

**Environmental Defense Institute  
Troy, Idaho 83871-0220**

**INL Operations Report Excerpts <sup>1</sup>  
Related to the Advanced Test Reactor  
and co-located  
Advanced Test Reactor Critical  
Neutron Radiography Reactor  
2006 to September 16, 2010 [Revision 16]  
Compiled by Chuck Broschious  
10/17/10**

**Summary**

Based on the cited reports below, there were at least the following unscheduled shutdowns, scrams, major startup interruptions and/or reactor power level curtailed at the Advanced Test Reactor due to safety system failures:

<b>Year</b>	<b>Shutdown/Scrams</b>	<b>Power Restricted</b>	<b>Total Shutdowns Power Restrictions</b>
2007	Two	-?-	Two
2008	Six	One	Seven
2009	Four	One	Five
2010 as of 9/27/10	Five	One	Six
Totals	Seventeen	Three	Twenty

The total for this period (less than 4 yrs.) is 20; with an average of 5/yr.

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 (400%) per year that is legitimately attributable to ATR's 47 year aging problem – acknowledged by DOE/INL below (August 23, 2006 report).

The Advanced Test Reactor Critical and the Neutron Radiography Reactors are included here because they are co-located with the ATR; operate under the same contractor (Battelle Energy Alliance (BEA) management structure and share safety systems. <sup>2</sup>

<sup>1</sup> DOE-Idaho Bi-Weekly Operations Summary is email posted to EDI/KYNF on a regular basis.

<sup>2</sup> Advanced Test Reactor Program Nuclear Safety Oversight Committee Meeting Report for March 23-25, 2010, INL FY [Fiscal Year] 10 Performance Summary (2<sup>nd</sup> QTR), page 27.

*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 Un-reviewed 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

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. 22: Neutron Radiography Reactor operations were being performed when an automatic **reactor shutdown occurred**. No observable failure was identified. The reactor was restarted by reactor operations personnel following verification that the high voltage power supply spurious alarm was clear and operational checks of the reactor protective circuits were completed satisfactorily. Reactor operations personnel did not notify management immediately and did not obtain permission for continued operation. **As a result, the reactor has been shut down and cannot be restarted without line management authority.** A critique is being performed. (NE-ID--BEA-NRAD-2006-0001)

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).

DOE/INL News Release; Monday, Dec. 3, 2007

### **DOE Cites Battelle Energy Alliance, LLC for Price-Anderson Violations**

The U.S. Department of Energy (DOE) today notified Battelle Energy Alliance, LLC (BEA) that it will fine the company \$123,750 for violations of the Department's nuclear safety requirements. BEA is the DOE Idaho Operations Office prime contractor for the operation of the Neutron Radiography (NRAD) reactor. The Neutron Radiography Reactor is used to non-destructively examine irradiated materials; the imaging technique utilizes thermal neutrons and is used for quality control purposes in industries which require precision machining.

The Preliminary Notice of Violation (PNOV) issued today cited a series of violations that occurred on August 20, 2006 during the restart and subsequent automatic unplanned shutdown of the NRAD reactor. Violations include failures to adhere to technical safety requirements and reactor operating instructions, inadequacies in the reactor operating instructions, failure to correct known problems with a reactor component, and failure to adequately conduct management assessments in reactor operations.

The proposed civil penalty of \$123,750 is based on the significance of the violations yet reflects substantial mitigation granted by DOE for BEA's identification of the issues and corrective actions they have taken to prevent recurrence of the identified deficiencies. While the

deficiencies in NRAD reactor operations did not compromise reactor safety systems, they did represent a significant departure from what the Department expects in the operation of its reactors. BEA will have 30 days to respond with any objections to the notice.

The Price-Anderson Amendments Act of 1988 authorizes the Energy Department to undertake regulatory actions against contractors for violations of its nuclear safety requirements. The enforcement program encourages departmental contractors to identify and correct nuclear safety deficiencies at an early stage, before they contribute to or result in more serious events.

## 2008

“ January 9, 2008; **The ATR was manually scrambled** due to unreliable lobe power indications provided by the Lobe Power Calculating and Indicating System (N-16). The system response to the change from the center to spare chamber was a sharp increase in indicated center lobe power, which was not expected and could not be immediately explained and was not believed to be associated with the original concern over the center N-16 signal. The ATR was manually scrambled after it was determined that the N-16 system could not be relied upon to provide accurate lobe power indication and that continued operation in this condition was not justified.” Occurrence Report (NE-ID-BEA-ATR-2008-0001).

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 [shutdown], 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. 8: 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. “On October 8, 2009 one of the two operating pumps in loop 2B-SE tripped on a zero net positive suction head (NPSH) signal from the Loop Operating Control Station Distributed Control System. The resulting pump M-2 breaker undervoltage condition resulted in an automatic scram (shutdown) of the ATR.” Occurrence Report** (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 Burnup Record: Idaho National Laboratory scientists have set a new world record for fuel burnup 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 [power stop] 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).

### **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 June 15 to July 5, 2010

June 15: A need for further safety analysis was determined at the Advanced Test Reactor. As part of ongoing review of the safety documentation at the reactor, it was determined the existing analysis does not look at what would happen in the unlikely event that all five experiment loops in the reactor failed during an earthquake. The preliminary analysis showed that this accident is already enveloped by other accidents in the unlikely category and it does not have any affect on safe reactor operation (NE-ID—BEA-ATR-2010-0009).

For the Period July 6-July 19, 2010

Issued July 21, 2010

July 8: A laborer, working at the Advanced Test Reactor Complex, cut the index finger and thumb on his left hand while trying to cut a plastic sprinkler pipe. The employee was evaluated by a doctor, who referred the employee to an off-site specialist. A review of the event and critique were performed. (NE-ID—BEA-RTC-2010-0002).

July 14: An engineer at the Advanced Test Reactor reported that the lubricating oil viscosity for a diesel firewater pump was out of specification. The pump was declared out of service, **operations were limited according to procedure, and a service request to change the lubricating oil and filter on the firewater pump was submitted and approved.** (NE-ID—BEA-ATR-2010-0010).

For the Period July 20-Aug. 2, 2010

Issued Aug. 4, 2010

July 20: An operator injured his elbow while moving a grating at the Advanced Test Reactor canal. The injury occurred in June, but was not fully diagnosed for a few weeks. The operator eventually had outpatient surgery. An accident investigation was initiated and a critique scheduled. (NE-ID—BEA-ATR-2010-0011).

July 22: Management at the Advanced Test Reactor (ATR) noted data anomalies from the Wide Range Neutron Level ion chamber. Specifically, the measured current from the ion chamber was expected to level out at high voltage, but did not. A critique was held and ATR engineering was asked to perform a technical evaluation of the chamber. (NE-ID—BEA-ATR-2010-0012).

**July 27: The Advanced Test Reactor was shut down following discovery of low oil pressure in one of the two primary coolant pumps. The pump was secured at temperatures well below acceptable levels and there was no equipment damage.** (NE-ID—BEA-ATR-2010-0013).

Occurrence Report July 29, 2010

“ATR Firewater Pump TRA-688-M-1 Declared Inoperable. On July 27, 2010, a crafts electrician was performing the quarterly preventative maintenance surveillance for TRA-688-M-1 and TRA-688-M-2 diesel firewater pumps (FWPs) and discovered that the specific gravity for starting battery #2, cell #5 was out of specification low for TRA-688-M-2 diesel FWP. ATR

Operations management was informed, the FWP was declared out of service, and Technical Specification Requirement Limiting Condition for Operation (LCO) 3.2.1.2, Condition C was entered. This LCO condition allows for one FWP to be inoperable for up to seven days. A request for service was submitted and approved for replacement of the starting battery.”  
NE-ID—BEA-ATR-2010-0014

Issued Aug. 20, 2010.

For the Period Aug. 3-Aug. 16, 2010

“Aug. 9: The safety analysis for the Advanced Test Reactor is continually reviewed. In a recent review, it was determined that a more conservative or safer approach would be to adjust the interim operating controls for the ATR surge tank, which affects the initiation time of the Emergency Firewater Injection System (EFIS). This was due to review of the ATR surge tank volume. The new controls were slightly more stringent. However, the actual EFIS as tested will operate much faster than the safety analysis requires. (NE-ID—BEA-ATR-2010-0015).”

Occurrence Report August 26, 2010

“ATR M-6 Emergency Diesel Generator Failure to Start. On July 13, 2010, a system engineer reported that the lubricating oil viscosity was out of specification for the TRA-688-M-2 diesel firewater pump. The oil sample results detected 5.1 percent fuel dilution by weight with a recommended limit of 2.5 percent and a viscosity at 11.91 centistokes. The firewater pump was declared out of service and Limiting Condition for Operation (LCO) 3.2.1.2, Condition C, was entered. The LCO allows one firewater pump to be inoperable for up to seven days. A request for service to change the lubricating oil and filter on the firewater pump was submitted and approved.” NE-ID—BEA-ATR-2010-0016

Issued Sept. 15, 2010

DOE-ID Bi-Weekly Summary

For the Period Aug. 27-Sept. 13, 2010

“Aug. 26: An air compressor at the Advanced Test Reactor failed due to high temperatures likely caused by a loss of cooling to the compressor. The cause is under investigation. (NE-ID—BEA-ATR-2010-0017).

“Aug. 26: An emergency diesel generator failed to start during a planned maintenance electrical outage at the Advanced Test Reactor. The electrical outage was suspended until the situation could be remedied. (NE-ID—BEA-ATR-2010-0016).”

Occurrence Report August 26, 2010

“Loss of ATR Air Compressors During Scheduled Maintenance. On August 18, 2010, a cooling water high temperature alarm was activated on the operating air compressor supplying ATR instrument air, after electricians disconnected the TRA-609 battery bank leads to secure DC control power, but before any cleaning or inspection began. Utility area operators were sent to investigate the alarm condition. They observed the compressor outlet air temperature reading 70° Fahrenheit higher than normal and light smoke from the compressor. One of the operators attempted to shut down the compressor by opening the circuit breaker for the M-6 compressor. The breaker failed to open because control power had been previously secured for maintenance on a distribution panel. Electricians restored the control power and the breaker was opened to

remove power to the 609-M-6 air compressor. Instrument air pressure at ATR began slowly lowering with no air compressors running. Utility area operators started the 609-M-8 compressor to restore instrument air to the ATR. The INL Fire Department responded to TRA-609 and determined that no fire was present. The source of the smoke is suspected to be overheated compressor fluid and/or paint on the compressor. At the critique, the system engineer stated the cause of the high temperature condition was most likely loss of cooling water flow to the compressor. The cause for this loss has not been determined and is under investigation.” NE-ID—BEA-ATR-2010-0017

Missing Occurrence Reports (as of this writing):

NE-ID—BEA-ATR-2010-0011

NE-ID—BEA-ATR-2010-0012

NE-ID—BEA-ATR-2010-0015

## **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/shutdowns shows the following:

1991 - 4

1992 - 1

1993 - 1

1996 - 1

1998 - 2

1999 - 1

Total 1991 to 1999 - 10