)

²⁹² Laurence ("Laird") Lucas local council for Plaintiffs NRDC and SRA in 8/5/05 court filing Case No. 01-CV-413-S-(BLW).

²⁹³ 2002 DOE/EIS-0287, page 2-10.

²⁹⁴ See EDI Amicus Brief, USA v. Kemthorne, 2 August 2002 in Civil No 91-0054-S-EJL

²⁹⁵ 1995 DOE/EIS 0203F, page 3-7 states INEEL inventory of SNF is 2.7,41.80 metric tons of heavy metal.

²⁹⁶ 2002 DOE/EIS-0287, page 2-10.

²⁹⁷ 2005 DOE/EIS-0203-F-SA-02, page 83.

Environmental Protection Agency (EPA) incorrectly accepts DOE's claim that waste water is not discharged to waters of the U.S. EPA states: "In its August 15, 2002 response, DOE claims that wastewaters from INEEL are not discharged to 'waters of the United States' and therefore INEEL is not required to have an National Pollution Discharge Elimination System (NPDES) permit."²⁹⁸

However, the "Clean Water Act extends federal jurisdiction over groundwater that is hydrological connected to surface waters that are themselves waters of United States."²⁹⁹

INL Advanced Test Reactor and Reactor Technology Complex (formerly Test Reactor Area) and Idaho Nuclear Technology and Engineering Center (INTEC) waste water discharge to unlined percolation ponds allow ATR/INTEC contaminants to migrate to EPA's designated Idaho sole source Snake River Plain Aquifer that then discharges to the Snake River. EPA denial of "publicly owned treatment works" (POTW) and "federally owned treatment works" (FOTW) and exemption to National Pollution Discharge Elimination System (NPDES) is also incorrect because of the above argument on the connection between the aquifer that supplies near total flow west of American Falls to the Snake River due to dam diversion for irrigation.

"Snake River Plain Aquifer at Risk," EDI 4/05 contains an extensive compilation of USGS and INEEL Oversight Program water sampling data taken along the Snake River where the aquifer discharges into the river. This monitoring data tracks gross beta and gross alpha constituents between 1989 through 2004.³⁰⁰

Everything at INL slips neatly through the cracks including the lack of a RCRA permit for the ATR which is a generator of hazardous waste. INL has been real quiet on this. The cooperation of IDEQ and DOE and EPA to keep everything running as normal without following the law was the main reason EDI and Dave McCoy filed a petition to withhold EPA certification of IDEQ as the hazardous waste management surrogate for EPA. We believe the lack of DEQ follow through on permits is a good reason to resurrect this issue. Also, IDEQ and EPA never gave us an answer on whether DEQ complied with the EPA Inspector General's demands set forth in his answer to our petition for withdrawal of IDEQ. The game is to just let everything slide on a time basis and hope all the problems will go away and the environmentalists will walk away in frustration.

Section 5-F-2 DOE Office of Independent Oversight

The DOE Office of Independent Oversight and Performance Assurance (OA) performed an inspection of the ES&H and Emergency Management programs at INEEL during August and September of 2003. The ES&H portion of the inspection evaluated four related aspects of the Integrated Safety Management (ISM) program:

- * Implementation of selected ISM guiding principles, including efforts to address the new 10 CFR 830, Subpart B, requirements for design safety reviews for nuclear facilities and implementation of suspect/counterfeit items requirements,

²⁹⁸ EPA Office of Enforcement and Compliance Assurance, 1/29/03, page 4, signed by Michael S. Alushin, Director Compliance Assessment and Media Programs Division Office of Compliance.

²⁹⁹ Federal Water Pollution Control Act Section 502(7), as amended, 33 USCA. Section 1362(7). Also see 142 F.Supp.2d 1169, Idaho Rural Council v. Bosma, No. CV-99-0581-S-BLW, advisory to the court.

³⁰⁰ "Snake River Plain Aquifer at Risk," Environmental Defense Institute, 4/05, available www.environmental-defense-institute.org

- * Feedback and continuous improvement systems,
- * Implementation of ISM core functions for various work activities, and
- * Functionality of selected essential systems at the Advanced Test Reactor (ATR).

The field inspection activities focused on INTEC, TAN, and IRC. The Emergency Management portion of the inspection evaluated selected aspects of emergency planning, emergency preparedness, emergency response, and preparedness assurance.

The inspection identified the following program weaknesses applicable to BBWI: Weaknesses in ATR design analysis raise concerns whether the systems designed to mitigate loss-of-coolant accidents adequately protect against all potential accident scenarios. pg. 71

OA-2003-ESH-05 ; Some potential accidents and accident phenomena have not been adequately analyzed and documented to provide assurance that Advanced Test Reactor (ATR) safety systems are capable of mitigating loss-of-coolant accidents in accordance with the ATR updated final safety analysis report (UFSAR). [Pg. 105]

OA-2003-ESH-06 ; The U.S. Department of Energy (DOE) has not supported and BBWI has not implemented an effective configuration control program to ensure that the ATR design meets all technical and procedural requirements as required by PRD-115, "Configuration Management." [Pg. 105]

OA-2003-ESH-07 ; BBWI has not established a technically adequate surveillance program for testing the operability of the ATR firewater pumps as required by technical safety requirement (TSR) limiting conditions for operations (LCO) 3.2.1.2, surveillance requirement 4.2.1.2.8, and UFSAR Chapter 14. [Pg. 105]

OA-2003-OFI-ESH-13; Establish and implement a plan to confirm the adequacy of the ATR safety design. [pg. 106]

Section 5 - G ATR Waste Stream and Applied Treatment

See Attached EDI Permit comments on INTEC Liquid Waste Management System ILWMS

Section 5 – H Accident Consequences

DOE 2000 PEIS Table I-34 "ATR Accident Consequences and Risks" states doses to the public within 50 miles at 5.17×10^{-4} (51,700) person rem. Based on an effected population of ~214,000 that amounts to 0.2415 rem, or 241.5 millirem which is significantly higher than EPA radiation limit of 4 millirem/year. [page I-66]

DOE documents show in Accident Analysis Conclusions "The bounding event used for radiological consequences was the hypothetical large-break loss-of-coolant-accident (LOCA), which is classified as a severe accident. This accident results in offsite doses ...of 185 rem thyroid, and 13.2 rem total effective dose equivalent (TEDE) For workers evacuating the TRA the potential doses are 75.7 rem thyroid and 5.3 rem TEDE."³⁰¹ This is significantly over limits for workers and the public. The discrepancy between the on-site worker dose and the off-site public dose challenges the validity of the estimates.

³⁰¹ SRA-153, ES-18

Section 5 - I Flooding Hazards

According to USGS analysis of 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 and/or expanded nuclear operations.³⁰² 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.

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) downstream 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.³⁰³ The ICPP as a whole is about as flat as a table top with only a couple feet change in elevation north to south.³⁰⁴ **The crucial point here is that even the slightest variation in a Big Lost River flood would also put the TRA/ATR underwater.** Proportionally less variation in floods would inundate the subsurface TRA facilities.³⁰⁵

Nuclear Regulatory Commission restrictions prohibiting citing nuclear facilities on 100 year flood plains must be observed. [NRC 10 CFR 61.50] The reason for these restrictions is because the flood water will leach the contaminants 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. 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

Section 5 - J Clean Water Act Violations

David McCoy did a legal analysis that, among other issues, identified major Clean water Act violations at INL.³⁰⁶ McCoy notes that the INTEC/TRA (located at INL) lies within the 100 year floodplain of the Big Lost River. The INTEC/TRA facilities service wastewater system and the Percolation Ponds are also located within the 100 year floodplain of the Big Lost River.

DOE Order 5400.1 requires DOE to comply with the mandatory requirements of Executive Order 11988 for Floodplain Management and Executive Order 11990 for Protection of Wetlands. (See 10 CFR 1022 et seq.).

³⁰² "Snake River Plane Aquifer at Risk," EDI Report 4/29/05.

³⁰³ 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

³⁰⁴ 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.

³⁰⁵ USGS 98-4065, page 9

³⁰⁶ David B. McCoy is an attorney living in Idaho Falls, ID who has written extensively about INEEL's violations of environmental law.

DOE Order 5400.1 requires DOE to comply with the requirements of the Clean Water Act, 33 USC § 1251 et seq. DOE violates DOE Order 5400.1 and the Clean Water Act by its failure to obtain a National Pollution Discharge Elimination System (NPDES) permit for the INTEC facilities.

The INTEC/TRA facilities are considered point sources under the CWA. 33 USC § 1362(14). Section 301 of the CWA, 33 USC § 1311(a) prohibits the discharge of any pollutant from a point source into the waters of the United States unless such discharge is permitted in a National Pollution Discharge Elimination System (NPDES) permit. As shown below, DOE has discharged pollutants including hazardous wastes and radionuclides to the waters of the United states without a NPDES permit, in violation of § 301(a) of the CWA, 33 USC §1311(a).

The INTEC/TRA facilities apparently do not, as of this writing, have a NPDES permit.

The unlined Percolation Ponds at INTEC/TRA, which receive the point source wastes from the INTEC/TRA facilities, are surface impoundments located in the floodplain above the Snake River Plain Aquifer which is hydro-logically connected to and part of the Snake River. The Snake River and its aquifer are waters of the United States. Waters of the United States include waters that are tributary to navigable waters. Congress intended to regulate the discharge of any pollutants that could affect surface waters of the United States, whether it reaches the surface water directly or through groundwater.

The INTEC/TRA Percolation Ponds discharge water into the waters of the United States, but DOE has failed to obtain a NPDES permit for the ponds. Also see US District Court for Idaho settlement agreement in Idaho Rural Council v. Bosma, No. CV-99-0581-S-BLW. where Judge Winmill ruled in favor of the citizen suit alleging noncompliance with NPDES permit. The court record acknowledges that if toxic waste ends up in surface waters, then it is covered under the Clean Water Act.

The USGS scientific studies show INL discharged waste eventually flows to the Snake River Plain Aquifer that then discharges to the Snake River, and federal court rulings document that the Clean Water Act regulations apply to INL toxic waste discharges. Court rulings state: “Congress intended to regulate ‘discharges of pollutants that could affect surface waters for the United States,’ the rationale supporting this conclusion is simple and persuasive: ‘since the goal of the CWA is to protect the quality of surface waters, any pollutant which enters such waters, whether directly or through groundwater, is subject to regulation by NPDES permit. Stated even more simply, whether pollution is introduced by a visible, above-ground conduit or enters the surface water through the aquifer matters little to the fish, waterfowl, and recreational users which are affected by the degradation of our nation’s rivers and streams.”³⁰⁷

Section 5 - K DOE Worker Radiation Exposure Issues

5.K.1 Determining Radiation Dose

Collective dose is a measure of the total amount of radiation exposure to everyone affected by an activity. Collective dose is usually measured in units of person-rem or person-Sieverts. For example, if there are 25 million people in the United States who smoke cigarettes and each of them receives 2 rem from smoking, the collective dose to the U.S. population is 50 million person-rem. Another example of collective dose is to say that the U.S. population receives about 81 million person-rem from natural background radiation because about 270 million people receive an average annual exposure of about 300 mrem each from natural sources.

³⁰⁷ Washington Wilderness Coalition, 870 F.Supp. at 990; cited in US Federal Court District of Idaho in Idaho Rural Council v. Bosma, No CV-99-0581-S-BLW. Also see State of New York v. PVS Chemicals, No 97-CV-596-A.

EIS page 4-37 Table 4-17 says; "Total Dose (person-rem/yr) for INL's Materials and Fuels Complex (MFC) is 32." The paragraph immediately above the Table 4-17 says; "Doses to involved workers from normal operations are given in Table 4-17 ; these workers are defined as those directly associated with process activities. The incremental annual average doses to workers at ATR would be negligible, and approximately 32 person-rem to workers at MFC. Doses to individual workers would be kept to minimal levels by instituting badged monitoring and ALARA programs." [DOE is admitting that they do not currently have a "badged monitoring and ALARA program" which is itself a violation their regulations because of ongoing current radiological operations at these facilities.]

EIS page 4-37 Table 4-17 says "The radiological limit for an individual worker is 5,000 millirem [5 rem] per year (10 CFR 835). However the maximum dose to a worker involved with operations would be kept below the DOE Administrative Control Level of 2,000 millirem per year (DOE 1999e)." [USDOE, Radiological Control, DOE-STD-1098-99, Washington, DC, July 1999e] Also says "There would be no incremental radiological impacts of operation of ATR because the insertion of targets does not affect reactor operation conditions or contribute a new source of radiological emissions."

The draft EIS Table S-3 Summary of Environmental Consequences of Alternatives, page S-42 States; "Total worker dose (person-rem/yr) at INL is 32.2" under the "Consolidation Alternative at INL." [DOE/EIS-0373D]

EIS page 4-37 Table 4-17 says; "Total Dose (person-rem/yr) for INL's Materials and Fuels Complex (MFC) is 32." The paragraph immediately above the Table 4-17 says; "Doses to involved workers from normal operations are given in Table 4-17 ; these workers are defined as those directly associated with process activities. The incremental annual average doses to workers at ATR would be negligible, and approximately **32 person-rem to workers at MFC**. Doses to individual workers would be kept to minimal levels by **instituting badged monitoring** and ALARA programs." [DOE is admitting that they do not currently have a "badged monitoring and ALARA program" which is itself a violation their regulations because of ongoing current radiological operations at these facilities.]

EIS page 4-37 Table 4-17 says "The radiological limit for an individual worker is 5,000 millirem [5 rem] per year (10 CFR 835). However the maximum dose to a worker involved with operations would be kept below the DOE Administrative Control Level of 2,000 millirem per year (DOE 1999e)." [USDOE, Radiological Control, DOE-STD-1098-99, Washington, DC, July 1999e]

EIS also says "There would be no incremental radiological impacts of operation of ATR because the insertion of targets does not affect reactor operation conditions or contribute a new source of radiological emissions."

Section 5.K.2 Worker Exposure Information ³⁰⁸

The June 2005 Independent Oversight Inspection of the ATR notes that worker radiation exposure was exceeded due to inadequate and improper locating on worker body of monitoring badges.

³⁰⁹ The INEEL Integrated Safety Management System Annual Report FY 2003 states; "The 318 employee safety concerns reported in FY 2003 was an increase from the 209 reported in FY 2002. However, the 209 reported in FY 2002 was a significant decrease from the 642 reported in FY-2001." ³¹⁰

³⁰⁸ Environmental Defense Institute, Citizens Guide to INL, page 168.

³⁰⁹ Independent Oversight Inspection of Environmental Safety and Health Program at the Advanced Test Reactor, DOE Office of Security and Safety Performance Assurance, page 18, June 2005.

³¹⁰ INEEL Integrated Safety Management System Annual Report FY 2003, November 2003, page 66, INEEL/EXT-03-01146.

“Oil, Chemical, and Atomic Workers Union now called PACE is proposing contract language which requests a 90% reduction of work exposure. "At the present level of 5 rem/year for a work life of forty years, the increase risk for developing cancer is estimated to range from eight times greater than that for the reference "safe industry" according to the Nuclear Regulatory Commission, to 20 times greater by the US Environmental Protection Agency. This risk estimate assumes that in the reference "safe industry" one death per 10,000 workers is acceptable. This accounts only for the cancer risk linked to radiation exposure; it does not reflect the other health and safety risks in the nuclear industry." [OCAW @ I-A] Exposure to non-radioactive carcinogens by DOE contract workers is considered by Union members to be equally as hazardous as radioactive exposures. Additionally, the synergistic (combined) effect of radiation and chemicals is a risk area workers believe the health agencies have overlooked.

The Three Mile Public Health Fund, created and supervised by Federal District Court in Harrisburg, PA announced the results of its study of DOE workers at Hanford, Rocky Flats, and Oak Ridge. Though the court authorized the study in 1987, DOE refused to release the data until 1990 after a protracted court battle which DOE ultimately lost. Dr. Alice Stewart, an internationally recognized epidemiologist, headed up the study. The study confirmed findings reported by Dr. Stewart, George Kneale, and Thomas Mancuso in 1977 which was under contract with DOE. The 1977 Hanford study contract was terminated and all data seized when DOE became aware of the research preliminary findings. It took another 13 years and numerous court orders before the researchers could continue their work.

The research found that workers exposed to very small doses of radiation in the same order of magnitude as background exposure may be at significant increased risk of developing radiogenic cancers. Stewart and Kneale's analysis of Hanford workers showed that there were extra deaths from radiogenic cancers due to occupational exposures. The additional cancer cases were mainly older workers over 40 years at the time of exposure. When exposure reached 26 rems, researchers found an increase of 100% in cancer incidence. Older workers (60 to 65 years) exposed to the same level (26 rem) showed an increase cancer risk 20 times higher than for all workers.

Physicians for Social Responsibility *Dead Reckoning*, cites INEEL exposure records acknowledging 154 workers received greater than 5 rem/yr, and 562 received 4 rem to just under 5 rem between 1951 and 1989. This figure includes only prime contractors and does not include subcontractors, construction workers, security guards, or military personnel. [Dead Reckoning@41]

Section 5 - L Off-site Radiation

Off-site radiation exposure in an ATR Accident . Final PEIS Table I-34 “ATR Accident Consequences and Risks” page I-66; notes doses to the public within 50 miles at 5.15×10^4 (51,700) person-rem. With an effected population within 50 miles of ~214,000 this amounts to 0.2415 rem or 241.5 millirem, which is significantly higher (200%) than EPA’s regulatory limit for radiation exposure of 4 millirem/year.³¹¹

The ATR Safety Analysis Report [SAR-153 pg. ES-18] estimated that populations within a 60 mile radius of an ATR loss-of-coolant accident would receive 185 rem (or 185,000 millirem) to the thyroid and 13.2 rem (or 13,200 millirem) whole body effective dose equivalent (EDE).

In such an ATR "Condition 4 [accident the] radiation exposure limits would be 25 rem [25,000 millirem] whole body and 300 rem [300,000 millirem] thyroid dose [effective dose equivalent (EDE) to

³¹¹ http://library.thinkquest.org/3471/radiation_effects_body_body.html

the maximally exposed individual] to off-site public and evacuating workers (excluding personnel considered directly at the location of the accident. Reactor fuel source term limit: The primary coolant pressure boundary must be maintained ... and the reactor confinement must not be damaged." ³¹² In other words, if the coolant and confinement are compromised, the radiation released and exposure would be significantly more for the off-site public.

The National Emission Standard for Hazardous Air Pollutants (NESHAP) for Radionuclides (40 CFR 61.92) limit is 10 millirem/year whole body effective dose equivalent (EDE) or 0.010 rem EDE. ³¹³ NESHAP limits for radioactive iodine are 3 millirem/year or 0.003 rem. ³¹⁴ Radioactive iodine primarily affects the thyroid.

In other words, in the event of a major ATR accident, anyone living within 60 miles (includes Pocatello) would potentially receive 2,500 times the NESHAP allowable whole body EDE radiation limit. Exposure to the thyroid would exceed the NESHAP standard by 100,000 times the EPA EDE limit. These are lethal doses by any standards. Downwinders living beyond the 60 mile radius would apparently receive less radiation depending on their location from the ATR, however if there is a meteorological situation of precipitation (snow/rain), the radiation can be carried much further and be more concentrated.

Recent health studies on radioactive iodine exposure show that 0.087 Sievert (8.7 rem) (8,700 mrem) will likely cause malignant tumors to the thyroid. ³¹⁵ Independent health critics claim this exposure level is grossly understated, and major thyroid cancers develop at much lower doses.

Section 5 - M FOIA Document Censorship/Redact Review

DOE Office of Hearings and Appeals letter March 16, 2006 states; "The Appellant also contends that the FOIA mandates that any reasonably segregable [sic] portion of a record must be disclosed to a requestor after the redaction of the parts which are exempt. October 14, 2005 Appeal Letter at 2. We

³¹² Advanced Test Reactor (ATR) Facility 10 CFR 830 Safety Basis Related to Facility Experiments, 6/02, 12th Annual Energy Facility Contractors Group Safety Analysis Workshop, INEEL/CON-02-00148, page 9. The ATR Safety Analysis Report [SAR-153 pg. ES-18] estimated that populations within a 60 mile radius of an ATR loss-of-coolant accident would receive 185 rem (or 185,000 millirem) to the thyroid and 13.2 rem (or 13,200 millirem) whole body effective dose equivalent (EDE). This Safety Analysis Report which is supposed to be definitive was off by a large factor on the amount of exposure possible. This indicates that DOE throws figures at the walls and hope they will stick.

³¹³ 40 CFR Sec. 61.92 Standard: states " Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.

³¹⁴ 40 CFR 61.102 Subpart I National Emission Standards for Radionuclide Emissions From Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H: states: (a) Emissions of radionuclides, including iodine, to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr. (b) Emissions of iodine to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 3 mrem/yr.

³¹⁵ "Radiation Linked to Thyroid Nodules in Atomic Bomb Survivors", Reuters, 3/1/06, As reported in the Journal of the American Medical Association for March 1, 2006.

agree. We have reviewed the ATR SAR which Idaho released to the appellant with redactions. We believe that chapters 3/4 pages 0-1 and 0-2 of the ATR SAR could be reasonably segregated and released to the Appellant. We will remand the matter to Idaho for review of those pages and issuance of a new determination either releasing the information or justifying its withholding." DOE/ID, as of this date, has not complied with this order.

Upgraded Final Safety Analysis Report for the Advanced Test Reactor (SAR-153)

Volume 1 (complete unless otherwise noted as missing/redacted)

1. Manual Table of Contents (Authorization Agreement)
2. 1AG-31(Authorization Agreement for RTC/ATR)
3. LST-100 (Safety Basis for ATR)
4. TSR-186 (Technical Safety Requirements, for the ATR" [ID:TSR-186]
5. List of Effective Pages (list of changes to SAR-153 through various revisions)
6. Table of Contents and Acronyms
7. Section 1; Use and Applications
8. Section 2; Safety Limits
9. Section 3; Operating Limits (**IS MISSING**)
10. Section 4; Surveillance Requirements (**IS MISSING**)
11. Section 5; Administrative Controls
12. Appendix A; (ALL 11 parts are **MISSING** see #6 above for list)

Volume 2 Upgraded Final Safety Analysis Report for the Advanced Test Reactor (SAR-153)

Chapter 1 (Includes Executive Summary) (**one page redacted**)

Chapter 2 Site Characteristics (**two pages redacted**)

Chapter 3 Design of Structures Components, Equipment and Systems
(**25 pages redacted**)

Chapter 3 Appendix A Master List of Safety Related Equipment (**all pages have portions redacted**)

Chapter 4; Reactor (**16 pages redacted**)

Chapter 5; Primary Coolant System

Chapter 6; Engineering Safety Features (**redacted pg 20**)

Chapter 7; Instrumentation and Controls

Chapter 8; Electric Power

Chapter 9; Auxiliary Systems (**redacted pages 9-37 to 9-42**)

Chapter 10 ; Experiment and Irradiation Facilities (**redacted page 10-67 & 10-68.**)

Chapter 11; Radioactive and Hazardous Material Waste Management (This section is significant because it quantifies ATR waste generation dumped at the RWMC)

Chapter 12; Radiological Protection (pages 12-11 to 12-15 **redacted**)

Chapter 13; Management, Organization, and Institutional Safety Procedures

Volume 3 that includes SAR-153 Chapters 14 through 22

Chapter 14; Initial Test Program (complete)

Chapter 15 (**completely redacted**)

Chapter 16 (**completely redacted**)

Chapter 17 Quality Assurance) (complete)
Chapter 18 Human Factors (complete)
Chapter 19 Applicable Statutes (complete)
Chapter 20; Hazard Analysis (complete)
Chapter 21; Hazardous Materials (complete)
Chapter 22; Provisions for Decontamination and Decommissioning (complete)

Other FOIA document redactions

1. Interoffice Memorandum, FOIA Item #49 Appendix A, has 9 pages redacted.
2. U.S. Government Memorandum, Idaho Operations Office, March 19, 2004, Advanced Test Reactor Continued operations Planning Assessment Report (TPO-TRA-04-026) FOIA Item No. 41, **has** every page partially redacted **and Office of Independent Oversight and Performance Assurance** report is missing.
3. ATR Planning Assessment Team Report 2/13/04, FOIA Item Number 43, has portions or total pages redacted.
4. There remain FOIA requested documents that DOE/ID states are being "transferred to HQ for response directly to requestor" (see list below). The final release disposition of these documents has (of this date) not occurred and/or released with major redactions.
 - a. **Item # 37; OA-2003-ESH-6**
 - b. **Item # 38; OA-2003-ESH-7**
 - c. **Item # 39; OA-2003-ESH-8**
 - d. **Item # 40; OA-2003-ESH-9**
 - e. **Item # 41; TPO-TRA-04-026** (major redactions)
 - f. **Item # 43; Rice Report** (major redactions)
 - g. **Item # 45; Integrated Safety Management System (ISMS) Reports for 2004 and 2005**
 - h. **Item # 58; Survey Seismic Evaluation of the Emergency Surveys for Nuclear Safety Culture classes at TRA (TRC) and associated final reports.** (major redactions)

Excerpts (related to redactions) from EDI Review of April 26, 2006 DOE FOIA Document Shipment to EDI (See; ATR FOIA\DOE.Ltr.Lst.4.26.06.pdf) [Revision # 7]

Documents **Requested** 1/27/06 FOIA (see: ATR FOIA\EDI.ATR.FOIA.1.27.06.doc)

1. Documents related to Advanced Test Reactor (ATR) RCRA (Resource Conservation and Recovery Act) waste permits.
2. Documents related to ATR equipment RCRA permits.
3. Documents that show where ATR RCRA waste is processed/disposed.
4. Documents that show what category and volume of mixed RCRA waste is generated by the ATR.
5. Documents that show the role of ATR cooling towers in management of wastes generated by the ATR.
6. Documents that identify the types and volume of ATR wastes which have been

released to air, water or land.

7. Documents that identify the types and volumes of ATR wastes which have been accidentally (spilled) released by operations since year 2000.
8. Documents that have been generated as a result of any state, federal, or independent agency inspections of the ATR for RCRA compliance since the application of RCRA statutes to the Idaho National Laboratory or that facility under any of its previous names such as INEEL, etc.
9. Documents that may show that ATR waste is exempt from compliance with RCRA.
10. Documents that show any existing RCRA noncompliance issues for the ATR and its associated equipment.
11. Documents that show any RCRA noncompliance for facilities or equipment that are processing ATR mixed wastes.
12. Documents related to DOE/ID INL facility petition to the Defense Nuclear Facility Safety Board for "exclusion" from DNFSB Recommendation 2004-2 "Active Confinement Systems" August 2005 for Hazard Category 2 and 3 defense nuclear facilities and operations from further review under this Recommendation.
13. Documents related to INL plans to construct a new nuclear materials production reactor to among other things irradiate Np-237 and other defense-related "target materials.
14. Documents related to the completion of the partially constructed Replacement Processing Center to separate Np-237 from Navy and other "high-assay" spent nuclear fuel.
15. Documents related to design and construction of a Pu-238 "wet chemistry processing" and foundry operations to make metal shapes.
16. All RTC/TR Accident/Unusual Occurrence Reports from 2000 forward.
17. Any and all information or documentation DOE provided in response to the EPA's June 4, 2002 request for information from DOE pursuant to the Clean Air Act Section 114. Such information should include, at a minimum, an August 15, 2002 document entitled "Response to EPA Request for Information Concerning 40 CFR Part 63" and an October 3, 2002 email from DOE containing additional information responsive to the EPA's inquiry, and additional information regarding wastewater treatment at INL.

Of the 17 documents requested (listed above) DOE/ID only sent seven, claiming that for the other 10 "No Responsive Documents Exist." Document items received and reviewed here include; Item Nos. 3, 4, 6, 7, 8, 16, and 17. Each "Item" contains multiple documents.

Item No. 3 [Graph/Table listing vendor and facilities where ATR RCRA waste is processed and disposed]

Item No. 4 [Summary table from the INL Integrated Waste Tracking System identifying the types of mixed wastes generated from the ATR operations]

Both McCoy and Broschius found a crucial contradiction. Item #1 "Documents related to ATR RCRA permit" DOE/ID determined "No Responsive Documents Exist." There is no ATR RCRA

permit. Yet Document # 3 shows ATR RCRA waste processors and # 4 shows quantities of RCRA waste. Specifically, document # 4 (3/13/06) with EDI manual totals mixed (RCRA) ATR generated waste for one year is 1.803 cubic meters = 63.646 cubic feet. Also the below link shows RCRA mixed TRU waste in the bottom of the ATR Canal.

<http://www.id.doe.gov/doiid/INLContract/SecJAttPconform.pdf>

Item No. 6

This Item has three distinct parts; 1.) Response to the First Five-Year Review Report for Test Reactor Area (DOE/NE-ID-11189, 5/05); 2.) EDF-5835; 3.) Air Quality Permit to Construct for RTC; 4.) Air Quality Permit to Construct.

1.) Response to the First Five-Year Review Report for Test Reactor Area (DOE/NE-ID-11189, 5/05) **has huge redactions**. Only pages 86 through 92 are provided that show TRA RCRA waste water discharges to percolation ponds contributing to recharge to the aquifer. The discharges are huge, however, no radiological data is provided.

2. Air Quality Permitting Statement of Basis, 5/14/06. This report is to "satisfy the requirements of IDAPA 58.0101.200 Clean Air Act Permit. Total pollutants discharged for one year is 57.4 tons. Total TAPS/HAPS is 0.02 tons/yr. [page 7]

3. Engineering Design File EDF-5835. This offers more data on rad releases but the numbers on ATR Main Stack at 190 ci/yr are understated when compared to 2005 EIS data. No filters on ATR main stack. [page 3] Emissions Summary and manual totals of large (>1.0) rad emissions per year are 1,029.87 curies per year from the main ATR operations. [page 4] This number is a bit more in line with the EIS number of 1,802.69 curies released from TRA/ATR in 2000.[DOE/EIS-0287 page 4-30] A curie is a huge amount of radiation. EPA regulatory limits are in units of pico-curies or one trillionth of one curie because it is so biologically toxic.

4. Air Quality Permit to Construct only relates to TRA 3 electrical diesel generators.

Item No. 7 [ATR Spills Table - Summary of Accidental spills from ATR since year 2000; Occurrence Reports re the ATR spills; Reportable Quantity Table]

Item No. 8 [DEQ Reports since 1996]

This Item contains four IDEQ letters to DOE/ID plus a 11/18/96 Notice of Violation, all heavily redacted/censored.

1. The most recent 7/16/04 IDEQ letter clearly show IDEQ was conducting TRA inspections and seeking resolution to ".. violations resulting from a Resource Conservation and Recovery Act (RCRA)/Hazardous Waste Management Act (HWMA) inspection at the INEEL 5/3-7/2004." Only pages 15, 16 and 17 are provided, **the other 40 pages are redacted**.

2. IDEQ 12/9/02 letter to DOE included an inspection of the ATR. This inspection included the TRA 780 Temporary Accumulation Area and found no discrepancies in the 90 day storage limit. [page 26] Only pages 26 and 27 are provided and **the other 34 pages redacted**. IDEQ 12/2/99 letter to DOE related to a 11/4/99 Notice of Violation states illegal TRA discharge of 33 liters of RCRA listed waste into the TRA Hot and Warm Waste System. [pg 2] On page 7 IDEQ claims the issue resolved with DOE "documentation" claiming the discharges less than 1×10^{-8} ppm. No sampling is required to verify this, presumably the 33 liters is diluted with other waste which would itself be a violation.

3. IDEQ 1/4/99 Letter to DOE/ID is heavily redacted. It only has pages 3, partial page 4 and 9

and 10 of a 32+ page Consent Order . **Major redactions here.**

4. IDEQ 5/4/99 letter to DOE/ID, Notice of Violation **is heavily redacted** . It only has pages 3, partial page 4 and 9 and 10 and 11 of a 32+ page Consent Order.

5. Notice of Violation 8/26/97 is **heavily redacted** and only has the first four pages, and part of page 6 of 28 pages.

DOE fails to include the Voluntary Consent Order (VOC) No. DE-AC07-05ID14517 Modification M020 Section J. Attachment P "VOC Issue - Site-Tank-005 VOC Actions Required After January 31, 2005 NE-Funded Activities" ... "ATR Canal Trash, Consisting of Metal, Pneumatic Rabbit Terminals Shield and CIT Plugs, Contaminating Radioactivity, Contaminated lead; Storage, Treatment and Final Disposition." Also additional 15 TRA Hot Waste Storage Tank RCRA waste. [pg J-P-4] The crucial point being this RCRA waste is defacto in storage.

<http://www.id.doe.gov/doesid/INLContract/SecJAttPconform.pdf>

Summary Item 8, there is a wide range of conflicting information related to RCRA compliance at the ATR/RTC/TRA. None of the above documents reference a specific RCRA permit, yet IDEQ conducts inspections and issues Notices of RCRA violations and acknowledges some Voluntary Consent Orders. IDEQ's Bullock claims above that "The [ATR and other INL] reactors are not currently regulated as Treatment Storage or Disposal Facilities. Moreover, the major redactions make it impossible to determine the totality of the RCRA compliance issues at ATR/RTC/TRA and the INTEC were much of the waste is processes.

Item Number 16 [129 Occurrence Reports]

This is a ~three inch stack of Occurrence Reports related to the ATR/RTC/TRA starting with NE-ID-BBWI-ATR-2000-0001 and ending with NE-ID-BEA-RTC-2005-007. These reports contain a lot of important information.

Occurrence Reports. Good list of recent ATR/RTC accidents/occurrences. Based on the ascension numbers, there are at least 27 missing reports. For example, if there is a 0007 and a 0009, it is assumed that 0008 is missing. Since we have no idea how many total reports for each year, there may be missing reports at the end that would not be obvious using this tracking method. The missing reports are listed in the table below.

Contractor	Facility	Year	Report Number
NE-ID-BBWI	ATR	2000	0008
			00018
		2001	0002
			0005
			0009
		2003	0001
			0005
			0013
			0014
		2004	0003
			0004
			0005
NE-ID-BEA	ATR	2005	0008
			0009
NE-ID-BBWI	RTC	2000	0001

			0004
			0009
		2001	0006
			0008
		2002	0004
		2003	0002
			0004
			0005
			0007
			0009
NE-ID-BEA	RTC	2005	0001
		2006	0002
TOTAL REDACTIONS			27

Inspection of Environment, Safety, and Health Management of the Idaho Operations Office and Idaho National Engineering and Environmental Laboratory, DOE Office of Independent Oversight and Performance Assurance, September 2003 Appendix F [pages 63 through 74] States;

"The following design analysis weaknesses identified during this review raise concerns about the adequacy of the ATR design to mitigate all potential [loss-of-coolant accidents] LOCA's:

1. "Vortexing [sic] in the primary coolant surge tank was not considered in the LOCA PCP shutdown system design analyses to show that air entrainment into the primary coolant system (PCS) would be precluded.
2. "The introduction of air into the reactor from the normally dry piping between the level control (injection) valves and check valves for both upper and lower [Emergency Fire Injection System] EFIS subsystems was not analyzed.
3. "Failure of the PCS surge tank vent line was not considered in the updated accident analysis.
4. "The potential for reactor coolant system or reactor core damage because of PCP failure when running under severely inadequate [net positive suction head] NPSH conditions has not been adequately analyzed.

"These [above] weaknesses each had one or more of the following attributes: (1) failure to consider all accident phenomena in the accident analyses, (2) insufficient analysis of some potential accident, and (3) inadequate justification for assumptions relied on to support the accident analysis.

"Finding #6: Some potential accidents and accident phenomena have not been adequately analyzed and documented to provide assurance that ATR safety systems are capable of mitigating LOCA's in accordance with the ATR [upgraded final safety analysis report] UFSAR.

1. "Insufficient questioning of assumptions and attention to detail.
2. "Pressures of day-to-day priorities inhibit backward-looking reviews.
3. "Inadequate review of industry experience.
4. "The [safety analysis review] SAR was not updated to reflect modifications make to the firewater supply tanks.
5. "BBWI has not maintained adequate configuration control of documentation.
6. "The PCS surge tank level limits were not calculated in accordance with the facility procedure and contain some errors.
7. "BBWI has not implemented a fully effective program ('system interactive program') for identifying and analyzing non-safety components that could impact safety

components.

8. "There is insufficient documentation supporting the UFSAR statement that the Test Reactor Area (TRA) large diameter fire protection system piping does not fail during an earthquake.

9. "There is insufficient documentation supporting the UFSAR statement that the Test Reactor Area (TRA) large diameter fire protection systems piping does not fail during an earthquake.

"Finding #7: DOE has not supported and BBWI has not implemented an effective configuration control program to ensure that the ATR design meets all technical and procedural requirements as required by PRD-115, Configuration Management.

"Finding # 8: BBWI has not established a technically adequate surveillance program for testing the operability of the ATR firewater pumps as required by TSR LCO 3.2.1.3 surveillance requirements 4.2.1.2.8 and UFSAR Chapter 14.

"Finding # 9: BBWI has not implemented the [American Society of Mechanical Engineers] ASME Section XI inspection requirements for the [emergency fire injection system] EFIS check valves specified in the [in-service inspection] ISI plan referenced in UFSAR." ³¹⁶

1. "ATR did not review, evaluate and perform the recommended PM called for in the vendor manual for the upper firewater injection system level control valves. These valves currently have substantial leakage through the packing as a result of corrosion and pitting of the valve stem. Efforts to reduce the leaking (e.g., tightening the packing) have caused valve stroke times to exceed TSR limits and have been discontinued.

2. No PM has been specified for the safety-related, normally-energized solenoid valves that control the level control valves; a vendor manual for the solenoids was not available at the ATR." [pg. 69]

Section 6 Conclusion

The current operation of the Advanced Test Reactor (ATR) by the DOE constitutes serious and illegal environmental pollution. The ATR operations have all the ingredients for creating a nuclear disaster with deaths, injuries and national psychic trauma and tragedy that could equal or exceed the destruction of the World Trade Center, the bombing of the Oklahoma Murrah Federal Building or Hurricane Katrina. DOE operates the ATR at great peril to Idaho and all downwind residents. Any disaster which may occur as a result of ATR operations will be seen to have been entirely preventable except for the failure of the DOE and US government officials and the State of Idaho to heed the obvious warning signs abundantly present. The DOE continues to operate ATR with full knowledge that:

- DOE is not being honest about the risks for potential accidents from unsafe ATR operations;

³¹⁶ Inspection of Environment, Safety, and Health Management of the Idaho Operations Office and Idaho National Engineering and Environmental Laboratory, DOE Office of Independent Oversight and Performance Assurance, September 2003.

- DOE hides information from the public by censoring Freedom of Information Act requests and making unavailable reports such as Un-reviewed Safety Questions;
- Safety analyses are inadequate;
- Seismic safety analysis and protection in the event of earthquakes are wholly inadequate;
- DOE flaunts federal law in operating the ATR. The ATR lacks the federal permits for operation under the Clean Water Act, Resource Conservation and Recovery Act, and the Clean Air Act;
- DOE is not in compliance with its own Orders for operations and safety at ATR;
- The ATR operations have dumped millions of gallons of contaminants in the Snake River Aquifer and continue to do so;
- The ATR operations continue to annually pollute the respiratory environment with thousands of curies of radiation risking the health of children, the community and its workers;
- Containment in the event of a major nuclear accident is non-existent;
- The equipment of the ATR is antiquated and replacements are difficult or impossible to obtain;
- There is lack of an adequate safety culture at ATR;
- There is lack of adequate funding to safely operate ATR.

It is our recommendation that the ATR be shut down and decommissioning

¹ KYNF v. DOE, Idaho District Court, Case 4:07-cv-00036-BLW, Doc. No. 69, Errata to December 3, 2007 Declaration of Robert D. Boston, DKT. No. 64.

² KYNF v. DOE, Civ. No. 07-36-E-BLW, Reply Memorandum of Points and Authorities in Further Support of Plaintiffs' Motion for Summary Judgment, 9/14/07. Also see EDI Newsletter Nov./Dec. 2007; and ATR Risk Report available at: <http://environmental-defense-institute.org/>

³ DOE/ID Facility Certification Report No. 29, "This certification is for the operation of the Advanced Test Reactor (ATR) to be implemented during Cycle 134B-2 and continuing with subsequent cycles under Technical Safety Requirement (TSR) 186, Revision 14, April 7, 2005. Also cited in Plaintiffs original NEPA Complaint, 1/10/07.

**Operations Report Excerpts
Related to the Advanced Test Reactor
and co-located
Advanced Test Reactor Critical**

**2006 to January 2013 [Revision 6-01]
Compiled by Chuck Broschious
1/24/13**

Summary

Based on the cited reports below, there were at least the following shutdowns or major startup interruptions at the Advanced Test Reactor: 2007 - one; 2008 – five; 2009 – five; 2010 – eight; 2011 – six; 2012 – five; 2013 as of January - one.

EDI's review of Occurrence Reports/Un-reviewed Safety Questions (NOT Operations Reports) released by DOE to EDI under a Freedom of Information request related to ATR shutdowns/scrams between 1991 and 1999 shows the following: ten during this nine year period, with an average of 1.25/yr. See individual annual listing at the end of this report.

The 2007 to 2010 period represents a radical increase in shutdowns (308%) per year that is legitimately attributable to ATR's 47 year aging problem – acknowledged by INL below (August 23, 2006 report).

The Advanced Test Reactor Critical is included here because they are co-located with the ATR; operate under the same contractor (Battelle Energy Alliance/management structure and share safety systems.

*Note: **Bolding/underline** in the cited DOE/INL text below is for emphasis only and not in DOE's original text.*

2006

Issued June 29, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of June 12-June 25, 2006

June 22: During a Safety Analysis Report (SAR) review, Advanced Test Reactor personnel identified a Potentially Inadequate Safety Analysis (PISA) condition regarding Primary Coolant System (PCS) overpressure protection in relation to a complete loss of heat sink (LOHS). Upon a LOHS condition, the PCS water will heat up, expand, and cause a pressure increase. Additional flow from the gland seal water (GSW) pump was not considered in the analysis. However, combining the GSW flow of 68 gallons per minute (gpm) with the LOHS transient flow (maximum of 622 gpm) would result in a total flow of 690 gpm. This would exceed the capacity of the SAR minimum required relief valve flow. The currently installed PCS relief valves have a combined certified relief capacity of 700 gpm, which would provide adequate protection for this transient. Appropriate notifications were made and an Unreviewed Safety Question evaluation was initiated. There were no restrictions or interim controls associated with this PISA conditions. (NE-ID--BEA-ATR-2006-0007)

June 22: During a Safety Analysis Report review, Advanced Test Reactor personnel identified a

Potentially Inadequate Safety Analysis condition regarding an extreme over-speed of the diesel-powered standby pressurizing pump. The analysis assumed that only the pressurizing pump would be affected by the diesel over-speed, and did not take into account the flow increase from the diesel-powered gland seal water pump. Appropriate notifications were made and an Unreviewed Safety Question evaluation was initiated. (NE-ID--BEA-ATR-2006-0008)

Issued June 5, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of May 15-28, 2006

May 22: During routine plant observations, it was noted that an unused Advanced Test Reactor (ATR) fuel element storage position was moving laterally approximately 1/2 inch. Movement was most likely induced by the flow from the canal recycle system. At the time, no other storage positions were noted to be moving and this condition was treated as a material deficiency. An extent of conditions review was performed and two additional storage positions were found to move greater than the design dimensional tolerance (1/32 inch). Initial assessment indicates that due to the large amount of conservatism built into the criticality safety evaluation for the fuel storage grid, this small amount of lateral movement poses no threat to criticality safety and no interim controls are required. ATR management has removed the three storage locations from service until a new detailed criticality analysis of the grid is completed.

(NE-ID--BEA-ATR-2006-0005)

Issued July 17, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of June 26-July 09, 2006

June 26: During post-maintenance testing at the Advanced Test Reactor Critical (normal shutdown/outage period), the #3 safety rod failed to drop into the reactor core, as required. A spare actuator controller was installed in the #3 position and the test repeated. The #3 safety rod again failed to drop into the reactor core, indicating performance degradation associated with the actuator controllers and their circuitry. Plant and Nuclear Safety Engineering commenced an evaluation of the problem for indication of a possible original design deficiency and a reasonability determination of the existence of a potential inadequacy in the safety analysis (PISA). There was no safety impact since the discovery was during facility shut down. Currently, there are no programmatic impacts. There is potential for future impacts, if further evaluation reveals the need for component redesign. (NE-ID--BEA-ATR-2006-0009)

Issued Aug. 14, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of July 24-Aug 6, 2006

July 26: A review of the powdered uranium inventory stored at the Nuclear Materials Inspection and Storage Facility (NMIS) was conducted to determine if it was within the safety basis to repackage and permanently remove the material from the facility. The quantity of material in some of the individual packages was large enough to raise a question about whether the current safety documentation was sufficient, resulting in an unreviewed safety question finding. Interim controls were established for the movement of uranium powders from these approved storage areas. (NE-ID--BEA-ATR-2006-0010)

Aug 2: Operations personnel were routing tubing through the Advanced Test Reactor Loop 2B transmitter cabinet when the tubing came in contact with a conduit. The radiological controls technician noted a spark coming from the end of the conduit upon contact. Work was immediately stopped, management was notified and boundaries were established to restrict access to the area. The source of the spark was determined and power to the energized wiring was tagged out. The wiring was placed in an electrically safe configuration by insulating the exposed ends of the wiring and then power was restored. (NE-ID--BEA-ATR-2006-0011)

Issued Aug. 30, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of Aug. 7 - Aug. 20, 2006

Aug. 7: Battelle Energy Alliance has a zero defect policy for administration of the lockout/tag out (LO/TO) process. Recently two events fell short of the zero defect expectation and caused the contractor to stop work and a critique and safety stand downs were conducted. Subcontractors were then trained on the LO/TO requirements and the contractor's expectations. In neither case was work performed without hazard mitigations in place. (NE-ID--BEA-ATR-2006-0012)

Issued Sept. 12, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of Aug 21-Sept 3, 2006

June 7: The Design Basis Reconstitution (DBR) team discovered a minor calculation error in the high pressure set point of the Advanced Test Reactor plant protection system. When primary coolant system pressure increased to a pre-determined value, the ATR core and several pumps are shutdown automatically. Due to the inaccuracy, the automatic shutdown may have been slightly delayed. The miscalculation was of such small magnitude, it was determined that no additional controls or limits were required for the continued operation of the ATR.

The DBR is an effort to search for and correct errors and inconsistencies in the design of the ATR. Similar DBRs have been conducted on numerous commercial nuclear reactors. (NE-ID--BEA-ATR-2006-0006)

Aug. 21: During non-routine maintenance on several Advanced Test Reactor switchgear and motor control centers, the systems control panel was placed under Lockout/Tag-out (LO/TO). During a control panel recheck an energized power source was found. Work was immediately stopped. A critique was held and the cause was identified prior to work restarting. (NE-ID--BEA-ATR-2006-0013)

Aug. 23: It was discovered that the Advanced Test Reactor's Safety Analysis Report did not fully analyze the bounding of accidents for reflector aging. A Potentially Inadequate Safety Analysis was identified after this discovery. Compensatory measures were taken, appropriate notifications were made, and an Unreviewed Safety Question Determination was initiated. (NE-ID--BEA-ATR-2006-0014)

Aug. 28: Part of the ongoing Advanced Test Reactor Design Basis Reconstitution Program includes review of the Safety Analysis Report (SAR) and supporting calculations. This review has resulted in a Potential Inadequacy in the Safety Analysis in Section 15.6, "Decrease in Primary Coolant Inventory." One of the supporting calculations had several deficiencies. The calculations will be corrected and changes made. Interim controls have been established to assure secondary coolant system activity remains within the controlled limits. (NE-ID--BEA-ATR-2006-0015)

Issued Nov. 2, 2006

DOE-Idaho Bi-Weekly Operations Summary

For the Period of Oct. 16 - 29, 2006

Oct. 2: During a standard review, it was determined that a more detailed analysis was needed for a maximum potential accident scenario at the Advanced Test Reactor spent fuel storage canal. No compensatory measures were required because requirements are already in place to prevent the movement of loads over irradiated fuel in the canal. Appropriate management notifications were made, and a more detailed safety review was initiated. (NE-ID--BEA-ATR-2006-0023)

Oct. 2: A condition was identified at the Advanced Test Reactor regarding inconsistencies in a maximum hypothetical accident analysis associated with radiological consequence analysis. Appropriate interim measures were taken, management notifications were made, and a more detailed safety review was initiated. (NE-ID--BEA-ATR-2006-0024)

2007

Issued Aug. 13, 2007

DOE-ID Bi-Weekly Summary

For the Period July 24-Aug. 6, 2007

July 31: While working on the Advanced Test Reactor Critical, operators noted that an instrument light for an amplifier was indicating erratically. The instrument was declared out of service, the failed amplifier was replaced, and required post-maintenance testing completed. (NE-ID-BEA-ATR-2007-0016).

Issued Aug. 27, 2007

DOE-ID Bi-Weekly Summary

For the Period Aug. 7 – Aug. 20, 2007

Aug. 9: During a maintenance outage of the Advanced Test Reactor, a discrepancy was identified in the safety documentation of the reactor. A review of the concern is under way while the reactor is in maintenance shut down, and no interim controls are required. (NE-ID-BEA-ATR-2007-0017).

Issued Oct. 5, 2007

DOE-ID Bi-Weekly Summary

For the Period Sept. 18 – Oct. 1, 2007

Sept. 19: Electricians working at the Advanced Test Reactor discovered electrical energy in an area that was supposed to be de-energized to allow for maintenance. Work was stopped and an investigation undertaken to determine the source of the energy. (NE-ID-BEA-ATR-2007-0018).

Issued Oct. 19, 2007

DOE-ID Bi-Weekly Summary

For the Period Oct. 2-15, 2007

Oct. 3: Equipment required for the safe operation of the Advanced Test Reactor (ATR) is identified using a rigorous analysis process and documented in the ATR Safety Analysis Report (SAR). Operation, maintenance, and modification of the ATR are accomplished only after careful review of the SAR for impacts to this safety analysis. When the SAR was upgraded in the late 1990s, a discrete list of this safety-related equipment was developed. Contrary to DOE administrative requirements, there is currently no procedure for maintaining this safety-related equipment list. This is not a safety issue because the list is not used for safety-related decision making – the source analysis documents are. (NE-ID-BEA-ATR-2007-0019)

Oct. 4: During a review of historical ATR documents, it was discovered that a fuel storage requirement had been inappropriately removed from operating procedures. Past operating procedures required that fuel used in the reactor not be placed within 12 inches of the wall of the fuel storage canal during the first 17 days of its storage. The heating of structural materials caused by their absorption of radiation may adversely affect the structural performance of those materials. The 12 inches of separation allows the canal water to shield the walls from the more intense radiation emitted by the fuel during the first 17 days of storage. This requirement was based on extremely conservative assumptions regarding ATR operations which yielded far higher wall radiation exposures than actual operations do. The requirement has been reincorporated into facility procedures. (NE-ID-BEA-ATR-2007-0020)

Issued Nov. 2, 2007

DOE-ID Bi-Weekly Summary

For the Period Oct. 16-29, 2007

Oct. 18: A total power outage occurred at INL when a phase conductor on a power pole fell to the ground and tripped the breakers at both ends of the power line. The power pole and cross arm were burned, but the conductor was not damaged. The power pole was repaired and the line was re-energized. (NE-ID-BEA-CFA-2007-0007).

Oct. 24: During startup of the Advanced Test Reactor Critical, the reactor operator reported that instrumentation was showing abnormal readings. **He stopped the start-up procedure and ordered the reactor shut down pending review.** (NE-ID-BEA-ATR-2007-0021).

Oct. 29: At the Advanced Test Reactor, “dampers” are used to prevent the release of radioactive material from the facility in the event of an incident. Several years ago, backup dampers were upgraded to provide the same kind of protection as primary dampers. While both the backup and primary dampers would close in the event of a release at ATR, current safety documentation only requires that one or the other is in service during reactor operations. This is inconsistent with a higher-level safety requirement, and is under review. (NE-ID-BEA-ATR-2007-0023).

Oct. 29: As part of an ongoing evaluation process to ensure that safety documentation at the Advanced Test Reactor is consistent, three issues were identified. These deal with how much pressure the reactor confinement system can withstand; an improper evaluation of the heating, ventilation and air conditioning system performance during a radiation release; and improper evaluation of the effect of negative air pressure on the confinement system. Both the ATR contractor and DOE have evaluated these issues and found there is no impact to the safe operation of ATR. An evaluation of the issues and how to correct them is ongoing. (NE-ID-BEA-ATR-2007-0022).

Issued Nov. 21, 2007

DOE-ID Bi-Weekly Summary

For the Period Oct. 12-Nov. 12, 2007

Nov. 5: Proper procedures were not followed when workers could not get a large sliding door to open at the Advanced Test Reactor building. A worker complained of shoulder pain resulting from manual efforts to force open the stuck door, was examined and released back to work with restrictions. An investigation into the failure to follow proper procedures is underway and corrective actions will be put in place. (NE-ID-BEA-ATR-2007-0024).

Issued Dec. 12, 2007

DOE-ID Bi-Weekly Summary

For the Period Nov. 13-Nov. 26, 2007

Nov. 15: During a planned power outage at the Reactor Technology Complex, power was unexpectedly lost to another building in the area. Work in progress, including crane operations and containment work requiring filtered air movers, was impacted. Upon discovery of the unexpected power loss, a decision was made to complete the work in order to restore power quickly to the affected building. A critique was held to determine the cause of the incident and to identify lessons learned. (NE-ID-BEA-ATR-2007-0025).

2008

Issued Feb. 26, 2008

For the Period Feb. 5-Feb. 19, 2008

Feb. 11: A leak was discovered in the non-radioactive system that supplies sealing and cooling water to the shaft seal on the primary coolant pump at the Advanced Test Reactor during recent operations. **The reactor was shut down to allow a switch to a different primary coolant pump with a non-leaking seal system, and the reactor was restarted.** (NE-ID-BEA-ATR-2008-0003).

Issued March 11, 2008

For the Period Feb. 20-March 4, 2008

March 4: It was determined there is a discrepancy between a computer model's projections for how quickly safety rods can be inserted at the Advanced Test Reactor, and the response time predicted in current safety documentation. Interim safety controls will be implemented while the issue is further analyzed. (NE-ID-BEA-ATR-2008-0005).

Issued May 22, 2008

For the Period May 2-19, 2008

May 6: During start-up of the Advanced Test Reactor, it was determined that a system that indicates power levels in the reactor lobes was not functioning properly, even though it was not required at lower power levels. Limits were placed on reactor operations as a precaution until the system is restored. (NE-ID-BEA-ATR-2008-0007).

May 13: The Advanced Test Reactor was inadvertently shut down when an operator hit the wrong computer command. Normal reactor shutdown procedures were followed. The test and

debug computer displays will be password protected in the future to prevent a similar inadvertent shutdown. (NE-ID-BEA-ATR-2008-0009)

Issued June 19, 2008

For the Period June 1-17, 2008

June 5: The Advanced Test Reactor experienced an unplanned shutdown due to an electrical malfunction. The reactor went into an unplanned outage to allow for troubleshooting and repair of the problem. (NE-ID-BEA-ATR-2008-0010)

Issued July 11, 2008

For the Period June 18-July 5, 2008

June 26: While inspecting the Advanced Test Reactor during a planned outage, a flow restrictor component was found out of its installed experiment position in the vessel tank. A review of the reactor loading records showed the flow restrictor was installed as part of the vessel closeout process. The closeout process will be revised to include performance of the final visual inventory and inspections after all in-vessel operations are complete and all long-handled tools are removed from the vessel. (NE-ID-BEA-ATR-2008-0013).

Issued July 28, 2008

For the Period July 6-21, 2008

July 10: During operation of the Advanced Test Reactor on July 5, operators observed an intermittent reactor vessel low differential pressure alarm. Follow-up investigation revealed electrical interference between the cables of a regulating rod and the differential pressure instrument, causing fluctuations in the differential pressure. Spacers were placed between the cables to limit the interference. Testing was performed and validated that the electrical interference was eliminated. (NE-ID-BEA-ATR-2008-0015).

July 15: A systems engineer determined that an electrical breaker installed in the switchgear cubicle of a pump at the Advanced Test Reactor was not the breaker that was expected to be installed. It was then determined that a required response check of the system was not conducted as prescribed. The pump was placed out of service until the required check could be performed. The pump was not operating at the time the discrepancy was found. (NE-ID-BEA-ATR-2008-0016 and 0017).

Issued Aug. 8, 2008

For the Period July 22-Aug. 5, 2008

July 29: It has been determined that there is an error in the computer code used as part of accident analysis at the Advanced Test Reactor and the Advanced Test Reactor-Critical. After an analysis of the error was conducted, it was determined the error would not significantly change the conclusions of the safety analysis done for the reactors, and no interim restrictions or requirements on reactor operation were necessary. (NE-ID-BEA-ATR-2008-0018).

Issued Aug. 22, 2008

For the Period Aug. 6-Aug. 18, 2008

Aug. 7: Operators noticed unusual noises caused by vibration from a coolant pump at the

Advanced Test Reactor. The pump was removed from service and the reactor was shut down. A technical evaluation was performed on the remaining coolant pumps and reactor operations resumed. (NE-ID-BEA-ATR-2008-0019).

Aug. 7: While exiting the storage canal area at the Advanced Test Reactor, an employee set off a personnel contamination monitor alarm when contamination was discovered on the operator's shoe. The contamination was removed and analyzed. Detailed surveys were performed in the canal area and additional controls were implemented for entry in that area. (NE-ID-BEA-ATR-2008-0020).

Aug. 11: An alarm went off while a primary coolant pump was being restarted at the Advanced Test Reactor. Operators noted that a stand-by pump was running inadvertently. Both pumps were shut down and management notified. (NE-ID—BEA-ATR-2008-0021).

Issued Oct. 7, 2008

For the Period Sept. 16-29, 2008

Sept. 22: It was discovered that the engine block heater thermostat on a diesel firewater pump failed at the Advanced Test Reactor Complex. The reactor was in shutdown condition and defueled, and the pump is not required to be operable when the reactor is defueled. The pump was declared inoperable and will be repaired. (NE-ID-BEA-ATR-2008-0027).

Issued Sept. 18, 2008

For the Period Sept. 3-Sept. 15, 2008

Sept. 11: While removing an experiment from the Advanced Test Reactor, it was discovered that configuration of the lift equipment was not in compliance with the drawing in the operating procedure. However, evaluation by the engineering staff determined that the configuration used was an acceptable and safe method for the lift. Management was notified of the non-compliance and an incident critique was held. (NE-ID-BEA-ATR-2008-0024).

Sept. 15: During inspection of a circuit breaker at the Advanced Test Reactor, suspect bolting material was discovered. A non-conformance report was placed into the tracking system for resolution. (NE-ID-BEA-ATR-2008-0025).

Issued Nov. 19, 2008

For the Period Oct. 28-Nov. 11, 2008

Nov. 3: The Advanced Test Reactor was shut down and a review undertaken after an investigation identified potential seismic concerns with a cinder block wall in the facility. Compensatory actions were taken to ensure the wall would not damage required utility systems in a seismic event, and the reactor was restarted. (NE-ID-BEA-ATR-2008-0028).

2009

Issued March 18, 2009

DOE-ID Bi-Weekly Summary

For the Period March 3 to March 16, 2009

March 10: During startup of the Advanced Test Reactor on March 8, it was determined that a primary coolant check valve was not seating properly. Startup preparations were stopped, the primary coolant system was depressurized and the reactor was defueled so the check valve could be replaced. (NE-ID-BEA-ATR-2009-0003).

Issued April 9, 2009

DOE-ID Bi-Weekly Summary

For the Period March 16 to March 31, 2009

March 19: An operator at the Advanced Test Reactor discovered that an inflatable seal on the canal bulkhead at a fuel storage facility was no longer maintaining required pressure because of an air leak. Spent fuel cask movements in the canal area affected by the failed seal were prohibited until the failed seal is repaired or modifications completed. (NE-ID-BEA-ATR-2009-0004).

March 26: It was determined that an existing safety analysis of the Advanced Test Reactor does not fully address the possibility that emergency cooling pumps at the reactor could be submerged before they are able to fulfill their safety function following a reactor shutdown in a particular accident scenario. No compensatory action was taken because subsequent calculations showed that the emergency cooling pumps would remain operational for the required time. (NE-ID-BEA-ATR-2009-0005).

March 30: During a routine safety walk down of the Advanced Test Reactor, a facility representative discovered a slightly open door on a 480-volt electrical panel. The open door provided a small opening where a person could contact energized wires. The electrical panel with the open door was roped off for further investigation. (NE-ID-BEA-ATR-2009-0006).

Issued June 23, 2009

For the Period May 26 to June 14, 2009

June 9: An operator at the Advanced Test Reactor noted power variations in one of the reactor's experimental lobes. After consulting with ATR engineering and verifying the indications were from a failure of the instrumentation system, the ATR shift supervisor declared the instrumentation system inoperable, and initiated limiting conditions on reactor operations. The indication problem was corrected and the limiting condition on reactor operations was removed the same day. (NE-ID-BEA-ATR-2009-0013).

Issued July 13, 2009

For the Period June 15 to July 6, 2009

June 29: An equipment operator noted the improper assembly of wire rope components on a mobile crane during a daily pre-use inspection at the Advanced Test Reactor Complex. Other suspect/counterfeit wire clamps were also noted. This crane was tagged out of service and further mobile crane inspections discovered suspect/counterfeit components. These cranes were also tagged out of service. (EM-ID-CWI-BIC-2009-0002).

Issued Sept. 2, 2009.

DOE-ID Bi-Weekly Summary

For the Period Aug. 18 to Aug. 31, 2009

Aug. 24: A review was initiated to look at the Advanced Test Reactor primary coolant system chemistry. In the course of the review, it was noted that the technical safety requirements limits for pH of the ATR primary coolant system water allow a low range (pH 4.7) that could possibly cause damage to the thin boehmite oxidation layer that is on the fuel. Interim controls after the discovery have been put into place that do not allow the pH of the primary coolant system to get below 5.0. A review of chemistry logs has been performed to ensure that none of the fuel in the canal has been exposed to a pH less than 5.0. (NE-ID—BEA-ATR-2009-0020).

Issued Sept. 30, 2009

DOE-ID Bi-Weekly Summary

For the Period Sept. 15 to Sept. 28, 2009

Sept. 16: It has been determined that evacuation sirens located at the Advanced Test Reactor Complex are mounted within office buildings that are not designed to withstand significant seismic events. A review of the safety analysis at the facility is underway. (NE-ID—BEA-ATR-2009-0021).

Issued Oct. 16, 2009

DOE-ID Bi-Weekly Summary

For the Period Sept. 29 to Oct. 12, 2009

Sept. 30: An automatic shutdown of the Advanced Test Reactor occurred when a circuit breaker on a diesel bus tripped open on a ground fault indication. An investigation was initiated into the cause of the ground fault trip. The reactor remained in a safe condition and was restarted following review of the shutdown. (NE-ID—BEA-ATR-2009-0022).

Oct. 12: An automatic shutdown of the Advanced Test Reactor occurred as the result of an error by an experiment operator who failed to follow proper procedures. The reactor remained in a safe condition; a critique was conducted and corrective actions taken. (NE-ID—BEA-ATR-2009-0023).

Issued Nov. 30, 2009

DOE-ID Bi-Weekly Summary

For the Period Nov. 10 to Nov. 23, 2009

Nov. 17: While connecting a battery charger to a battery bank at the TRA-604 Battery Room, an electrician was burned on both hands by an electrical arc. The injured electrician was treated at the Central Facility Area medical dispensary and then driven home. The doctor found first and second degree burns over 5 percent of the electrician's hands. Electrical work was stopped and access to the battery room secured pending a critique of the incident. (NE-ID—BEA-RTC-2009-0002).

Fuel Burn-up Record: Idaho National Laboratory scientists have set a new world record for fuel burn-up with a reactor fuel for next generation high temperature gas reactors. As part of a nearly three-year experiment, about 19 percent of the fuel's low-enriched uranium has been consumed in the INL's Advanced Test Reactor – more than double the previous record set by German researchers. Better reactor fuels mean more efficient heat and power production and less waste when the fuel is spent.

Issued Dec. 8, 2009

DOE-ID Bi-Weekly Summary

For the Period Nov. 24 to Dec. 7, 2009

Nov. 24: Start-up of the Advanced Test Reactor was interrupted by an instrument problem. The problem was diagnosed and corrected and reactor start-up resumed. (NE-ID-BEA-ATR-2009-0024).

Dec. 2: The Advanced Test Reactor was shut down when a calculation error was discovered in the assurance package for that particular reactor operating cycle. The reactor remained in shutdown until the error was corrected and a re-calculation performed. (NE-ID—BEA-ATR-2009-0025).

2010

Issued Jan. 21, 2010

DOE-ID Bi-Weekly Summary

For the Period Jan. 5 to Jan. 18, 2010

Jan. 12: The shift supervisor at the Advanced Test Reactor entered into a limiting condition [shut-down] for operation of the reactor when two instrument systems used to calculate water flow in the reactor were declared out of service. Limiting conditions for operation are a Department of Energy approved method to ensure safety of nuclear facilities while system performance is evaluated. The shift supervisor used other data systems to verify the safety of reactor operations while the systems were repaired and returned to operation. (NE-ID—BEA-ATR-2010-0001).

Nuclear Research: The INL's Advanced Graphite Capsule project will test over 2,000 different samples of graphite in the INL's Advanced Test Reactor over a 10-year period. The tests are part of work to certify the graphite that is used in many parts of advanced nuclear reactor designs.

Issued Feb. 25, 2010

DOE-ID Bi-Weekly Summary

For the Period Feb. 3 to Feb. 22, 2010

Feb. 11: An air leak was detected from two pressurized seals on the bulkhead at the head of a nuclear fuel storage canal. Cask handling was prohibited in the canal until the seal was repaired. (NE-ID—BEA-ATR-2010-0003).

Issued March 15, 2010

DOE-ID Bi-Weekly Summary

For the Period Feb. 22 to March 8, 2010

March 9: An electrician violated a lock out/tag out when he mistakenly disconnected the electrical system for the wrong pump motor at the Advanced Test Reactor. The motor was not energized at the time, and there were no injuries or damage to equipment. A lock out/tag out was applied and a critique of the incident was scheduled. (NE-ID—BEA-ATR-2010-0004).

DOE-ID Bi-Weekly Summary

For the Period March 22 to April 5, 2010

Distributed April 7, 2010

Reactor Experiments: After a year of intense nuclear irradiation, the first four university experiments to use Idaho National Laboratory's Advanced Test Reactor (ATR) National Scientific User Facility are coming out of the reactor. Up next for the experiments: post-irradiation analysis, another key step in the User Facility's effort to encourage collaboration among nuclear energy researchers from academia, industry and U.S. Department of Energy national labs.

Distributed April 22, 2010

DOE-ID Bi-Weekly Summary

For the Period April 6 to April 19, 2010

April 8: An operator at the Advanced Test Reactor noted that the distribution breaker for the Plant Protective System channel C battery charger had tripped open. An attempt was made to reset the breaker, but it immediately tripped open again. The system is not required to be operable while the reactor is shut down, and it was taken off-line. (NE-ID—BEA-ATR-2010-0006).

For the Period April 20 to May 5, 2010

Distributed May 12, 2010

April 26: Two subcontractors violated posted radiological control area entry instructions while delivering waste boxes to a storage pad at the Advanced Test Reactor Complex. Because of the low radiological fields present in the area, the two workers did not receive significant exposures. A radiation engineer will complete a radiological exposure questionnaire to document any dose received. (NE-ID—BEA-RTC-2010-0001).

May 5: Several instances of suspect/counterfeit bolts were discovered during a recent outage at the Advanced Test Reactor. Some of the suspect bolts were determined to be non-load bearing and acceptable for use. They will be replaced when future maintenance activities require disassembly of the components. All other suspect bolts were removed pending determination for disposal or destruction. (NE-ID—BEA-ATR-2010-0008).

DOE-ID Bi-Weekly Summary

For the Period June 15 to July 5, 2010

June 7, 2010 INL.gov website Information Update

On May 30, 2010, Idaho National Laboratory voluntarily interrupted [shutdown] routine testing at the Advanced Test Reactor because operators detected momentary, higher-than-normal radioactivity levels in the reactor's primary coolant and building exhaust systems.

The radioactivity levels detected were too low to trigger any routine reporting criteria, but warranted interruption of testing at the ATR to allow for experiment analysis and removal of the source. No measurable exposure to workers or the public occurred.

One of the ATR's functions as a test reactor is to test how new nuclear fuel designs perform. During this testing, experiments may release minor quantities of radioactivity into the reactor's primary coolant system. INL's continuous monitoring of ATR systems quickly detects such release conditions, should they occur.

ATR staff has now determined that the experiment which released fission products into the reactor

coolant is one of several testing new types of low-enriched fuel that could be used in research reactors that currently run on highly-enriched uranium. Testing at the ATR will resume after the experiment causing the increased radioactivity is removed and normal scheduled maintenance work is completed.

DOE-ID Bi-Weekly Summary

For the Period Nov. 15-Dec. 1, 2010

Nov. 22: During startup of the Advanced Test Reactor Primary Coolant System, the shift supervisor noted that a required procedural step was not documented in the log book. The primary coolant pump was secured and the discharge check valve verified shut as a conservative action until it could be verified that the procedural step was taken. Upon further review of documentation, it was verified that the step had indeed been taken as required. A critique of the incident was held. (NE-ID—BEA-ATR-2010-0023).

2011

DOE-ID Bi-Weekly Summary

For the Period May 17-June 6, 2011

May 17: An issue was identified at the Advanced Test Reactor Complex dealing with the nuclear measurements of experiments in the Advanced Test Reactor Critical facility. It was determined through extensive measurements that the procedure used to measure experiments needs to be strengthened. (NE-ID—BEA-ATR-2011-0009).

June 6: A misaligned pressure control valve caused water to inadvertently drain from the reactor vessel during a scheduled maintenance shutdown at the Advanced Test Reactor. Radiological monitoring showed there were no excessive radiation levels as a result of the lowering water level, and a minimum of 10 feet of water was maintained above the core when the shift supervisor directed repositioning the misaligned valve to restore the level. A design feature of the reactor ensures the reactor core remains covered with at least 4 feet of water to provide adequate cooling with no operator action. A critique of the occurrence was held. (NE-ID—BEA-ATR-2011-0010).

June 7: An issue was identified at the Advanced Test Reactor dealing with the requirements for calibration of nuclear instruments. It was noted that although the nuclear instruments were being calibrated as required, a written requirement needed to be strengthened in the technical safety documents. (NE-ID—BEA-ATR-2011-0011).

DOE-ID Bi-Weekly Summary

For the Period Sept. 27- Oct. 17, 2011

Oct. 5: While preparing to remove scaffolding from around a check valve at the Advanced Test Reactor, workers realized that a reach rod for the M-6 inlet valve was in the area they were planning to work, and that it had not been locked out. Work was stopped until the proper isolation of hazardous energy was established, and the lockout/tagout was changed to include the motor for the M-6 valve. (NE-ID—BEA-ATR-2011-0017).

Oct. 12: An operator noted that the engine block heater reading for a firewater pump at the Advanced Test Reactor Complex was at 210 degrees F, which is outside the specified range of 120-160 degrees. The circuit breaker to the heater was opened, the pump was declared out of service,

and compensatory actions were taken. (NE-ID—BEA-ATR-2011-0018).

DOE-ID Bi-Weekly Summary

For the Period March 8-April 11, 2011

March 10: During systems testing at the Advanced Test Reactor, yokes on two emergency firewater injection system control valves failed. Work was stopped and management notifications were made. The reactor was already defueled and shut down, so there was no need for a shut down due to the inoperability of this system. A critique was performed. (NE-ID—BEA-ATR-2011-0004).

March 21: A manager at the Advanced Test Reactor, while conducting an observation, noticed that the personnel door between the reactor main floor and the canal area did not close. The door is safety class equipment but was not required to be operable at the time. The hinges on the door were adjusted so that it closes properly as designed. (NE-ID—BEA-ATR-2011-0005).

April 4: During a walk down of lockout/tagout procedures at the Advanced Test Reactor, the locking device, lock, tag and hasp all came loose from the tagged 120 VAC distribution breaker. An investigation was performed to determine why the lockout/tagout components came off. All ATR lockout/tagouts were checked and all of those of similar design as the one that broke were removed from service pending further evaluation. (NE-ID—BEA-ATR-2011-0006).

April 7: A technician removed a 120-volt jumper from a 480-volt switchgear at the Advanced Test Reactor without proper protective equipment. Management was notified and a critique of the incident was held. (NE-ID—BEA-ATR-2011-0007).

DOE-ID Bi-Weekly Summary

For the Period April 11 – April 25, 2011

April 14: A computer code which was used to determine the maximum amount of radioactive material produced in the capsules in the hydraulic shuttle at the Advanced Test Reactor was found to be missing one line of code. While this error could potentially affect the safety analysis, after further review no impact to the analysis was found. (NE-ID—BEA-ATR-2011-0008).

DOE-ID Bi-Weekly Summary

For the Period Aug. 9 – Aug. 23, 2011

Aug. 11: New information was developed in an analysis of the uncertainty of the Water Power Calculator (WPC) system at the Advanced Test Reactor when thermal quadrant powers are greater than 47 megawatts. This is caused by potential mixing of flow between quadrants that may introduce more uncertainty into the WPC quadrant power calculation. Quadrant thermal power is an important parameter because it is used as a check to verify that the Lobe Power Calculation and Indication System are indicating within an acceptable range of the true lobe power. Lobe Power is the parameter by which the reactor operators adjust the power of the reactor to ensure that the effective plate power limits are not exceeded. At the time of the discovery the reactor was shut down. (NE-ID-BEA-ATR-2011-0012).

Aug. 18: The Advanced Test Reactor documented safety analysis classifies diesel generator 674-M-6 as Seismic Category I, safety-related equipment. The accident analysis credits 674-M-6 as supplying power to safety related loads to ensure a complete loss of coolant flow is a beyond design basis event.

Surveillance activities are required to ensure that safety related equipment is operable to ensure safe operation. Operability and surveillance requirements, however, are not documented in the safety basis documents. Operability of 674-M-6 was being properly confirmed. (NE-ID-BEA-ATR-2011-0013).

DOE-ID Bi-Weekly Summary

For the Period Aug. 24-Sept. 12, 2011

Sept. 6: During fuel transfer cask loading at the Advanced Test Reactor, operators mistakenly isolated the wrong valves of the canal parapet, causing back-up systems to initiate. The correct air valves were positioned and air was restored to the correct portion of the canal. Canal work was stopped. (NE-ID—BEA-ATR-2011-0014).

Sept. 7: During a reactor shutdown at the Advanced Test Reactor, a valve failure occurred on the primary coolant pump discharge check valve. The valve was declared out of service and a repair package prepared. (NE-ID—BEA-ATR-2011-0015).

2012

DOE-ID Bi-Weekly Summary

For the Period Feb. 7 to Feb. 27, 2012

Feb. 20: During routine preventative maintenance while the Advanced Test Reactor was in a maintenance shutdown condition, it was determined that tubing used in backup plant monitoring equipment was leaking. The tube was replaced during the maintenance shutdown. (NE-ID—BEA-ATR-2012-0004).

Feb. 27: While performing routine maintenance during the shutdown of the Advanced Test Reactor, the position alarm on the Firewater Injector System valve failed to actuate as expected. Management was notified and corrective action was taken. (NE-ID—BEA-ATR-2012-0005).

Feb. 27: The crash bar on a confinement door at the Advanced Test Reactor was found broken. The ATR was not in operation at the time, and confinement was not required. The door was repaired the same day. (NE-ID—BEA-ATR-2012-0006).

DOE-ID Bi-Weekly Summary

For the Period Dec. 26, 2011 – Jan. 23, 2012

Jan. 3: The latch for a confinement door at the Advanced Test Reactor came loose, leaving the door in a position where it would not stay latched in the closed condition. The door latch was repaired, the door declared operable and limitations on operations were lifted. (NE-ID—BEA-ATR-2012-0001).

Jan. 3: The canal bubbler at the Advanced Test Reactor was out of service, resulting in limited operating conditions for the canal. Staff verified that the canal level was normal and that no cask handling was taking place in the canal. The needle valve was opened and the canal level alarm restored, allowing resumption of normal operations. (NE-ID—BEA-ATR-2012-0002).

DOE-ID Bi-Weekly Summary

For the Period Feb. 28 to March 27, 2012

March 6, 7, 13 and 26: On several occasions throughout the period: A “limiting condition for operation” was entered into at the Advanced Test Reactor when it was discovered that confinement door latches for the reactor building had suffered mechanical failures and were not functioning properly. Maintenance personnel temporarily repaired the latches while a long term action is being developed. (NE-ID—BEA-ATR-2012-0007, 0008, 0010 and 0014)

March 7: An operator performing routine inspection rounds noted excessive sparking from a diesel generator at the Advanced Test Reactor. The diesel generator was shut down and declared out of service, while a backup generator was started. (NE-ID—BEA-ATR-2012-0009).

March 13: A small leak was discovered in a cooling water line on a diesel generator at the Advanced Test Reactor. The generator was shut down and the power load shifted to a backup generator. The leaking line was replaced and the generator was placed back into service. (NE-ID—BEA-ATR-2012-0011).

March 20: At the Advanced Test Reactor, it was discovered that a power supply system was left energized with an exposed and unguarded 120 volt terminal board. Upon discovery, the equipment was immediately de-energized by a technician. The equipment was located on an elevated work platform in a location that is not typically accessed by untrained workers. (NE-ID—BEA-ATR-2012-0012) that states:

15. Description of Occurrence:

“ At 0806 on 22 March 2012, the ATR automatically shut down (scrammed) due to loss of power to the diesel generator powered electrical distribution bus. Paralleling operations required to support shutdown for planned maintenance on the on-line diesel generator (670-M-43) and load transfer to the 674-M-6 emergency diesel generator were in progress at the time. Shortly after the 670-M-43 generator output breaker was opened, per procedure, and the 674-M-6 emergency generator was carrying the diesel bus loads, an operator misinterpreted an indication and manually opened the 674-M-6 generator output breaker, resulting in no power being supplied to the diesel bus.

During plant recovery efforts, an excessive negative pressure (less than -1.0 inches of water column) was achieved on the ATR building confinement due to the start of exhaust blower HVE-17A without supply blower HVS-1 in operation.

In addition, airborne particulate contamination levels in an ATR buffer area were elevated, as indicated by alarms received on three Constant Air Monitors (CAM) in the area of the east side of the first basement.

19. Immediate Actions Taken and Results:

“ Appropriate levels of BEA management and DOE-ID were notified of this event.

Following the loss of diesel power and automatic reactor shutdown (scram), actions in accordance with the ATR Complex Emergency Response Procedure (ERP) Network Procedures E-0, Entry Procedure, and ERP-0.4, Loss of Diesel Power, were completed and ventilation was restored to normal.

The building leak rate test, per RTC-USQ-2007-726 interim controls, has been scheduled and entered into the ATR Reactor Cycle Control Document (RCCD) for tracking purposes. Systems Engineering personnel completed a walkdown of accessible confinement sealing surfaces and no damage was identified as related to the under-pressure event.

Due to the elevated airborne contamination levels on the east side of the first basement, nonessential personnel were directed to egress the ATR confinement and canal areas, all personnel were cleared of the east side of the first basement, and the area was posted accordingly.

Following restoration of ventilation, surveys determined that the airborne contamination levels had returned to normal and normal access was restored.

A critique was held on 22 March 2012 at 1030.

31. HQ Summary:

“ On March 22, 2012, the Advanced Test Reactor (ATR) automatically shut down (scrammed) due to loss of power to the diesel generator powered electrical distribution bus. Operators were transferring electrical load from the on-line diesel generator (670-M-43) to the 674-M-6 emergency diesel generator to support planned maintenance on the 670-M-43 generator. Shortly after the 670-M-43 generator output breaker was opened, per procedure, and the 674-M-6 emergency generator was carrying the diesel bus loads, an operator misinterpreted an indication and manually opened the 674-M-6 generator output breaker, resulting in no power being supplied to the diesel bus. During recovery efforts, an excessive negative pressure (less than -1.0 inches of water column) was achieved on the ATR building. **In addition, airborne particulate contamination levels in an ATR buffer area were elevated, as indicated by alarms received on three Constant Air Monitors in the area. Due to the elevated airborne contamination levels on the east side of the first basement, nonessential personnel were directed to egress the ATR confinement and canal areas, all personnel were cleared, and the area was posted accordingly.** Systems Engineering personnel completed a walk down of accessible confinement sealing surfaces and no damage was identified. Following restoration of ventilation, surveys determined that the airborne contamination levels had returned to normal and normal access was restored.”

[In other words workers were evacuated. Was there worker rad doses determined?]

Distributed Dec. 12, 2012 **12-15**

DOE-ID Operations Summary

For the Period Nov. 13 – Dec. 10, 2012

Nov. 19: An unreviewed safety question was raised at the Advanced Test Reactor after a recent safety inspection showed that the reactor shutdown system neutron level and wide range neutron level subsystem channel cables do not meet separation requirements defined in the ATR design basis. Management was notified and interim controls were instituted until the situation can be reviewed and remedied, if necessary. (NE-ID—BEA-ATR-2012-0027).

Nov. 28: A primary coolant pump (PCP) at the Advanced Test Reactor failed to shut down properly in September of this year. Trouble-shooting efforts during a recent outage showed the cause of the pump breaker failure, which led to categorizing the event as reportable after the fact. A snap ring on the trip shaft of the breaker was missing from the end of the shaft and found on the bottom of the breaker case. Since the trip shaft is common to all trip functions of the breaker, the engineering safety features that trip the breaker open were degraded. All other PCP breakers were inspected and snap rings were found to be intact. (NE-ID—BEA-ATR-2012-0028).

Dec. 3: While rebuilding an electrical breaker at the Advanced Test Reactor, electricians found what appeared to be about 50 suspect/counterfeit fasteners throughout the breaker. The suspect parts will be replaced with authentic parts. (NE-ID—BEA-RTC-2012-0006).

Dec. 4: A tool used to measure the cooling channel width between reactor fuel plates at the Advanced Test Reactor canal became lodged between two fuel plates. The operator dislodged the

tool, bending the top of one of the fuel plates. Work was immediately stopped and the fuel element was removed to an approved storage grid in the canal, and will be placed in the restricted fuel database. (NE-ID—BEA-ATR-2012-0029).

Dec. 6: A security officer was able to open a confinement door at the Advanced Test Reactor that is not supposed to be able to be opened from the outside during reactor operations. A door watch was stationed until the door knob could be repaired by the INL locksmith. (NE-ID—BEA-ATR-2012-0030).

2013

Operations Summary 13.2
Distributed Jan. 29, 2013

DOE-ID Operations Summary
For the Period Jan. 1 to Jan. 28, 2013

Jan. 15: An operator manually shut down the Advanced Test Reactor Critical Facility during start up when related instrumentation was not operating as designed. The instrumentation was repaired before the reactor was restarted. (NE-ID—BEA-ATR-2013-0001).

Jan. 15: The warning system at the Advanced Test Reactor indicated there was a problem with the reactor Plant Protective System. The system has redundant channels so that the ATR remained protected. Technicians determined that a 12-volt power supply to the logic module had failed. Maintenance personnel restored the power supply and all the logic circuits were declared operable. (NE-ID—BEA-ATR-2013-0002).

Jan. 23: The Advanced Test Reactor Critical was ordered shut down by the reactor supervisor when the facility experienced an instrumentation noise spike that caused reduced power levels to the reactor. The reactor was safely shut down and appropriate notifications were made. (NE-ID—BEA-ATR-2013-0003).

1991 - 1999

EDI's review of Occurrence Reports/Un-reviewed Safety Questions (NOT Operations Reports) received by EDI under an earlier FOIA request related to ATR scrams shows the following:

1991 - 4

1992 - 1

1993 - 1

1996 - 1

1998 - 2

1999 - 1

Total 1991 to 1999

Attachment B

Environmental Defense Institute
Summary of Advanced Test Reactor Shutdowns
1973 Through 3/27/12
September 20, 2012 ⁷

Year	Shutdown/ Scrams Dates	Power Restricted Dates	Total Shutdowns Power Restrictions	Comments DOE Document Citation
1973 1974 1977 1980	Feb. 2 Jan. 15 June 5 Sept. 12 Feb. 9 11 Total 16	?	Total 16	Foot Note (FN) ⁷ FN ⁷ + FN 6 FN 3 + FN 6 FN 3 + FN 6 FN ⁷ + FN 6 FN ⁷ + FN 6
1991 1992 1993 1996 1998 1999	4 1 1 1 2 1 Total 10	?	Total 10	FN ⁷ FN 6 FN 6 FN 6 FN 6 FN 6
2000- 2001 2002 2003 2004	Jan. 2 Jan. 11 Feb. 1 Sept. 27 Feb. 6 Nov. 1 + 1 Aug. 21 July 10 Total 9	?	Total 9	NE-ID-BBWI-ATR-2000-0003 NE-ID-BBWI-ATR-2000-0004 FN 6 NE-ID-BBWI-ATR-2000-0020 NE-ID-BBWI-ATR-2001-0004 Internal Office Memo 11/18/02 NE-ID-BBWI-ATR-2002-0008 + FN 6 NE-ID-BBWI-ATR-2003-0012 NE-ID-BBWI-ATR-2004-0007
2005 2006	1 Total -1	Sept. 14 Total 1	Total 2	NE-BEA-ATR-2005-0004 NE-BEA-ATR-2006-0019

Year	Shutdown/ Scrams Dates	Power Restricted Set backs	Total Shutdowns Power Rest.	Comments/ DOE Document Citation
2007	June 25 Dec. 13 Total 2	June 17 Total 1	Total 3	NE-ID-BEA-ATR-2007-0013 FN 6+NE-ID- BEA-ATR-2007-0014 Reported in 2008; NE-ID- BEA- ATR-2008-0001
2008	Jan. 9 Feb.7 Feb. 11 April 1 May 1 May 13 June 3 Aug. 5 Aug. 11 Oct.16 Nov.21 Total 11	April 30 Oct. 15 Total 2	Total 13	NE-ID- BEA ATR-2008-0001 NE-ID- BEA ATR-2008-0003 FN 6 NE-ID- BEA -ATR-2008-0007 NE-ID- BEA -ATR-2008-0008 NE-ID- BEA ATR-2008-0009 FN 5 NE-ID- BEA ATR-2008-0010 NE-ID- BEA ATR-2008-0019 FN 6 FN 7 (water power alarm) FN 7 NE-ID- BEA-ATR-2008-0028 FN ⁷ (PCS activity RERTR)
2009	Jan. 19 Mar. 8 Mar. 10 May 31 Sept. 29 Oct. 8 Oct. 12 Oct. 14 Nov. 6 Dec. 1 Total 10	Mar. 17 Nov. 22 Total 2	Total 12	FN 7 (outer shim control) FN 6 +NE-ID-ATR-2009-0003 FN 7 (regulator rod #2 failure) FN 6 FN 7 (high neutron level) + ATR-CR-5-31-09 FN 7 + NE-BEA-ATR-2009-0022 FN 7 + 6+ NE-ID-ATR-2009-0023 FN ⁷ (loss diesel power) +FN 7 FN ⁷ + FN 6 FN ⁷ + FN 7 FN 6+NE-ID-BEA-ATR-2009-0024 FN 7+NE-ID-BEA-ATR-2009-0025

Year	Shutdown/ Scrams Dates	Power Restricted Limiting Conditions Dates	Total Shutdowns Power Rest. Limiting Conditions	Comments/ DOE Document Citation
2010	Feb. 14 May 27-30 July 23 July 26 Oct. 12 Oct. 26 Nov. 17 Total 7	Jan. 12 July 13 July 25 Total 3	Total 10	NE-ID-ATR-2010-0001 FN 7+ FN ⁷ (Channel A vent failure) FN 7+FN ⁷ (Increase Rad. PCS/Stack) FN 7 (quad IV flow inst. Failure) + INL Initial Not. Rpt. 14/7/10 FN 7 (M-6 PC pump lub. Failure) + NE-ID-BEA-ATR-2010-0013 FN ⁷ + FN 7 FN ⁷ (low coolant flow) FN ⁷ + NE-ID-BEA-ATR-2010-0019 FN ⁷ + FN 6 + INR 26 Oct. 2010 FN ⁷ INR 11/17/10
2012*	Mar. 22 Mar. 27 Total 2	Mar. 6-26 May 9 June 5 Total 3	Total 5	NE-ID-BEA-ATR-2012-0007 + 0008 +0010+0014 NE-ID-BEA-ATR-2012-0013 NE-ID-BEA-ATR-2010-0015 NE-ID-BEA-ATR-2012-0017 (fire water pump failure) NE-ID-BEA-ATR-2012-0021 (fire water pump failure)
Totals 1973 to 3/27/12	Total 67	Total 12	Total 79	

*Through 3/27/12

Additional References:

1. Advanced Test Reactor Outage Risk Assessment, July 9, 1998, INEEL/Con-97-0463; Conf-980616
2. INL Reactor Outage, 2/5/08, DOP-7-7.2.7, Rev.24.