Environmental Defense Institute

News on Environmental Health and Safety Issues

August - 2012 **Volume 23 Number 4**

INL's Advanced Test Reactor is Shut Down Two More Times in 2012

According to Department of Energy (DOE) Occurrence Reports, the Advanced Test Reactor was shut-down twice so far in 2012 (January through May 27). The DOE reports state:

First Shutdown

"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." [1]

Second Shutdown

"At 1414 on 27 March 2012, the Advanced Test Reactor (ATR) was manually shut down due to potential incorrect data contained in the Core Safety Assurance Package (CSAP) which is credited for meeting Technical Safety Requirements (TSR) Surveillance Requirement (SR) 4.6.1.1 for the current operating cycle.

"At 1300 on 27 March 2012, ATR Programs Nuclear Engineering informed ATR Management that they had found an issue with an input to the CSAP for the current operating cycle. Engineers at the Bechtel Marine Propulsion Corporation (BMPC), while working to resolve issues with axial neutron flux perturbations caused by a proposed experiment, had discovered a reasonable probability that a similar experiment currently being irradiated in the ATR could also be causing axial flux perturbations beyond acceptable criteria.

"An Engineering Advisory Board (EAB) was convened to review and evaluate the data presented by BMPC and concluded that the CSAP had a high potential to be incorrect, resulting in a failure to meet SR- 4.6.1.1 of TSR-186. At 1414 on 27 March 2012, Limiting Condition for Operation (LCO)-3.6.1, Condition E, was entered and the reactor was manually scrammed in accordance with Required Actions contained in Condition E." [2]

---

[1] DOE Occurrence Report: NE-ID-BEA-ATR-2012-0013

[2] DOE Occurrence Report: NE-ID-BEA-ATR-2012-0015.

Several other crucial reactor safety system components failed so far in 2012 – thankfully during normal reactor shutdown periods for refueling – involving the ATR Firewater Pumps failures. [3] Had these failures been detected during regular ATR operating periods, reactor shutdown would have been required.

EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) for –"the effective dose equivalent to the maximally exposed individual member of the public is 10 mrem/year." [4] **INL reporting of ATR gaseous emissions provides low mrem/yr doses to a chosen location miles from the facility, but it does not identify the isotopes or curie amounts released. So, it is difficult to determine what and how much the ATR routinely emits**.

* The INL NESHAP report provides (Table 1) – which lists nuclides and released curie amounts – but ONLY for the sources that are continuously monitored. The rest, like the ATR stack, are not continuously monitored so the isotopes released and the estimates of curie amounts are nowhere in the report.

* The doses are calculated at Frenchman's Cabin. The distances to the nearest farm or residence are included, and for MFC, for example, Frenchman's Cabin is much farther away than the nearest farm or residence. It would seem to me to through a real arbitrariness to the comparisons of facilities at the site. Wouldn't you rather see the isotopes and the curie amounts for each facility. They had to make estimates in order to compute the mrem doses. The way they have done things makes the report inscrutable.

* A commercial nuclear plant mainly routinely emits noble gases and iodine, Carbon 14, Xenon, Krypton, and tritium. The noble gases don't get into the food chain and the iodine has a short half-life. But ATR is releasing noble gases, iodides, mixed fission and activation products (Section 5.2 of the report). The releases of fission products from ATR may be more long lived – yet, the report does not list the amounts released.

* EDI will try to take a look at 40CFR61 Subpart H. It makes sense to not have to continuously monitor something very difficult to monitor, like a waste pit that's being excavated. But, the CFR allowing a stack to not require continuous monitoring –and not to publish the estimated releases – there's something very wrong with that.

* The NESHAP report notes that the method of effluent control for the ATR stack and ATR canal is "None". There are primary coolant system resin bed cleanup systems, and there is an Argon delay line. But, were ATR in a more populated area, filtered release for routine effluents would have been installed.

"**On** 25 May 2010, a 'high stack activity high' alarm was received in the ATR control room." The ATR was shut down due to "the stack effluent discharge rate for total nuclides was 105 Ci/day." [5] Since this occurrence occurred over 2 days (3/25/12 to 3/27/12 shutdown, the total radioactive release could be 210 Curies. ATR can operate with the intentionally defective experiment fuel material, but increased releases indicate more fuel defects than predicted. The ATR fuel for the reactor, not the experiment material, may also have unintended defects, which would also result in higher releases of nuclides into the [Primary Coolant System] PCS, and subsequently, the ATR stack. These PCS and stack release amounts required notifications, and although below amounts that would exceed the approved safety basis levels of 450 Ci/day, these

[3] DOE Occurrence Report: NE-ID-BEA-ATR-2012-017 & 021.

[4] DOE National Emission Standards for Hazardous Air Pollutants – Calendar Year 2009 INL Report for Radionuclides, June 2010.

[5] DOE INL Initial Notification Report, 27 May 2010.

levels would create increased contamination for subsequent plant maintenance.

But a serious transient with fuel melt would far exceed 450 Ci/day and DOE's accepted approach for determining the acceptable level of safety for nuclear facilities would be unacceptable if most people understood it. The DOE can conclude its operations are safe enough by using acceptance criteria that the larger accidents limit doses to 25 rem per person, off-site. By remotely siting its facilities and using the dilution effect of weather patterns, an enormous amount of radionuclides can be released during accident conditions. These accident releases would require tremendous costs for remediation, compensation to landowners, and wide-spread contamination, not to mention health risks.

EDI's review of about 22 Occurrence Reports just to July 2012 and many from previous years indicates serious safety system problems and an accident waiting to happen. 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.

The 2007 to 2012 period (see table below) 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." [6]

Summary of ATR Shutdowns

Based on the cited reports above & 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; unscheduled 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.
There are continuing problems of degraded plant condition, poor conduct of operations, and safety basis deficiencies. See Table below.

[6] Letter to J.J. Grossenbacher, INL Laboratory Director, Battelle Energy Alliance, LLC; from P.C. Hildebrandt., Reactor Programs Nuclear Safety Oversight Committee Chairman, May 17, 2010. The reactor shut downs that are manually initiated are administratively required and do not necessarily require that the reason pose an immediate and significant public safety threat. The safety system failures are remedied. Exception: the seismic upgrade fixes that were not required by DOE or BEA to be reported until all analytical approaches had been exhausted. When all analytical approaches had been exhausted, the plant fixes were ready to install. Reactor Programs Nuclear Safety Oversight Committee Chairman, May 17, 2010.

Year	Shutdown/ Scrams	Power Restricted	Total Shutdowns Power Restrictions
2007	2	-?-	2
2008	6	1	7
2009	7	1	8
2010	5	4	9
2012*	2	2	2
Totals	22	8	30

*Through 3/27/12

The total for this five 1/2 year period is 30; with an average of 5.7/yr. [7]

DOE's ATR operating contractor Battelle Energy Alliance (BEA) is really in a vulnerable position with ATR – vulnerability isn't obvious to many just yet. This is because the ATR keeps aging and changes keep being made to the plant and to operations. One would expect this to be a mature operation with everything routine. It is not. And added complexity of new programs brings added safety issues. And the staff turnover in recent years has yielded an inexperienced set of managers and engineers, and an aging and overworked set of reactor operators, the ones who have not transferred out. BEA is finally commencing to hire and train more operators due to the real shortage of trained reactor operators – an effort that is several years late. Issues that arise are taking longer to deal with because the managers and staff are simply quite inexperienced with the facility, and the constant changes to the facility mean that older analysis, documents, and procedures cannot be relied on – everything is always changing. Sincere efforts are being made to operate safely, but they could easily get bit by what they don't know – as they try to push the envelope further and further.

The occurrence reports with ATR diesel generators indicate continuing conduct of operations and reliability issues. Unlike commercial nuclear power plants, ATR has a diesel generator running all of the time and so the diesel bus has loads normally powered by diesel generators. Typically, there is one normally running dg [diesel generator]; a seismically capable diesel generator needs to be available in the event of a seismically induced loss of commercial power. However, diesel generator reliability has been far below nuclear industry standards.

Still, this event and the serious blunders with electrical power maintenance seem to be steps backwards in what should be a very procedural zed and worker safety oriented environment. The ops report didn't go into specifics on safety documentation issues, but did note that there were several conduct of operations problems at various facilities.

For more information, see EDI's Unacceptable Risk, Advanced Test Reactor, The Case for Closure; available on EDI's website (http://environmental-defense-institute.org).

[7] "Advanced Test Reactor Unplanned Shutdowns, Slow Setbacks, Power Reductions for FY-2009 and FY-2010" Department of Energy, Idaho Operations, Freedom of Information Document # 18. DOE-ID Biweekly Summary, 3/28/12 citing; (NE-ID—BEA-ATR-2012-0013), https://orpspublic.hss.doe.gov/orps/reports/

INL's Highly Radioactive Liquid Waste Treatment Plant Having Major Startup Problems

The Integrated Waste Treatment Unit (IWTU) is designed to convert ~900,000 gallons of previously classified high-level liquid waste generated over decades of nuclear fuel reprocessing to a solid form suitable for final disposal in a geologic repository. DOE's Occurrence Reports document serious malfunctions of the IWTU.

"On Saturday, June 16, 2012, the Integrated Waste Treatment Unit (IWTU) was performing startup and testing activities when an unexpected pressure transient caused a loss of vacuum in the Carbon Reduction Reformer (CRR) vessel activating the Rapid Shutdown System (RSS). IWTU Operations were in the process of performing the system lineup to transfer Off-Gas Filter (OGF) material to the Product Receiver Filter/Product Receiver Cooler-1 (PRF/PRC-1) when the CRR began losing vacuum needed to maintain established operating parameters and to continue heat-up of the steam reforming process. Control room operators backed out of the product transfer lineup, exited the transfer procedure and continued to operate the plant under the IWTU startup procedure. IWTU Operations personnel, with engineering support, continued to monitor the system and make adjustments throughout the evening attempting to restore CRR heat up and to maintain vacuum. During the adjustments, the pressure in the CRR rose to approximately 14 inches of water column. The RSS trip point is 14.0 inches of water column. Downstream temperature and differential pressure problems became evident in the HEPA filters, 260 and 240 blower systems. A pressure increase in the Off-Gas Cooler (OGC) caused a rupture of the rupture disk on the OGC and an increase in the OGC outlet temperature which tripped Safety Instrumented Function (SIF)-2. The failure of the rupture disk and the tripping of SIF-2 are the initiating events for this ORPS occurrence. Timeline: 11:57 - A Hi CRR pressure alarm was received. Operators responded per procedure by raising the Off-Gas Blower speed. CRR pressure responded as expected and pressure returned to normal. 12:08 CRR pressure began to rise. Operators responded per procedure and pressure became erratic. 12:20 - CRR pressure began to rapidly rise passing through the Hi and Hi-Hi alarm set-points. 12:24 - A Hi-Hi-Hi CRR pressure alarm was received along with the corresponding Distributed Control System (DCS) - RSS activation. 13:05 - The shift supervisor commenced plant shutdown per procedure. During shutdown a dark plume was noted coming from the stack. 13:35 - The OGC rupture disc pressure alarm was received indicating Rupture Disc PSE-SRC-160-003, a design feature SSC, had ruptured. 13:59 - Following rising temperatures at the outlet of the OGC, SIF-2 High-Temperature Protection System (a Safety Significant System) activated.

"Immediate Action(s): All applicable Emergency Action Response procedure steps were verified completed and a plant shutdown/cool-down was initiated. Notifications were made to DOE-ID and CWI Corporate." [8]

"On March 13, 2012, a Hot Work Permit was authorized and a Fire Safety Watch was present for workers to weld and grind brackets in Room 109 South Corridor at IWTU. At 1430 hours MST, the Fire Safety Watch observed smoke coming out of the fume extractor unit, disconnected the unit and took it outside of the facility. After taking the smoking unit outside the Fire Safety Watch removed the spark trap cover and observed a small flame in the pre-filter which self-

[8] DOE Occurrence Report; EM-ID-CWI-IWTU-2012-0008

extinguished.

"The workers were performing hot work (welding and grinding) installing supports on an electrical cable tray. The workers were in compliance with the hot work permit. Due to the restricted work area the intake funnel on the fume extractor hose was located below the hot work area, pointed up and positioned close to the welding location, but not directly under. The cable tray is approximately 10 feet above the ground with the fume extractor, ACE Industrial Products, Model No 73-200 M, located on a cart below. It appears that a hot spark was sucked into the funnel and down the hose into the spark trap portion of the fume extractor. The spark was drawn onto the surface of the pre-filter where it caused the pre-filter media to smolder generating the smoke observed by the fire watch." [9]

U.S. Nuclear Waste Technical Review Board

"The NWTRB is an independent agency of the U.S. Federal Government. Its sole purpose is to provide independent scientific and technical oversight of the Department of Energy's program for managing and disposing of high-level radioactive waste and spent nuclear fuel." [10]

According to Dr. Darryl Siemer, former INL scientist, "the people on the NWTRB Board are supposed to serve as totally independent advisors/counselors to DOE on its "technical' issues - kinda like what the folks at the National Academy of Sciences & Defense Nuclear Facility Safety Board are also supposed to be doing for it (us?). Frankly, I think that DOE has made captives of all of its "advisors" because 1) it's both fun & lucrative (about $165K/yr for part time work) to be one of DOE's pet independent experts, and 2) they don't really have to do all much for it (their support staff does all the scut work). The main problem is that DOE usually dictates what its independent experts are supposed to "think" about & provides them with carefully rehearsed dog & pony shows/selected documents to "bring them up to speed" on each such issue. Most of these experts don't seem to question what they're being told & therefore usually end up not spotting/fixing the real problem(s)."

Additional Occurrence Reports on IWTU Problems

7/30/12; ITWU – Failure to Follow Confined Space Entry Process; [11]

5/2/12; ITWU Potential Inadequacy of Safety Analysis (PISA) – Inadequacy of Technical Safety Requirements TSR-level Controls for Fire Detection in Granular Activated Carbon Beds; [12]

4/25/12; ITWU Hazardous Energy Control Process Violation; [13]

2/27/12; IWTU – Safety Significant Pressure Safety Disk PSE- SRH-141-001A Discovered Ruptured; [14]

[9] DOE Occurrence Report; EM-ID-CWI-IWTU-2012-0004
[10] http://NWTRB.gov
[11] DOE Occurrence Report; EM-ID-CWI-IWTU-2012-0011
[12] DOE Occurrence Report; EM-ID-CWI-IWTU-2012-0007
[13] DOE Occurrence Report; EM-ID-CWI-IWTU-2012-0006
[14] DOE Occurrence Report; EM-ID-CWI-IWTU-2012-0002

Our lives still hang by a Devil's thread at Fukushima

by Harvey Wasserman

The molten cores at Units 1, 2 & 3 have threatened all life on Earth. The flood of liquid radiation has poisoned the Pacific. Fukushima's cesium and other airborne emissions have already dwarfed Three Mile Island, Chernobyl and all nuclear explosions including Hiroshima and Nagasaki.

Children throughout Japan carry radioactive burdens in their thyroids and throughout their bodies. Hot spots in Tokyo demand evacuation. Radioactive tuna has been caught off San Diego. Fallout carried across the Pacific may have caused spikes in cancer and infant mortality rates here in the United States.

And yet, 16 months later, the worst may be yet to come. No matter where we are on this planet, our lives are still threatened every day by a Unit 4 fuel pool left hanging 100 feet in the air. At any moment, an earthquake we all know is coming could send that pool crashing to the ground.

If that happens---and it could as you read this---the radiation spewed into the atmosphere could impact every living being on Earth. And that certainly includes you.

Cecile Pineda lays it all out in her brilliant new DEVIL'S TANGO: HOW I LEARNED THE FUKUSHIMA STEP BY STEP (Wings Press: San Antonio; www.ipgbook.com).

With poetic fury, Cecile rages in satanic detail about how Fukushima was built despite volumes of whistleblower testimony underscoring its fatal flaws. But after agreeing with proof that the GE designs were patently insane, NRC Chair Joseph Hendrie approved them anyway because doing otherwise would have killed the nuclear industry.

There are 23 of these Mark I monsters in the US alone, far more worldwide. Pineda's passionate prose runs the gamut from detailed technical critiques to heart-wrenching dirges about the birth defects and malformations imposed on countless downwind victims.

One reads with horror Cecile's descriptions of hundreds of horribly deformed children of Chernobyl. In three towns near Fukushima, nearly half the youngsters already suffer from low-level thyroid exposure.

In Iraq and Bosnia, Pineda writes, vaporized depleted uranium shells have carpeted the countryside with radioactive powder. According to the International Journal of Environmental Research and Public Health, children born at Falluja were eleven times as likely to suffer from "neural tube defects affecting the brain or lower extremities, with cardiac or skeletal abnormalities, or with cancers." As elsewhere in Iraq, and in Bosnia, premature births, spontaneous abortions and birth defects have become a plague.

Some uranium by-products can kill for 4.5 billion years---a common estimate for the lifespan of the Earth itself. Pineda takes us on a tragic tour of other facilities with radioactive burdens, including nuclear waste dumps, weapons factories and power reactors.

But nothing quite matches Fukushima and how it threatens us today. Astonishing as it may seem, the GE Mark I design includes waste storage pools perched 100 feet in the air. Around the world, thousands of tons of the most radioactive substances ever created are swung out of reactor cores and into these "swimming pools" to sit for months or years, suspended in air.

The presumption has been that they would somehow be removed and shipped to a central repository. But nowhere has one been approved. Nor has anyone devised a safe way to get the rods there if one is.

Experts like Robert Alvarez are begging that Fukushima's rods be removed to dry casks where they might be out of immediate harm's way.

But at Unit 4, more than 1500 rods remain suspended in air. Called "a bathtub on the roof" by CNN anchor Jon King, the damaged pool teeters atop a building decimated by seismic shocks and at least one hydrogen explosion. The question is not if, but when it will come crashing down.

Thus far, TEPCO has removed just two rods, and says it won't get the rest until late next year.

Meanwhile, we are all hostage. DEVIL'S TANGO provides ample evidence that the Fukushima disaster was caused primarily by the earthquake of March 11, 2011. The tsunami that followed made things worse. But the atomic reactors there and around the world remain far more vulnerable to seismic shocks than their builders want us to know.

This means Indian Point, New York; Diablo Canyon and San Onofre, California; in Virginia, Ohio, South Carolina and virtually everywhere else these reactors sit.

All these reactors---including virtually every one in Japan---could be destroyed by shock waves like those that took down Fukushima.

Cecile Pineda makes it passionately clear that our species has no more pressing priority than to get those fuel rods out of the Fukushima 4 pool and onto the ground before another earthquake does it for us.

The only way out is a switch to Solartopia, to a world based on technologies that will end forever this death dance that is atomic energy.

Meanwhile, as those rods still sway above Fukushima, the Devil's Tango has us right at the brink of a hellish world of radioactive hurt.

HARVEY WASSERMAN'S HISTORY OF THE US is at www.harveywasserman.com, along with SOLARTOPIA! OUR GREEN POWERED EARTH. He editswww.nukefree.org.