

Emergency Diesel Generator Problems at Peach Bottom

Nuclear generating stations remain one of Pennsylvania's largest consumers of foreign oil. Emergency diesel generators (EDG) at Pennsylvania's five nuclear generating stations burn hundreds of thousands of gallons of oil annually. For example, Three Mile Island (TMI) is required to have a diesel fuel oil tank with sufficient minimum inventory to supply two operating emergency diesel generators for at least seven days. This minimum inventory is 28,285 gallons. This equates to each emergency diesel generator consuming about 85 gallons per hour of run-time. EDGs must be run about two hours per month plus one 24-hour run per year. These generators also must be in operation during post-maintenance periods and after equipment breakdowns. One EDG at TMI running 100 hours in a year consumes 8,500 gallons of fuel.

- May 21, 1991 - Both units were affected by the inoperability of the emergency diesel generator due to unqualified relays. (NRC inspection reports 50-277/91-16 and 50-278/91-16, pp.5-6.)

- May 23, 1991 - Units 2 and 3 were shutdown "due to a belief that the 4 station Emergency Diesel generators (EDG's) could potentially be rendered inoperable during design basic events" (Licensee Event Report 50-277 and 50-278.)

- July 16-17, 1991 - The licensee determined that there was low emergency water flow to Unit 2's Emergency Diesel Generators and residual heat removal pumps. "As a result, the Unit 2 RCIC and 'B' loop of low pressure coolant injection (LPCI) were declared inoperable on July 16 and 17" (NRC inspections 50-277/91-21 and 50-278/91-21.)

- August 27, 1991 - Both units were "shutdown following discovery that two of the four emergency diesel generators (EDG) were inoperable" (NRC inspections 50-277/91-27 and 50-278/91-27.)

- August 10, 1992 - PECO entered a seven day maintenance outage on the E-4 emergency diesel generator.

- December 10 and 27, 1996 - Emergency diesel generator power fluctuations were reported. (IR 50-277/97-01 & 50-278/97-01.) (See December 27, 1996 and January 24, February 7 and March 6, 1997 for related developments.)

- December 27, 1996 - The NRC cited PECO for a violation involving the failure to verify a modification change on an emergency diesel generator. (IR 50-277/96-06 & 50-278/96-06.) (See December 10, 1996 and January 24, February 7 and March 6, 1997 for related developments.) - February 7, 1997 - An “unresolved item” was identified during an inspection “dealing with your staff’s inability to identify the cause of load fluctuations on the E-1

emergency diesel generator during testing operations. This item was of concern since, without a root cause, the possible affects on operability may not be clearly identifiable.” (Walter J. Pasciak, NRC, Chief, Projects Branch 4, Division of Reactor Projects.) (See December 10 and 27, 1996 and February 7 and March 6, 1997 for related developments.)

- September 12, 1997 - A Notice of Violation was issued dealing with PECO’s “troubleshooting of the main control radiation monitor, during which and communication weaknesses led to a noncompliance with technical specifications...in a few instances, your staff did not formally review issues with potential for learning opportunities. Examples included the missing E-2 emergency diesel generator exhaust gasket, and inconsistencies between plant procedures and technical specifications associated with emergency diesel generator starting air reservoir pressure.” (Clifford J. Anderson, NRC, Chief Projects Branch 4, Division of Reactor Projects.) (See July 10, 1997 and May 15, 1998, for related problems.)

- June 9, 1998 - "...plant personnel and the inspectors observed smoking and small flames on the E1 EDG exhaust manifold flanges, and the oil occasionally flashed and self-extinguished as the temperature of the exhaust manifold increased during EDG loading. The smoking and leakage essentially stopped several minutes after the EDGs were fully loaded." (See May 5, 1998, for a precursor event.)

"Some emergency diesel generator (EDG) oil leak reduction strategies were not well-implemented or well-communicated to operations personnel. These factors contributed to oil leaks and flames observed on the E2 and E1 EDG exhaust manifolds in May and June, 1998, respectively." (IR 50-277/98-06; 50-278/98-06; NOV.)

- October 28, 1998 - The use of an improperly sized jumper led to an unplanned core spray loop inoperability and "extended the inoperability period for all four emergency diesel generators (EDG)." (IR 50-277/98-10, 50-278/98-10; NOV.)

- July 7, 1999 - "...operators observed that the 'A' ESW pump flow rate to the emergency diesel generators (EDGs) was in the In-Service Test (IOST) alert range specified in the surveillance procedure...Engineering placed the 'A' ESW pump on an increased testing frequency and conducted an investigation into possible causes of the degraded flow." (IR 50-277/99-06; 50-278/99-06; and, 72-1027/99-06).

- January 12, 2000 - "A contract painter inadvertently bumped an E4 emergency diesel generator coolant expansion tank drain valve, resulting in a partial drain down of the coolant expansion tank. The emergency diesel generator remained operable. The problem was similar to a recent previous event."

- October 1 through November 18, 2000 - “Emergency service water (ESW) system check valve 2-33-514 failed [sic] open, allowing safety-related ESW flow to be partially diverted from emergency diesel generators(EDGs) and emergency core cooling system room coolers. The inspectors and the licensee identified that this risk important component had not been included in a preventive maintenance program.

- October 30, 2001 - “...the E-2 emergency diesel generator (EDG) tripped on low jacket coolant discharge presurre during routine testing of the EDG...Although Exelon was unable to detemine who closed this valve or exactly when it was closed, they did determine that the valve was closed somewhere in the period between October 12, 2001 and Ocotber 30, 2001...The EDG was successfully tested and returned to service on October 31, 2001” (IR 50-277/01-10, 50-278/01-10.)

This was the *twenty-fourth* **Non-Cited Violation** since June 1998. Exelon's **total cost avoidance**, i.e., “**credit**” for 24 Non-Cited Violations = **\$1,205,000**.

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Mixed findings at plant

Team investigated Sept. shutdown of 2 reactors

By KRISTIN FINAN *Dispatch/Sunday News*

A special team that analyzed the causes of, and responses to, an automatic shutdown of both reactors in September at the Peach Bottom Atomic Power Station reported mixed findings about the facility's handling of the event.

The U.S. Nuclear Regulatory Commission and representatives from Exelon, the company that operates the plant, presented their early report last night to the public at the Peach Bottom Inn in Delta.

Lightning struck the plant on Sept. 15 and disturbed the local electrical grid. Because Peach Bottom receives energy from the grid as well as provides it, it shut down automatically around 1:30 a.m. when those power sources were reduced.

The six-person team of specialists from the NRC regional office will release a full report by Dec. 18. As it outlined its findings last night, the team said it found both positives and negatives in the way the situation was handled.

Malfunction: The Peach Bottom facility, which has been generating electricity since 1974, is on the west bank of the Susquehanna River in southeastern York County and serves about 2.5 million homes. It is one of 17 generation units operated by Exelon Nuclear.

A major problem with the September shut-down was a malfunction with a system backup, said NRC spokesman Neil Sheehan. Typically, if there is a problem with a reactor, **emergency diesel generators** provide more power.

But the reactors shut off after an hour, and one of the diesel generators shut down.

Team members said that while the generator's failure appears to be an equipment problem, they were not yet sure who should have been accountable.

Team members also found degraded conditions within the plant that should have been updated and said concerns voiced by staff members were never investigated.

They noted lapses in the monitoring of equipment, procedural problems concerning what action should be taken after a shutdown and conflicts over which departments should take action about specific issues.

"We have not been as diligent at identifying problems and getting them out on the table as we need to," said Rusty West, Peach Bottom site vice president. "We need to better u"We have not been as diligent at identifying problems and getting them out on the table as we need to," said Rusty West, Peach Bottom site vice president. "We need to better understand all the equipment anomalies that we have and pursue them with great vigor."

But the team noted that the Peach Bottom staff acted quickly and correctly determined how to respond to the incident, the team reported.

And managers have been diligent about conducting internal investigations and taking proactive actions --- such as cleaning equipment and defining emergency procedures, it said.

But some audience members said the NRC should be doing more to prevent future shutdowns.

Sept. 15 was the plant's fourth automatic reactor shutdown in the past year. On July 22, Peach Bottom's unit 2 reactor lost power after generator problems. The same unit shut down previously on April 12 and Dec. 21.

In response, the NRC recently labeled unit 2 a white performance indicator, meaning it will be monitored more closely, Sheehan said.

But Eric Epstein, chairman of Three Mile Island Alert, a group that monitors local nuclear plants, said the four shutdowns in a year are cause for concern.

"You should be concerned with the trend," Epstein said. "Any time there's a forced shutdown, it means the plant's safety systems are being challenged."

THE NRC's Inspection team **found six "Green: violations** as a result of the incidents. All six were deemed Non-Cited violations

The power station was issued violations after a September reactor shutdown.

By SEAN ADKINS Daily Record staff Tuesday, February 10, 2004

The U.S. Nuclear Regulatory Commission will be more vigilant of Peach Bottom Atomic Power Station's Unit 2 reactor as result of a second-tier safety violation.

The commission has penalized the Unit 2 reactor with a "white" finding related to the failure of an emergency diesel generator during an unscheduled Sept. 15 reactor shutdown.

A white violation refers to an event at the plant that is considered as of low to moderate safety significance.

Since the generator failure affected both of the plant's units, NRC officials tacked on a green violation in regard to the power station's Unit 3 reactor.

A green violation is an event characterized as being of very low safety significance, said Neil Sheehan, spokesman for the NRC.

The commission decided on a green violation because fewer safety-related electrical loads powered by the emergency generator exist for Unit 3.

“This will help us better know where we need to focus an increased level of attention going forward,” Sheehan said.

A bolt of lightning struck a Chester County power pole Sept. 15, generating an electrical surge along power lines that feed into Peach Bottom Atomic Power Station.

The strike led to the automatic shutdown of the plant, which triggered the formation of a special, augmented NRC inspection team.

As part of its findings, the team found that faulty protection circuitry and a loose wire failed to contain the surge that disabled the plant.

Exelon has replaced all damaged fuses and tightened necessary wires to help ensure a similar event will not shut down the power station.

Within moments of the September shutdown, the plant’s four diesel generators kicked on to power the station’s vital equipment and offices.

About an hour later, one of the reserve generators seized. Exelon declared a “discretionary” unusual event — the lowest of the NRC’s emergency categories.

“This is not a common thing,” Sheehan said. “These generators should operate smoothly.”

The commission’s inspection team found that deficient procedures were followed during the 1992 installation of generator adapter gaskets. Combustion gas leaked into the jacket water cooling system — a problem that led to the automatic tripping of the generator Sept. 15.

In March and April 2003, Exelon took corrective actions to repair the observed low jacket water pressure conditions. The NRC said the...problem was not resolved.

Last June, commission inspectors documented that lube oil had leaked from loose flange joint bolts on an emergency diesel generator at the plant. That leak caused a small fire in the exhaust manifold during a test.

The NRC responded to the fire by issuing a green violation.

Exelon has less than a month to reply to the commission's white finding. The company will not appeal the determination, said Craig Nesbit, a company spokesman.

Exelon agrees with the NRC's findings, he said.

YDR: NRC still watching Peach Bottom -

Four unplanned shutdowns in about a year netted the reactor a 'white' violation, which gets it extra oversight.

By SEAN ADKINS Daily Record staff Saturday, April 10, 2004

At bottom: · IF YOU GO A low to moderate safety violation discovered last year means additional regulatory oversight for Peach Bottom Atomic Power Station's Unit 2.

The unit will face a Nuclear Regulatory Commission supplemental inspection later this year as a result of deficient performance based on its number of unplanned shutdowns.

The commission will follow a normal inspection schedule for the power station's third unit through Sept. 30, 2005. Based on the assessment of an NRC inspection team, the commission cited Unit 2 with a "white" violation for the failure of the emergency diesel generator.

Following a Sept. 15 unplanned shutdown of Units 2 and 3, a reserve generator seized.

The generator, one of four, helps power the plant's vital equipment and offices.

A commission inspection team later found that deficient procedures were followed during the 1992 installation of generator adapter gaskets. Gas leaked into the equipment's jacket water cooling system — a problem that led to the automatic tripping of the generator Sept. 15. The NRC team determined that corrective actions Exelon took to repair the observed low jacket water pressure conditions in March and April 2003 were inadequate. The problem was not resolved.

Since that time, the plant has created corrective actions to ensure the operation of the generators, said Pete Resler, spokesman for Exelon Nuclear, which co-owns and operates the power station.

For example, the plant has revised maintenance, testing and inspection procedures for the diesel generators.

Training materials regarding the generators have been updated, Resler said.

Aside from the low to moderate safety breach, five "green" violations at Unit 2 in 2003 caught the attention of the commission.

A green violation is characterized as being of very low safety significance.

Some of the green infractions include problems with the second unit's safe shutdown emergency lights and the emergency diesel generator fire protection system. "These findings highlight a need for Exelon to improve this area," according to a March 3 letter sent by the NRC to the utility.

Commission officials will make another trip to Peach Bottom Atomic Power Station's Unit 2 in September to review the causes behind the reactor's four unplanned shutdowns per 7,000 critical hours, or roughly one year of operation.

The shutdowns occurred between the fourth quarter of 2002 and the fourth quarter of 2003, said Diane Screnci, spokeswoman with the NRC.

The fourth shutdown that occurred during the third quarter of 2003 netted the second reactor a white performance indicator, she said.

Increased oversight was maintained by the NRC at Peach Bottom-2, “which will face a Nuclear Regulatory Commission supplemental inspection later this year as a result of **deficient performance** based on its number of unplanned shutdowns. The commission will follow a normal inspection schedule for the power station's third unit through Sept. 30, 2005 (*York Daily Record*.)

Unplanned shutdowns and equipment failure were to blame.

By SEAN ADKINS Daily Record staff Thursday, April 15, 2004

With little more than a projection screen between them, officials with both the Nuclear Regulatory Commission and Exelon Generation met Wednesday night at the Peach Bottom Inn to walk through the agency's annual safety performance assessment of Peach Bottom Atomic Power Station.

Based on a 2003 low-to-moderate safety violation, commission officials will host a supplemental inspection of Unit 2 to ensure the reliability of the plant's diesel generators.

In September, NRC staff will investigate through an additional inspection the reason behind Unit 2's four unplanned shutdowns per 7,000 critical hours, or roughly one year of operation. The unscheduled shutdowns occurred between the fourth quarter of 2002 and the fourth quarter of 2003.

The fourth shutdown that occurred during the third quarter of 2003 netted the second reactor a white performance indicator — a violation of low to safety significance.

Between Jan. 1 and Dec. 31, 2003, both Peach Bottom Atomic Power Station's Unit 2 and 3 reactors racked up 17 green violations — an infraction of very low safety significance, said Brian Holian, deputy director of reactor projects for the NRC's Region 1.

Some of the green infractions include problems with the second unit's safe shutdown emergency lights and the emergency diesel generator fire protection system. "Seventeen green violations," Holian said, "it's a hefty amount. But you have to remember it's a twin reactor plant and that's

***The commission investigated a loss of power at
Peach Bottom's power station in May***

By SEAN ADKINS Daily Record

- September 4, 2003 - For about nine days in May, an undetected broken wire caused a loss of power to a redundant control station for Peach Bottom Atomic Power Station Unit 3.

A failure to observe work order test instructions after maintenance on the panel prevented plant technicians from immediately discovering the broken wire, according to a U.S. Nuclear Regulatory Commission report.

Damage to the power supply wire occurred during maintenance to the high-pressure coolant injection alternative control station — a system used to shut down the plant if the operators are forced to leave the main control room because of a fire, said NRC spokeswoman Diane Scenci.

While the violation is under commission review, the incident did not pose a safety threat since the plant repaired the wire and restored power to the back-up station on May 14, Scenci said.

"There are other ways you could shut down the plant even if you don't have the station active," she said.

Depending on the commission's findings, the infraction could mean additional plant inspections.

In June, Peach Bottom Atomic Power Station was the subject of a supplemental NRC inspection for a violation committed the year before.

Last year, a light bulb dropped from the ceiling onto a circuit board and caused the plant's fire-suppression system to discharge carbon dioxide [Refer to July 11, 2003] into the E-3 emergency diesel generator room in the Diesel Generator Building.

The supplemental inspection found that the plant had taken the proper corrective actions and the power station could return to a routine inspection schedule.

While the plant showed that its fire-suppression system was in working order, a malfunction in one of its diesel generators garnered a non-cited commission violation of very low safety significance.

In June, NRC inspectors found that Exelon technicians had not adequately tightened the engine top cover flange joint bolts of an emergency diesel generator during a maintenance procedure.

As a result, lube oil leaked from the joint and caused a small fire on the exhaust manifold during a test.

During that same time period, Three Mile Island Unit 1 violated an NRC reporting requirement.

In June, NRC inspectors found that, on three instances, TMI officials found potentially disqualifying medical conditions among its licensed operators but had not reported them to the NRC within the required 30 days.

TMI requested its doctor to confirm with the patient's physicians, which extended past the 30-day NRC reporting period.

Two units at nuke plant shut down; grid disturbance cited

- September 15, 2003 - An electrical disturbance on the power grid cut off incoming electricity at the Peach Bottom nuclear power plant and caused both reactors to shut down automatically early Monday, Exelon Nuclear officials said.

Plant officials declared an "unusual event" just after 2:30 a.m.

The plant's four emergency backup diesel generators provided emergency power for about an hour, said Exelon spokesman David Simon. One of the generators malfunctioned, and then another backup source of power was used to power vital equipment, such as lights and emergency feed water pumps, until power was restored later in the morning, Simon said.

... PJM Interconnection, the company that operates the power grid in the Mid-Atlantic, said it was investigating the grid disturbance. PJM spokesman Ray Dodter said the company couldn't yet say what caused the disruption.

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Unit-2 was operating at 100% power, and returned to full power on September 25, 2003.

Unit-3 was operating at 91% power, and remained shut for the 3R14 refueling outage.

✓ **Unusual Event Declared, Terminated at Peach Bottom Nuclear Plant in York County**

DELTA (Aug. 16) -- Exelon Nuclear's Peach Bottom Atomic Power Station's fire brigade extinguished a small fire onsite yesterday after a backup emergency diesel generator's exhaust gasket on the roof of the diesel generator building unexpectedly caught fire.

The fire occurred during routine testing of one of the station's four diesel generators. The fire prompted the declaration of an Unusual Event at 6:14 p.m. Tuesday, in accordance with station procedures, due to a fire in the Protected Area that was not extinguished within 15 minutes. The fire was extinguished at 6:35, and the Event was terminated at 8:40 p.m. No offsite fire responders were needed to extinguish the fire.

There was no threat to the safe operation of the plant, and there was no danger to station personnel.

An Unusual Event is the lowest of four emergency classifications established by the U.S. Nuclear Regulatory Commission.

There was no danger to the public during the event and no special action by the public was needed. Exelon Nuclear notified all appropriate federal, state and local emergency response officials of the Unusual Event.

✓ Lancaster Online.com: Fire extinguisher malfunction leads to alert at Peach Bottom, By STAFF REPORT, Intelligencer Journal

Published: Aug 09, 2007 12:56 AM EST

LANCASTER COUNTY, Pa. - The unintentional discharge of a fire extinguisher in one of Peach Bottom Atomic Power Station's emergency diesel generator rooms forced Exelon Nuclear to declare an alert at the plant Wednesday afternoon.

The alert was terminated about an hour later, according to a news release from Exelon.

There was no fire and no injuries.

The extinguisher "mechanically failed" about 3:36 p.m. Wednesday, and the alert was terminated at 4:53 p.m., according to the release.

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