

Incident Chronology at TMI from NRC: 1979-2014

March 28, 1979, 4:00 a.m. - Beginning of the Three Mile Island (TMI) Unit-2 loss-of-coolant, core melt accident. The plant came within 30 minutes of a full meltdown. The reactor vessel was destroyed, and large amounts of unmonitored radiation was released directly into the community.

March 28, 1979, 4:30 p.m. - Press conference of Lt. Governor William Scranton:

This is an update on the incident at Three-Mile Island Nuclear Power Plant today. This situation is more complex than the company first led us to believe. We are taking more tests. And at this point, we believe there is still no danger to public health. Metropolitan Edison has given you and us conflicting information. We just concluded a meeting with company officials and hope this briefing will clear up most of your questions. There has been a release of radioactivity into the environment. The magnitude of this release is still being determined, but there is no evidence yet that it has resulted in the presence of dangerous levels. The company has informed us that from about 11 a.m. until about 1:30 p.m., Three-Mile Island discharged into the air, steam that contained detectable amounts of radiation.

March 30, 1979 - Governor Richard Thornburgh recommended an evacuation for preschool children and pregnant women living within five miles of the plant. Out of a target population of 5,000, over 140,000 Central Pennsylvanians fled the area. Schools in the area closed...

The U.S. House of Representatives committee examining reporting information during the accident concluded:

The record indicates that in reporting to State and federal officials on March 28, 1979, TMI managers did not communicate information in their possession that they understood to be related to the severity of the situation. The lack of such information prevented State and federal officials from accurately assessing the condition of the plant. In addition, the record indicates that TMI managers presented State and federal officials misleading statements (i.e. statements that were inaccurate and incomplete) that conveyed the impression the accident was substantially less severe and the situation more under control than what the managers themselves believed and what was in fact the case.

May 22, 1979 - Former control room operator Harold W. Hartman, Jr. tells Nuclear Regulatory Commission (NRC) investigators that Metropolitan Edison- General Public Utilities (GPU) had been falsifying primary-coolant, leak rate data for months prior to the accident. At least two members of management were aware of the practice. NRC investigators do not follow-up or report the allegations to the Commission (See [February 29, 1984](#), for first-ever criminal conviction of a nuclear utility for violating the Atomic Energy Act.)

June 22, 1979 - Governor Richard Thornburgh wrote to the NRC, expressing his "deeply felt responsibility for both the physical and psychological well being of the citizens of Pennsylvania." Thornburgh stated his "strong opposition to any plans to reactivate Unit -1 until a number of very serious issues are resolved."

July 2, 1979 - The NRC ordered the indefinite shutdown of TMI-1 until assurances are in place that the plant can be operated safely.

August 9, 1979 - The Nuclear Regulatory Commission set up Atomic Safety & licensing Board (ASLB) to hold hearings to determine whether there is reasonable assurance Three Mile Island Unit-1 can be operated without endangering the health and safety of the public. Most of the

issues pertained to General Public Utilities (GPU) managerial, financial and technical resources. The NRC Commissioners committed themselves to directly review any appeal of the ASLB's restart decision, thus, bypassing the normal, time-consuming route through the Appeal Board. However, the Commission later reversed itself on August 20, 1983.

October 25, 1979 - The NRC issued a Notice of Violation (NOV) for the accident to Met Ed and recommended the maximum fine, \$155,000, permitted under law.

October 30, 1979 - The Kemeny Commission, appointed by President Jimmy Carter, found human error, institutional weaknesses and mechanical failures caused the TMI accident.

December 15, 1979 - Met Ed denied all NRC charges but agreed to pay the NRC fine.

1980

The Susquehanna Valley Alliance, based in Lancaster, successfully prevented GPU/Met Ed from dumping 700,000 gallons of radioactive water into the Susquehanna River.

March 25, 1980 - Met-GPU, blaming Babcock & Wilcox (the plant's designer) for the TMI accident, sue B&W for \$500 million. (See [January 24, 1983](#), [February, 1983](#) and [May 19, 1983](#), for more information.)

GPU also filed an unsuccessful \$4 billion law suit against the NRC. GPU alleged that the NRC's negligence contributed to the TMI accident.

June-July, 1980 - For 11 days, Met Ed illegally vented 43,000 curies of radioactive Krypton-85 (10-year half-life; beta and gamma) and other radioactive gasses into the environment without having scrubbers in place. (See [November 1980](#), for court ruling.)

July 23, 1980 - First human entry into TMI-2 containment building since March 28, 1979. (See [July 21, 1982](#) and [July 24, 1984](#), for related developments.)

September, 1980 - Met Ed renames itself GPU Nuclear.

October 15, 1980 - The NRC restart hearings begin. Design and hardware issues were litigated by the Union of Concerned Scientists (UCS); emergency planning was litigated by ANGRY, Newberry Township Steering Committee and Norman and Marjorie Aamodt; financial capability was litigated by TMI-Alert; and, management issues were litigated by TMI Alert and the Aamodts.

PANE appealed the NRC's decision not to adjudicate "psychological stress." This issue eventually worked its way up to the U.S. Supreme Court. The Commonwealth of Pennsylvania also appeared in the hearings. (See [January 7, 1982](#) and [April 19, 1983](#), for follow-up decisions.)

November, 1980 - The United States Court of Appeals for the District of Columbia ruled that the krypton venting ([June-July, 1980](#)) was illegal.

1981

February, 1981 - A \$20 million fund is set up to pay over 15,000 claims for affected area residents and business within the 25-mile radius of TMI. (See 1989 for more information.)

Another \$5 million was set up to establish the TMI Public Health Fund. However, several years after the establishment of the TMI Public Health Fund (1986), TMI-Alert and area political representatives unsuccessfully petitioned the federal court to remove the Fund's administrators due to nepotism and poor communication with the community.

March, 1981 - The NRC Commissioners dismissed the financial qualification issue without the case ever being litigated. The D.C. Circuit Court decides TMIA's appeal is premature.

July, 1981 - One billion defueling plan proposed by Governor Thornburgh.

July 9, 1981 - Main restart hearings end.

August 20, 1981 - The NRC reversed its promise to area residents not to allow restart until all internal NRC appeals are complete.

October 2, 1981 - The ASLB reopened the restart hearings based on allegations of operators cheating on operator license exams.

November 1981 to January 1982 - GPU discovers it has damaged over 29,000 steam generator tubes at TMI-1. (See [December 7, 1983](#); [July 16](#) and [October 31, 1984](#); and, [January 11, 1999](#), for background information and additional developments.)

1982

January 7, 1982 - The D.C. Circuit Court decided psychological (psych) stress does not need to be covered during the restart hearings. However, the Court ruled, that under the National Environmental Policy Act (NEPA), psych stress must be addressed. The Court ordered an injunction on restart until a study on psych stress was conducted. ([October 15, 1980](#) and [April 19, 1983](#), for background developments.)

March, 1982 - The American Journal of Public Health reported: "During the first two quarters of 1978, the neonatal mortality rate within a ten-mile radius of Three Mile Island was 8.6 and 7.6 per 1,000 live births, respectively. During the first quarter of 1979, following the startup of accident prone Unit 2, the rate jumped to 17.2; it increased to 19.3 in the quarter following the accident at TMI and returned to 7.8 and 9.3, respectively, in the last two quarters of 1979." Dr. Gordon MacLeod, Secretary, Pennsylvania Department of Health.

May 18, 1982 - Voters in Cumberland, Dauphin and Lebanon counties vote by a 2-1 margin in a non-binding referendum to oppose the restart of Unit-1. (See [May 18, 1983](#), for related development.)

July 21, 1982 - The first look at the TMI-2 core is recorded by a mini-TV camera. (See [July 23, 1980](#) and [July 24, 1984](#), for related developments.)

August 12, 1982 - William Pennsylv, a cleanup worker, was fired for insisting he be allowed to wear a respirator while undressing men who entered highly radioactive areas. Pennsylv filed a complaint with the U.S. Department of Labor. (See, [April 11, 1984](#), for follow-up information).

November 1, 1982 - The Babcock & Wilcox (B&W) trial begins. (See [March 25, 1980](#); [January 24](#), [February 1983](#), and [May 19, 1983](#), for additional information.)

November 9, 1982 - NRC Commissioners hold a public meeting in Harrisburg. Over 1,200 area residents attend. The commission announced a restart decision would be made by December 1982, even though appeals on the NRC's Partial Initial Decisions (PID) had not been heard.

December 10, 1982 - No decision from the NRC on restart of TMI-1...

1983

January 24, 1983 - B&W and GPU settle out-of-court. ([March 25, 1980](#); [November 1, 1982](#); and, [February 1983](#) and [May 19, 1983](#), for background material.)

February, 1983 - A majority of the Commissioners opposed Commissioner Victor Gilinsky's request to have the NRC Office of General Counsel review the GPU-B&W trial record. (See [March 25, 1980](#); [January 24](#), [February](#) and [May 19, 1983](#), for more information on this case.)

March 22, March 27, and April 2, 1983 - Three senior level plant employees, Richard Parks, Larry King, and Edwin Gischel, charge GPU and Bechtel with harassment, intimidation and circumvention cleanup safety procedure.

April 18, 1983 - The NRC staff begins to back away from its support of GPU.

April 19, 1983 - The United States Supreme Court reversed the D.C. Circuit Court's opinion on psych stress and ruled an environmental study is not necessary.

April 26, 1983 - The NRC staff explains that the basis for the need to "revalidate" GPU's management was the "open issue of the Hartman allegations concerning the falsification of leak rate data," which could "possibly affect the staff's position on management integrity."

May 5, 1983 - GPU reveals for the first time to the NRC that management audits concluded by BETA and RHR, completed in February and March, 1983, were critical of plant operations and management.

May 18, 1983 - Twelve area residents were arrested at TMI for blocking the plant entrance on the anniversary of the TMI referendum. (See [May 18, 1982](#), for background material.)

May 19, 1983 - William J. Dircks, NRC Executive Director for Operations announces the staff's withdrawal of support for GPU's management based on five "open" issues: 1) Hartman allegations; 2) B&W trial transcript (See [March 25, 1980](#)); 3) Cleanup worker allegations; 4) BETA and RHR reports; and, 5) GPU's failure to promptly report BETA and RHR's conclusions to the NRC.

June 2, 1983 - Governor Thornburgh urged the NRC not to make a final decision on restart until the State's appeal of all issues are concluded. Eight days later GPU writes to the Governor and proposes to reorganize some personnel, and promises not to let those individuals who cheated on exams operate Unit 1. Thornburgh drops the Commonwealth's appeal on the "cheating" issue, and suggested GPU's proposal is a "good start" towards satisfying his concerns.

July 22, 1983 - GPU is fined \$140,000 for submitting material false statements to the NRC in connection with the license certification of then TMI-2 Supervisor of operations who cheated on his license requalification exam IN 1979. (See [June 15, 1984](#).)

October 17, 1983 - Prehearing conference on steam generator tubes. (See [December 7, 1983](#).)

September 22, 1983 - Dauphin County Commissioners pass a resolution to establish air emissions standards for TMI. The county also established a task force to write the ordinance. This is the first time a county takes legally binding action to control the hazards caused by nuclear power operations.

November 7, 1983 - The Department of Justice indicts Met Ed for falsifying leak rate data and destroying documents before the accident, in violation of their license, NRC regulations, and the federal criminal code.

December 5, 1983 - The NRC staff recommends TMI-1 restart at 25% power, although they can not endorse GPU's management. (See [April 26, 1983](#) and [July 26, 1984](#), for more information.)

December 7, 1983 - The Commission's Office of General Counsel reports that the steam generator tube repairs are a "significant hazard consideration" and a vote to the contrary would violate the Atomic Energy Act. (For related developments see [November 1981 - January 1982](#); [July 22, 1983](#); [July 16, 1984](#); and, [January 11, 1999](#))

1984

January 11, 1984 - By a 3-2 vote, and with only a day of public notice, the NRC decided to separate integrity issues from restart.

February 29, 1984 - A plea bargain between the Department of Justice and Met Ed settled the Unit 2 leak rate falsification case. Met Ed plead guilty to one count, and no contest to six counts of an 11 count indictment.

The Company also agreed to pay a \$45,000 fine, and establish a \$1 million dollar interest-bearing account to be used by the Pennsylvania Emergency Management Agency. The Settlement stipulated that the fines, emergency preparedness fund, and legal cost of the prosecution, would not be paid by GPU/Met Ed rate share holders. (See [May 22, 1979](#), for initial complaint.)

April 11, 1984 - William Pennsylv settled out-of-court two days before an administrative law judge was scheduled to hear his case. (See [August 12, 1982](#), for background information).

May 24, 1984 - The NRC's Atomic and Safety Licensing Board orders new hearings on management competence and integrity.

June 4, 1984 - In response to a freedom of Information request by the Philadelphia Inquirer, the NRC released transcripts of closed door Commission meetings from 1981- 1983. The Commission's strong commitment to restart is only tempered by legal and political considerations. Additionally, the Commission clearly lacked an in depth understanding of the legal and technical issues, and holds the public views in disdain.

June 15, 1984 - James Floyd, former TMI-2 Supervisor of operations, is indicted by a federal grand jury for cheating on 1979 licensing exams, and for causing two material false statements to be submitted to the NRC in connection with his license certification. (See [November 6, 1984](#) and [January 2, 1985](#), for related developments.)

July 16, 1984 - TMIA is the only group to intervene in the steam tube case. The Board refuses to allow evidence relating to the recently discovered steam generator tube problem. (See [November](#)

[1981 through January 1982](#); [December 7, 1983](#); [July 16](#) and [November 6, 1984](#); and, [January 11, 1999](#), for related developments.)

July 24-27, 1984 - During the 159-ton reactor head lift, which was delayed due to polar crane failure, GPU vented radioactive gases into the environment despite pledges by the Company and NRC that no radioactive releases would occur. This is the time there has been direct access to Unit-2's damaged fuel. GPU was fined \$40,000 by the NRC for this violation.

July 26, 1984 - The NRC endorsed GPU's management, but concludes that as of 1981 "the licensee had not yet met the standard of reasonable assurance of no undue risk to public health and safety." (See [December 15, 1979](#) and [April 26, 1983](#), for background information.)

August 13, 1984 - TMIA, joined by political officials and New Jersey safe-energy organizations, petitioned the NRC to revoke GPU's license based on the fact that the Company lacks the ability to safely operate TMI. (See NRC ruling on [January 15, 1985](#)).

August 15, 1984 - Governor Thornburgh addresses the NRC and urged them not to vote on restart until ASLB hearings are held on certain "management integrity" issues, and until funding is in place for the cleanup.

September 25, 1984 - The NRC staff denies UCS petition to require repairs to the emergency feedwater system before Unit 1 is allowed to operate. (See [December 20, 1984](#), for Commission decision.)

October 31, 1984 - The AS&LB approves the Unit 1 steam generator tube repairs.

November 6, 1984 - Research conducted by the Department of Energy (DOE) on reactor damage during the accident, indicates temperatures may have reached in excess of 4,800 degrees. (See [February 9, 1990](#), for follow-up research.)

November 8, 1984 - The NRC notifies Congress that the Justice Department has begun a federal grand jury investigation of the NRC staff.

November 14, 1984 - ASLB hearings recommence on the first of four remanded issues: the Diekamp Mailgram.

November 16, 1984 - Former TMI Supervisor James Floyd is convicted in federal court of cheating on NRC operator exams in 1979. (See [June 15, 1984](#).)

December 10, 1984 - TMIA filed a motion to reopen the steam tube case based on new data, including the revelation of recently discovered cracks in unrepaired areas.

December, 1984 - Former NRC Investigator David Gamble testified at NRC hearings that the NRC's investigation as to whether Met Ed-GPU officials withheld information during the accident was deliberately incomplete and inaccurate. Gamble added the NRC's conclusion exonerating the Company was not supported by facts.

December 13, 1984 - The Commission denies a motion by the Aamodts regarding radioactive releases during the accident.

December 19, 1984 - Hearings begin on second remanded issues: training since 1981 cheating scandal.

December 20, 1984 - The Commission denied UCS's petition to delay restart until modifications are made on the accuracy of emergency feedwater flow indications. (See [September 25, 1984](#), for background information.)

1985

TMI's owners and builders paid more than \$14 million for out-of-court settlements of personal injury lawsuits. The largest settlement was for a child born with Down's Syndrome.

January 2, 1985 - Ivan Smith, ASLB Chairman, sends a letter to district court asking leniency for James Floyd. The letter prompts protests from elected officials and local citizens. (See [June 15](#) and [November 6, 1984](#), for background data.)

January 11, 1985 - The Commonwealth calls for the removal of Ivan Smith, Chair of the ASLB, for showing pervasive bias in favor of GPU. Similar motions were filed by TMI Alert and UCS. Later the NRC staff supported motions for Smith's removal. (See [January 2, 1985](#).)

January 15, 1985 - The NRC staff denied TMIA's 2.206 petition asking for GPU's license to be revoked based on deficient character. (See [August 13, 1984](#), for background information.)

March 24, 1985 - Claims of \$110 million for reduced property values and lost business revenues have yet to be paid by GPU's insurers.

May 29, 1985 - The NRC Commissioners vote by 4-1 to restart TMI-1. TMIA, UCS and the Aamodts appeal the NRC's decision.

At TMI, 79 local residents were arrested at the North Gate.

July 12, 1985 - Two workers who participated in the initial phase of the cleanup and contracted cancer, joined 2,500 area residents suing GPU.

August 1985 - Marc Sheaffer, a psychologist at the Uniformed Services University of the Health Sciences in Bethesda, released a study linking TMI-related stress with immunity impairments. (See [August, 1987](#) and [April, 1988](#), for related studies.)

August 9, 1985 - GPU's permit to ship low-level radioactive waste (LLRW) to Hanford, Washington was temporarily suspended due to mislabeling of three barrels of radioactive waste. (See [August 14, 1985](#); [December 1987](#); [May 6, 1992](#); and, [April 9, 1993](#), for related rad waste problems.)

August 12, 1985 - GPU and Bechtel were fined \$64,000 for cleanup worker allegations first reported on [March 22, 1983](#).

August 14, 1985 - Three-thousand gallons of LLRW water leaked into the containment building. (See [August 9, 1985](#); [December 1987](#); [May 6, 1992](#); and [April 9, 1993](#), for related rad waste problems.)

October 3-4, 1985 - TMI-1 restarts...17 area residents are arrested at the North Gate.

October 1985 - Removal of damaged fuel from TMI-2 begins.

1986

TMI-2 defueling work force peaks at 2,000...

February 1986 - One celled organisms believed to be fungus, bacteria and algae like creatures were discovered. These creatures obscured the view of the reactor core, and impeded the cleanup.

March, 1986 - See [June 15, 1987](#), for positive drug testing results that began during this month. (Also, please refer to [August 18, 1996](#), for a related incident.)

July, 1986 - First shipment of damaged fuel debris was shipped to Idaho.

December 16, 1986 - A cleanup worker was contaminated and injured when lead shielding fell on him. The worker was treated in an emergency room at a local hospital.

1987

Spring 1987 - Three Mile Island Alert (TMIA) was recognized by the Pennsylvania House of Representatives for ten years of community service. (See [Spring 1997](#), for related public service acknowledgments.)

March 29, 1987 - A contractor employee was arrested and charged with criminal mischief for releasing halogen gas on the ground floor of the Unit-2 control building. The employee wanted to leave work early. Total damage from the incident was approximately \$50,000.

May, 1987 - A non-licensed plant employee was found sleeping in the Unit-2 radioactive waste control room. (See [December 1, 1987](#); [July 19](#) and [August 3, 1988](#); [October 11, 1989](#); and [July 31, 1990](#), for related sleeping events.)

June, 1987 - The NRC endorsed GPU's plan to evaporate 2.3 million gallons of accident-generated, radioactive water, including tritium, cesium and strontium, directly into the atmosphere.

June 15, 1987 - Ten employees working at TMI-1 & TMI-2 tested positive for drugs; eight individuals were suspended for 30 days without pay and one resigned.

Since March 1986, sixteen employees have tested positive for drugs. (See [August 31, 1988](#), for a related incident.)

August, 1987 - James Rooney and Sandy Prince of Embury of Penn State University reported that chronically elevated levels of psychological stress have existed among Middletown residents since the accident. (See [August, 1985](#) and [April, 1988](#), for related studies.)

December, 1987 - Shipment of certain LLRW to Barnwell, South Carolina was barred. The failure of a 12,000 pound liner containing "solidified sludge" to properly harden was cited as the reason for the prohibition. (See [August 9](#) and [14, 1985](#); [May 6, 1992](#); and [April 9, 1993](#), for related problems.)

December 1, 1987 - GPU announced the firing of a TMI-2 shift supervisor for sleeping on the job. Although the employee had a record of sleeping on the job dating back to the early 1980s, GPU did not issue a warning until October 1986.

Edwin Stier, former Director of the New Jersey Division of Criminal Justice, reported that 21 witnesses saw the shift supervisor asleep on the job. (See [May 1987](#); [July 19](#) and [August 3, 1988](#); [October 11, 1989](#); and, [July 31, 1990](#), for other sleeping incidents.)

1988

February 9, 1988 - Due to a partially "split hose" in the sludge processing system, " a spill of liquid radioactive waste" resulted "...with accompanying high dose rates."

April, 1988 - Andrew Baum, professor of medical psychology at the Uniformed Services University of the Health Sciences in Bethesda discussed the results of his research on TMI residents in Psychology Today. "When we compared groups of people living near Three Mile Island with a similar group elsewhere, we found that the Three Mile Island group reported more physical complaints, such as headaches and back pain, as well as more anxiety and depression. We also uncovered long-term changes in levels of hormones...These hormones affect various bodily functions, including muscle tension, cardiovascular activity, overall metabolic rate and immune-system function..." (See [August, 1985](#) and [August, 1987](#), for related studies.)

May 23, 1988 - A clean up worker "fell part-way into an opening above the Unit 2 reactor vessel" and "received low radiation exposure to the skin below the knees." During the incident the "worker's legs were immersed in shielding water above the reactor vessel up to his knees."

June 2, 1988 - A minor was exposed to radiation "...in excess of the limits..." due to the falsification of his date of birth. "Different radiation standards are applied to juveniles and adults. The minor was "removed" from TMI.

July, 1988 - GPU settles a class action suit challenging high utility rates for \$1.25 million.

July 19, 1988 - The operator of the Reactor Building polar crane was found sleeping at his station.

The same day a worker was found asleep in the Unit-2 Contamination Control Crucible. (See [May 1987](#) and [December 1, 1987](#); [July 19](#) and [August 3, 1988](#); [October 11, 1989](#); and, [July 31, 1990](#), for more on workers asleep on the job.)

July 26, 1988 - "A rail car carrying a loaded shipping cask and its unmanned yard engine drifted for approximately 60 yards on the site tracks. The engine and the rail car came to a final rest as a result of an increase in the natural grade of the rails." (See [November 30, 1988](#), for a related development.)

August 3, 1988 - A worker was found sleeping in the Unit-2 auxiliary building. (See [May 1987](#) and [December 1, 1987](#); [July 19, 1988](#); [October 11, 1989](#); and [July 31, 1990](#), for other sleeping events.)

August 31, 1988 - A Unit-2 operator was fired after an 11 day investigation, including a medical probe, "showed the licensed operator, who was not identified, had been drinking and taking drugs either before or after he reported to work or while he was at work." (See [June 15, 1987](#), for related drug problems.)

November 30, 1988 - Three railway casks containing core debris destined for the Idaho National Engineering Laboratory were prevented from being shipped for a month. The delay was due to faulty change out O-rings in the shipping casks. (See [July 26, 1988](#), for a related incident.)

1989

After ten years of defueling activities, 5,000 TMI workers have received "measurable doses" of radiation exposure.

GPU collected \$560 million in insurance as a result of the TMI accident. The Company's insurers have paid over \$55 million in health, economic and evacuation claims since March 1979.

September 21, 1989 - At the TMI Advisory Panel Meeting, Dr. Michael Masnik of the NRC informed the Panel that "the NRC Office of Investigations report on the subject of management involvement in the inattentiveness issue at TMI-2 has been referred to the Justice Department and is under evaluation at this time." Dr. Masnik also acknowledged that the NRC believes there is "...wrongdoing on the part of the licensee."Two days later...

September 23, 1989 - A TMI-2 operator was found reading "unauthorized material", i.e. a "girly" magazine. (See [September 21, 1989](#), for the precursor event, and [September 1991](#) and [April 21, 2001](#), for related incidents.)

September 25, 1989 - Two cleanup workers received radiation exposures while handling a "small piece of reactor core debris..." in the decontamination area. "Officials said preliminary calculations show one worker may have a radiation exposure on the hands above 75 rem. The second worker may have an exposure greater than 18.75 rem. The federal occupational limit for exposure to extremities is 18.75 per calendar quarter."

On [January 13, 1990](#) - GPU was fined \$50,000 for a violation of "requirements protecting workers."

October 11, 1989 - A polar crane operator was found "reclining on the walkway with his feet draped over the handrail, eyes closed and head nodding." (See [May 1987](#) and [December 1, 1987](#); [July 19](#) and [August 3, 1988](#); and, [July 31, 1990](#), for other sleeping problems at TMI-2.)

November 1, 1989 - One of two workers involved in a radiation exposure "incident" may have received 220 rems to the hands, i.e., "extremities." The other worker in the incident is projected to have received 35 rems of exposure. The incident began when the workers picked up an object they thought was a "nut" or "bolt", but was in fact a piece of highly radioactive fuel. The workers were then advised to throw the "object into the reactor vessel." Since the fuel was "discarded", GPU had to use models to predict dose calculations and exposure rates.

GPU was also in violation for failing to report this incident in a timely fashion. Additionally, the workers have reported contradictory statements about the event. (See [September 25](#) and [November 28, 1989](#), for recent worker exposures.)

November 28, 1989 - Another exposure incident occurred at TMI-2 when a worker, who was wearing protective clothing, took the object [a 40-foot poll] and began wiping it with a towel...the worker was holding a radiation monitor and noticed after a few seconds that the object was highly radioactive..." GPU termed this incident an "unplanned exposure" [below one rem] and not an overexposure. (See [September 25](#) and [November 1, 1989](#), for recent worker exposures.)

GPU ordered a temporary shutdown of the cleanup, and the NRC "suggested" defueling may be halted.

1990

January 13, 1990 - GPU was fined \$50,000 for excessive radiation exposure to a worker. (See [September 25](#) and [November 1](#) and [28, 1989](#), for background information.)

February 9, 1990 - "An apparent crack has been discovered in a sample of metal that has been taken from the bottom of the reactor vessel at Three Mile Island Unit 2. The crack appears to extend deeper into the bottom head of the vessel than was believed last summer when apparent cracks were detected on the surface of the five-inch-thick bottom head." (See [November 6, 1984](#), for initial research findings.)

July 31, 1990 - The NRC announced "that an allegation that a shift supervisor on duty at Three Mile Unit 2 control room, during defueling operations in 1987, had sometimes slept on shift or had been otherwise inattentive to his duties, was true.

"Although some key members of the site management staff were aware of the sleeping problems and some actions were taken to correct it, it [sic] was not effectively corrected until utility corporate management became involved. The NRC staff proposes to fine GPU Nuclear, Inc. (GPUN) the company that operates the TMI site, \$50,000. The staff also proposes a Notice of Violation to the former shift supervisor." (For related sleeping problems refer to [May 1987](#) and [December 1, 1987](#); [July 19](#) and [August 3, 1988](#); and, [October 11, 1989](#).)

December 10, 1990 - GPU began evaporating 2.3 million gallons of accident-generated radioactive water directly into the atmosphere. Two days later the evaporator was shut down for mechanical problems.

1991

January 24, 1991 - The evaporator was "shut down four times due to various mechanical and electrical difficulties."

April 7 to May 11, 1991 - The evaporator was shut down for most of this period so GPU could "rewrite the main operating procedure." A Notice of Violation was issued by the NRC.

June, 1991 - Columbia University's Health Study (Susser-Hatch) published results of their findings in the American Journal of Public Health. The study actually shows a more than doubling of all observed cancers after the accident at TMI-2, including: lymphoma, leukemia, colon and the hormonal category of breast, endometrium, ovary, prostate and testis. For leukemia and lung cancers in the six to 12 km distance, the number observed was almost four times greater. In the 0-six km range, colon cancer was four times greater. The study found "a statistically significant relationship between incidence rates after the accident and residential proximity to the plant." (See [August, 1996](#) for Wing Study.)

September, 1991 - Standley H. Hoch, Chairman and CEO of GPU, was forced to resign after it was disclosed he had an affair with Susan Schepman, vice president of communications. (See [September 21 & 23, 1989](#) and [April 21, 2001](#), for related incidents.)

1992

May 6, 1992 - The NRC issued a Notice of Deviation related to GPU's "commitment" to conduct annual radioactive, waste transport audits. GPU was actually conducting the audits every 24 months. (See [August 9, 1985](#); [December 1987](#); and [April 9, 1993](#), for related rad waste problems.)

August 5, 1992 - GPU "declared an event of potential public interest when the Unit-2 west cooling tower caught fire." The fire lasted for ten minutes.

September, 1992 - GPU and the NRC agree to a negotiated settlement on the Post-Defueling Monitored Storage (PDMS) of TMI-2 with TMI-Alert, Chairman Eric Epstein. The Agreement stipulates GPUN will provide equipment and resources to independently monitor radioactive levels at TMI-2; \$700,000 for remote robotics research to assist in the cleanup and minimize worker exposure; and, guarantees that TMI-2 will never operate or serve as a radioactive waste repository for any radioactive waste generated off the Island. (See [December 1993](#) and [April 23, 1998](#), for more information.)

November 12, 1992 - "Due to slightly higher activity levels, approximately 600,000 gallons of accident generated water (AGW) must be processed through the evaporator twice before being vaporized into the atmosphere."

1993

January, 1993 - GPU "discovered" they failed to take periodic samples of approximately 221,000 gallons of accident generated water in the borated water storage tank.

February 7, 1993 - An intruder drove past TMI's guarded entrance gate, crashed through a protected area fence, crashed through the turbine building roll-up door, and hid in a darkened basement of the plant for almost four hours before being apprehended by guards.

On February 11, 1993, the NRC's top safety official Thomas Murley wasn't sure if any regulations had been violated during the incident at TMI. Nineteen days later, Samuel Collins head of the NRC's investigation team announced: "An individual can challenge the security events that currently exist.

(See [March 1, 1996](#) for follow-up information.)

April 9, 1993 - A Notice of Violation was issued for a "shipment of containers to the burial facility in Washington in which...free standing liquid inside the containers [was] in excess of ...NRC regulations." (See [August 9 and 14, 1985](#); [December 1987](#), and, [May 6, 1992](#), for related rad waste problems.)

August, 1993 - Evaporation was completed six months behind schedule.

August, 1993 - Dr. Michio Kaku, professor of Theoretical Nuclear Physics at City University of New York, evaluated studies conducted or commissioned by the NRC on the amount of fuel left in TMI-2. Kaku concluded: "It appears that every few months, since 1990, a new estimate is made of core debris, often with little relationship to the previous estimate...estimates range from 608.8 kg to 1,322 kg...This is rather unsettling...The still unanswered questions are therefore

precisely how much uranium is left in the core, and how much uranium can collect in the bottom of the reactor to initiate re-criticality."

December, 1993 - GPU placed TMI-2 in Post-Defueling Monitored Storage. (See [September 1992](#), for background information.)

1994

March 17, 1994 - TMI-1 shutdown for unscheduled repairs.

1995

September 20, 1995 - The Pennsylvania Supreme Court reversed a lower court's decision, and sided with GPU in allowing the Company to charge rate payers for the TMI-2 accident.

The decision ignored the financial facts of the case: TMI-2 was built at a cost to rate payers of \$700 million and had been on line for 90 days, or 1/120 of its planned operating lifetime, when the March 1979 accident began. One billion has been spent to defuel the plant, which now lays in idle shutdown, i.e., Post-Defueling Monitored Storage.

1996

March 1, 1996 - The NRC issued a violation against GPU for a breach in the protected area barrier on February 6, 1996. "Due to this event being similar to other security events that occurred in September 1995 and for which you were cited with a violation, the NRC is concerned about the implementation and effectiveness of the corrective actions to prevent recurrence of that type of violation..." NRC, James T. Wiggins, Director, Division of Reactor Safety.

(See [February 7, 1993](#), for data on Unauthorized Forced Entry.)

June 4, 1996 - U.S. District Judge Sylvia H. Rambo granted summary judgment to GPU and its codefendants in consolidated proceedings of more than 2,000 personal injury claims arising from the March 1979 accident at TMI. (See [August 1996](#), [November 2, 1999](#) and [June 12, 2000](#) for related health suit activities.)

August, 1996 - A study by the University of North Carolina-Chapel-Hill, authored by Dr. Steven Wing, reviewed the Susser-Hatch (Columbia University) study released in June 1991. Dr. Wing reported "...there were reports of erythema, hair loss, vomiting, and pet death near TMI at the time of the accident...Accident doses were positively associated with cancer incidence. Associations were largest for leukemia, intermediate for lung cancer, and smallest for all cancers combined...Inhaled radionuclide contamination could differentially impact lung cancers, which show a clear dose-related increase." (See [June 4, 1996](#), [November 2, 1999](#) and [June 12, 2000](#), for related developments on TMI health claims.)

August 18, 1996 - A contract supervisor tested positive for a controlled substance and was escorted from the site. (Also refer to [June, 1987](#).)

1997

February, 1997 - In their 1997 Annual Report, GPU reported that the cost to decommission TMI-2 doubled in four years. The original \$200 million projection has been increased to \$399 million for radioactive decommissioning. An additional \$34 million will be needed for non-radiological decommissioning. The new funding "target" is \$433 million; or a 110% increase in just 48 months.

March 4, 1997 - GPU improperly downgraded safety equipment and prepared inadequate design and safety evaluations at TMI. (See [October 14, 1997](#), for NRC fine.)

March 5, 1997 - GPU failed an emergency preparedness drill. (See [October 14, 1997](#), for follow-up fine.)

Spring, 1997 - The Pennsylvania House of Representatives, along with the City of Harrisburg, recognized TMI-Alert for 20 years of community service. (See [Spring 1997](#), for related public service award.)

October 14, 1997 - GPU agreed to pay a \$210,000 fine for violations identified by the NRC between November 1996 and May 1997 including: inadequate engineering design controls; improperly downgrading safety equipment; and, inadequate implementation of the plant's emergency preparedness program. (See [March 4 and 5, 1997](#), for background information.)

1998

January 1, 1998 - "Despite four incidents at Three Mile Island-1 involving personnel errors, including one involving contamination and another the type of valve that stuck open and led to the Three Mile Island-2 accident in 1979, the Nuclear Regulatory Commission staff has issued a Notice of Violation -- but not a civil penalty -- against GPU Nuclear Corporation. (See [October 14, 1997](#), for recent NRC violations.)

April 23, 1998 - RedZone Robotics, who has built robots at TMI-2 as part of the TMI-2 Settlement Agreement, will design a robot to map the damaged Chernobyl nuclear power plant in the Ukraine. (See [September 1992](#), for background information.)

1999

January 11, 1999 - TMI-1 is operating with thousands of damaged steam tubes. "...OTSG "A" has plugged 1,300 tubes and OTSG [Once Through Steam Generator] has 395 plugged tubes, totaling 1,695 plugged tubes at TMI-1. Each OTSG has 15,531 tubes. The NRC approved limit is a maximum of 2,000 total tubes plugged. GPUN has analyzed and submitted for NRC review a request to revise the tube plugging limit to 20% per OTSG, or 3,106 tubes per OTSG.

OTSG "A" has 248 tubes sleeved (one previously sleeved tube has been plugged) and OTSG "B" has 253 tubes sleeved." (AmerGen's Response to Questions and Concerns Regarding TMI-1 License Transfer Application. (See [November 1981](#) through January 1982; [December 7, 1983](#); and, [July 16, 1984](#), for background information.)

January 14, 1999 - TMI's new owners, AmerGen, entered into a Negotiated Settlement Agreement with TMIA's Chairman, Eric Epstein. The Agreement stipulates that AmerGen will

maintain equipment to allow citizens to independently monitor radiation releases at TMI; ensure the TMI work force exceeds minimal NRC requirements; additional decommissioning costs will be absorbed by AmerGen; guarantees no radioactive waste generated offsite can be stored at TMI; and, AmerGen also agreed not to conduct business with any company boycotted by the U.S. for military or economic reasons.

July 21, 1999 - GPU Nuclear received permission from the NRC to reduce the insurance at TMI-2 from \$1.06 billion to \$50 million.

November 2, 1999 - The Third Circuit Court of Appeals "revived the the rest of the lawsuits [1,990], citing those individuals constitutional right to have their cases heard by a jury." The Circuit Court upheld U.S. District Chief Judge Sylvia H. Rambo's "ruling on the expert testimony and the dismissal of the 10 [test cases]." (Pennsylvania Law Weekly, June 12, 2000). (Also refer to [June 4 and August 1996](#) and [June 12, 2000](#) for United States Supreme Court rejection of GPU's appeals.)

2000

June 12, 2000 - The United States Supreme Court , without comment, rejected an appeal by GPU to throw out 1,990 health suits. (Please refer to [June 4 and August 1996](#) and [November 2 1999](#), and [May 2, 2001](#), for related developments.)

August 9, 2000 - FirstEnergy Corp. and GPU announced a planned merger expected to be finalized by August 2001. FE would acquire GPU for approximately \$4.5 billion Ownership of TMI-2 and liability for 1,990 health suits against GPU would be transferred to FirstEnergy.

October, 2000 - Twenty-one years after the TMI-2 accident ruled on a rule making request by Public Citizen to change the agency's criteria for an "extraordinary nuclear occurrence."

2001

January, 2001 - A bomb threat was made at TMI.

April 21, 2001 - GPU fired an engineer who worked at TMI for 20 years for possessing "computer images of children engaging in sex acts or simulated sex acts." The man faces 112 counts and was released on \$50,000 bail. (See [September 21 & 23, 1989](#) and [September 1991](#) for related incidents.)

May 2, 2001 - The Third Circuit Court ruled that "new theories" to support medical claims against Three Mile Island will not be allowed. (Please refer to [June 4 and August 1996](#) and [November 2, 1999](#), and [June 12, 2000](#), for related developments.)

September 17, 2001 - TMI-Alert filed a Petition for rule making with the NRC requiring the Agency to mandate armed security guards at the entrance to all nuclear power plants. A final decision is expected in November 1, 2002. The Nuclear Energy Institute, First Energy's "voice in Washington, "recommended" that the Petition be "denied."

October 6, 2001 - After the September 11, 2001, terrorist attacks on the World Trade Center, the Pentagon and a downed airliner in Somerset County, Pennsylvania, the NRC has issued a "Security Advisory", and required 13 "prompt actions" which are "safeguarded" and "classified."

October 9, 2001 - TMI was shut down for a planned 29 day refueling outage...(See [December 8, 2001](#), for refueling costs.)

October 17, 2001 - Due to a "credible threat" against Three Mile Island, the Harrisburg and Lancaster airports were closed for four hours, air travel was restricted in a 20-mile radius, a fighter jets were scrambled around TMI. (See [October 6, 2001](#), for a related event.) (On January, 2001, a bomb threat was made at TMI.)

November 2, 2001 - Governor Mark Schweiker reversed an earlier decision, and ordered the National Guard to Pennsylvania's nuclear power plants. The Commonwealth joins over a dozen states with National Guard and/or Coast Guard detachments deployed to protect nuclear facilities against terrorist attacks. (See [October 6 & 17, 2001](#), for related incidents).

December 8, 2001 - TMI resumed operation after a 58 day refueling outage that cost the company over \$100 in lost revenues, replacement energy, and planned and unplanned repairs, and upgrades. Among the "big-ticket" items: replacement of the turbine generator and four main transformers; repairs of cracks in six control-rod drive mechanisms; trouble shooting on chronic emergency feedwater problems; and, experimental steam tube generator repairs which led to the "unplugging" of 870 tubes and taking 266 tubes out-of-service. (See [October 9, 2001](#), for data relating to start of refueling outage.)

2002

January 11, 2002 - Siren testing at TMI encountered numerous problems: all sirens failed in York County and one siren failed in Lancaster County. AmerGen attributed to computer malfunctions.

January 30, 2002 - President Bush's State of the Union Address including a warning that nuclear power plants may be targeted for a terrorist attack.

March 3, 2002 - A siren malfunctioned in York County again. During TMI's annual test on on January 30, 2002, all 34 sirens in York County, located within ten-miles of the plant, failed to activate.

March 21, 2002 - Three Mile Island Alert (TMIA) was recognized by the Pennsylvania House of Representatives and Senate and the City of Harrisburg for 25 years of community service.

March 28, 2002 - The NRC admitted that and the Three Mile Island and the 102 nuclear power plants could not withstand an impact of airplane the size of those that crashed into the Pentagon and World Trade Center on September 11, 2001.

May 15, 2002 - "A foreign intelligence service recently warned that a nuclear power plant in the Northeast could be the target of a July 4 terrorist attack...Published reports suggested that the target could be Pennsylvania's Three Mile Island, but a second US official with knowledge of the information said no specific facility had been named." (Knight Ridder, [May 15, 2002](#).) (See [January, 2001](#), [October 6 & 17, 2001](#), [January 30, 2002](#), for related incidents.)

September 5, 2002 - Three Mile Island Alert filed a formal Petition for Rulemaking with the Nuclear Regulatory Commission to include day-care centers and nursery schools in emergency evacuation planning. The proposed rule would affect all 103 operating nuclear plants in the United States.

November, 2002 - Governor Schweiker "directed the National Guard to join State Police in a joint security mission at the state's nuclear facilities." In December, the Governor extended the joint mission of the National Guard and the State Police at the Commonwealth's five nuclear generating stations until March 4, 2002. ([DEP Update, December 6, 2002.](#))

December 3, 2002 - The United States Court of Appeals for the Third Circuit upheld the Summary Judgment of the United States District Court for the Middle District. (1999) With the demise of the 1,990 health suits, the last remaining TMI case involves 17 Route 30 business from Lancaster County. The business have claimed loss o business revenues and include Dutch Wonderland, restaurants and lodging establishments.

2003

"On **July 2, [2003]** area firefighters and the Pennsylvania State Police responded to the electrical fire that damaged the turbine building's switchgear room at TMI Unit 2. "Although a five-member AmerGen fire brigade also responded to the blaze, Akron, Ohio-based FirstEnergy is responsible for the operation of TMI Unit 2.

"AmerGen Energy, co-owner and operator of TMI Unit 1, has an agreement with FirstEnergy to maintain and monitor TMI Unit 2. "While the cause of the fire remains under investigation, FirstEnergy has determined that a transformer in the switchgear room that powers lighting at TMI Unit 2 appears to have overheated and failed, said Richard Wilkins, a company spokesman.

"The company will spend more than \$100,000 to replace the damaged 55-gallon drum-sized transformer, switchgear, wires and other equipment damaged in the smoky blaze, he said.

"For the next two months, while workers repair the equipment, TMI Unit 2 will use temporary lights, Wilkins said. "It's not unusual for a transformer to fail," Wilkins said. "It's not unheard of." (Sean Adkins at 771-2047 or sadkins@ydr.com)

Dec 3, 2003 - Report: Funds set aside for nuke cleanup inadequate, by AD CRABLE, Lancaster New Era

Congressional investigators say utilities are not adequately setting aside the hundreds of millions of dollars needed to clean up nuclear reactors at Three Mile Island and Peach Bottom when the plant sites close.

The report by the U.S. General Accounting Office claims that funds that, by law, must be set aside for restoring plant sites to their original condition may be as much as 25 percent lower than needed for TMI's Unit 2 reactor. Decommissioning for Peach Bottom's closed Unit 1 reactor appears to be 51 to 100 percent underfunded, according to the report.

The cost of closing down and removing TMI Unit 2 was estimated at \$433 million in 1997. The cost of decommissioning Peach Bottom Unit 1 was recently estimated at \$129 million by plant owner Exelon Nuclear. The report did not say how much actually had been set aside to date in the decommissioning funds for the two reactors.

However, the owners of the two plants, where other reactors remain in use, said today that the decommissioning funding report by the investigative arm of Congress is flawed and that the money will be there when the plant sites end their useful life several decades from now.

Updating a 1999 report that first warned that decommissioning funding at many U.S. nuclear plants was not adequate, the GAO said on Monday that the \$27 billion saved by the nuclear industry through 2000 was actually ahead of schedule.

But breaking down the savings by individual plant owners, the study said that owners of 42 of the 125 nuclear plants that have operated in the United States had accumulated fewer funds than needed to be on track to pay for eventual decommissioning, after the plants close.

"Under our most likely assumptions, these owners will have to increase the rates at which they accumulate funds to meet their future decommissioning obligations," the 55-page report said. Furthermore, the report criticized the federal Nuclear Regulatory Commission -- the nuclear industry's governmental watchdog -- for not taking action to force utilities to step up funding to address inadequacies.

In 1988, the NRC began requiring owners to certify that sufficient money would be available when needed to decommission their nuclear plants. Beginning in 1998, utilities were required every two years to show how much money had been set aside and where the money was coming from. Most funds come from ratepayers and investments in trust funds.

The GAO study singled out Exelon Nuclear, the owner of Peach Bottom and the active reactor at TMI, as being behind the curve on set-aside funding. GAO said the trust funds for 11 of the 20 nuclear power plants owned by the company were inadequate.

However, the GAO found that Exelon Nuclear was actually well above other utilities in saving for the future closure of TMI's active Unit 1 reactor and Peach Bottom's two active reactors. And Exelon spokesman Craig Nesbit said the more-than-adequate funding will take care of any deficiency for the other Peach Bottom reactor that closed in 1974. Nesbit criticized the GAO report, saying it looked only at individual units instead of entire plant sites, and did not consider specific decommissioning strategies, such as Exelon's.

He also said the GAO study was "skewed" because it did not take into account that most nuclear plants, such as Peach Bottom and TMI, will be relicensed for another 20 years, which gives utilities more time to save decommissioning funds. "All of Exelon's plants are adequately funded for decommissioning now, and will be in the future," Nesbit said.

Though Exelon owns the site, the responsibility for decommissioning the TMI Unit 2 reactor, closed since a 1979 accident, lies with FirstEnergy Corp., which bought out former TMI owner GPU.

The GAO study indicated the funding shortage is between 1 percent and 25 percent for TMI's Unit 2. FirstEnergy spokesman Scott Shields denied today that there were inadequate funds for restoring the Unit 2 site to its original condition. "We will continue to collect funds for the decommissioning for Unit 2 and we will be fully funded by the time the plant is retired," he said. Shields noted the site can't be cleaned up until Unit 1 is closed. TMI's license expires in 2014 but an extension is expected.

Eric Epstein, an expert witness on decommissioning before the Pennsylvania Public Utility Commission and chairman of TMI-Alert, a safe-energy citizens group, is not so confident.

He said the GAO study on decommissioning shortcomings is just the tip of the iceberg. Citing the escalating costs of disposing of low-level and high-level nuclear waste, Epstein said "clearly the utilities underestimate and lowball decommissioning costs." Epstein fears utilities will not be

making the profits in the future when plants are closed down and will not be able to pay for what it will actually cost to restore nuclear plant sites. People not yet born may have to pay for that shortcoming through higher electric bills, he said.

Inadequate funding for future closures was a constant concern expressed by former Lancaster mayor Art Morris when he chaired a citizens advisory panel on the cleanup of TMI in the 1980s.

"It's just the same old story. It's absolutely remarkable that after all these years of public comment and criticism that the Nuclear Regulatory Commission just sits and does nothing about (inadequate funding)," Morris said today. "The taxpayers will have to pay for it. There needs to be an NRC that stays on top of this and monitors it

Incident Chronology at TMI from NRC : 2010-2012

Nov. 1, 2010 – The NRC reported its findings from a three-month baseline inspection that ended Sept. 30, 2010.

In the report, the NRC said it found one item of very low safety significance, and said the matter would be treated as a non-cited violation because plant officials would enter it into their corrective action program.

The issue stemmed from a potential hazard to safe shutdown and safety related equipment operations. On July 28, 2010, inspectors found a more than 20-foot extension ladder that was not secured and was laying against piping in the spent fuel pool cooler room. "The ladder posed a hazard to the spent fuel pool (SFP) radiation monitor and small SFP instrument lines and piping," the NRC said. "This could in turn cause a SFP leak and degrade cooling to the spent nuclear fuel in the SFP."

The NRC also noted that an equipment cart with tools and a spare motor was found unattended and unsecured in close proximity to intermediate cooling pumps and a supply valve. "This posed a potential hazard to the cooling water supply to the reactor coolant pump thermal barriers and control rod drive mechanisms," the NRC said. The NRC added that maintenance records indicated the cart "had been left in this condition for several weeks."

Although no other findings of significance were discovered, the NRC noted that a nuclear river cooling water pump was declared inoperable on July 11, 2010 based upon degraded flow observed during performance of the quarterly in-service flow test. Corrective pump repairs were scheduled for late fall

(Three Mile Island Unit 2 Independent Spent Fuel Storage Installation in Idaho)

April 7, 2011 – The NRC issued a report to the U.S. Department of Energy about problems with deterioration of the concrete at the horizontal storage modules.

The modules were constructed in 1999 and were designed for a 50-year service life. However, the NRC report noted, and the DOE agreed, that the modules were displaying significant cracking in nearly all of the 30 units. The DOE has begun restoration efforts.

The modules are located at the Idaho National Laboratory site that has been licensed by the NRC to maintain the spent fuel of the crippled TMI unit 2 reactor, site of the nation's worst commercial nuclear accident in March 1979.

The horizontal storage modules (HSMs) provide a structure to protect the canisters containing the spent fuel rubble. The first dry shielded canister containing Unit 2 core debris was moved to the Idaho facility in March 1999. Each dry shielded canister contained 12 TMI Unit 2 canisters. There are a total of 29 dry shielded canisters on site.

The NRC noted that radiation levels were within acceptable limits except within a few feet of the storage modules. It added that the concrete on all but one of the storage modules “had experienced damage from the freezing and thawing process over the years due to water getting into the space around the roof anchor bolts, resulting in cracks occurring in the concrete.” The NRC said the damage was “extensive” on several of the modules.

“The concrete degradation was showing new damages each year and was recognized by the licensee as a significant problem,” the NRC report said.

The NRC said the problem was first recognized in 2000. “At that time,” the NRC said, “the cracking was not significant and was determined to be cosmetic.” But by 2007, the DOE realized the cracking was unabated, and a year later, “the licensee recognized that the continued cracking of the HSMs brought into question the ability of the HSMs to fulfill their originally planned 50-year service life as an important safety component.”

An analysis was conducted. “The conclusion reached was that the freezing of trapped water that had entered through cracks and the anchor blockout holes was the primary mechanism causing the concrete problem,” the NRC report said. “Several actions were recommended that have been either completed by the licensee or are scheduled. The anchor bolt blockout holes have been filled with polyurethane foam. Cracks gauges at various locations on the HSMs have been installed and were being monitored.” Other activities are planned to repair the damaged concrete, the NRC and DOE said.

In addition to the concrete issues, the NRC report noted that there was a deviation from a commitment made by the DOE in 2005. The DOE had informed that NRC that the written agreement for offsite emergency medical services would be reviewed every five years and updated as needed. However, the site's emergency plan, effective Dec. 10, 2007, did not contain this provision.

April 28, 2011- In an April 28, 2011, letter, the NRC updated operators at the Susquehanna Steam Electric Station of its initial finding contained in a letter a month earlier. (**see below**)

In the April letter, the NRC said it identified a violation determined to be of at least low to moderate safety significance during a baseline security inspection conducted Feb. 7-11, 2011. The NRC said the nature of the finding is sensitive and is not being publicly disclosed.

The letter said the finding will require additional NRC inspections and is considered a violation of NRC regulations.

“The NRC has concluded that information regarding the reason for the violation, the corrective actions taken and planned, and the date when full compliance was achieved is already adequately addressed on the docket” in NRC inspection reports, the letter said.

In a letter dated March 28, 2011, the NRC notified officials at the Susquehanna Steam Electric Station in Berwick that it had completed a baseline security inspection on Feb. 11, 2011.

As a result of the inspection, it discovered one finding that was determined “to be greater than very low security significance.” The letter noted that the deficiency was “promptly corrected” and the “plant was in compliance with applicable physical protection and security requirements within the scope of this inspection before the inspectors left the site.”

Nonetheless, the NRC said the finding is an apparent violation of NRC requirements and is being “considered for escalated enforcement action in accordance with the NRC’s Enforcement Policy.”

The letter provides no details of the issue involved.

The NRC said it would complete its evaluation and issue a final determination within 90 days of the date of its letter.

The letter also mentioned two self-revealing findings that were determined to be of very low security significance, and one licensee-identified violation of very low security significance. Details were not discussed in the letter.

May 2, 2011 – The NRC issued a letter regarding the completion of an inspection at Unit 1 for the first quarter of 2011. The NRC identified no findings of significance. However, the plant licensee identified one item that was determined to be of very low safety significance and is being treated as a non-cited violation.

The licensee-identified issue involved a failure to update reference guides following December 2009 maintenance of a nuclear river pump discharge piping. The licensee said appropriate post maintenance testing work instructions were not established or implemented, and station

personnel ended up determining the pump was inoperable and it was replaced in November 2010.

In other items in the NRC letter, the agency noted that safety technicians identified elevated carbon monoxide levels on March 3 during reactor building containment atmospheric sampling. The NRC said workers were directed to leave containment and follow-up air sampling confirmed carbon monoxide levels as high as 157 parts per million. These levels are well below immediately dangerous readings of 1,200 parts per million, the NRC said. The “most likely source of the elevated carbon monoxide was

decomposition of lubricating oil which had leaked” from a reactor coolant pump, the NRC said. The NRC “reviewed the causal analysis and verified reasonable adverse condition monitoring plans were established.”

The NRC also said that, in general, plant operator Exelon “had taken timely and appropriate actions in accordance with American Society of Mechanical Engineers Code requirements and their corrective action program. Following identification of each missed surveillance test, station personnel successfully completed the associated test or appropriately scheduled the test ... Therefore, the safety significance of the missed surveillance tests was minor. Exelon’s assigned corrective actions were generally aligned with their identified causal factors, adequately tracked, properly documented, and completed as scheduled.”

July 20, 2011 – The NRC granted requests from TMI operator Exelon for relief and allowed it to use alternative procedures to certain requirements for in-service examination of components and steam pressure tests conducted during 10-year intervals. The requests were part of the fourth 10-year inspection that began on April 20, 2011 and ends no later than April 19, 2022.

The NRC staff concluded that that the proposed alternatives for some of the requirements “provide an acceptable level of quality and safety” as outlined by Exelon.

The staff also noted that Exelon had “demonstrated that it is impractical to comply with the specified” American Society of Mechanical Engineers code requirements for one issue and “that the proposed alternative testing will provide reasonable assurance of leak tightness of the subject components.”

July 27, 2011 - The NRC staff issued a letter on its inspection of TMI for the quarter running from April through June 2011. The staff said no findings of significance were identified.

The report added that inspectors determined “that corrective actions to address configuration control performance deficiencies from the first half of 2010 and transient material control deficiencies from all of calendar year 2010 continued to be effective.” It added that the number

of configuration control deficiencies identified in the first half of 2011 “were notably reduced from the first half of 2010.”

But the report noted that inspectors “identified several instances for which corrective action timelines was not commensurate with potential significance of degraded equipment conditions.” It added, “Station management acknowledged the issues, verified

they were captured in the corrective action program, and initiated several significant station-wide actions to reemphasize worker performance fundamentals. The inspectors determined these correction actions were appropriate and observed improved worker fundamental performance through the end of June 2011.”

Aug. 25, 2011 – The NRC issued a brief report on a radiation safety inspection conducted from July 25-28, 2011 at the damaged Unit 2 reactor. No violations were identified during the inspection, the NRC said.

Sept. 12, 2011 – The NRC completed an inspection of the Unit 1 facility to review facts and circumstances on changes made to the emergency action plan at the plant. The NRC issued a similar report on the Peach Bottom plant that, like TMI, is owned by Exelon Corp. (See Peach Bottom report for Sept. 12, 2011.)

According to the NRC, the TMI staff implemented a plan revision on Jan. 3, 2008, that the NRC said had the potential to decrease the effectiveness of TMI’s emergency response to fires. The NRC treated the matter as a non-cited violation because it was of very low safety significance and was entered into the plant’s corrective action program.

The NRC said Exelon, the licensee, modified the emergency action level to extend “the start of the 15-minute emergency classification clock beyond a credible notification that a fire is occurring, or indication of a valid fire detection system alarm.” The plant must declare an unusual event if a fire in a protected area is not extinguished within 15 minutes of detection.

Specifically, the plant’s staff implemented the change on Jan. 3, 2008, so that a 15-minute notification period would not begin until there is a credible notification that a fire is occurring, or that a fire alarm is verified to be valid by staff or additional control room instrumentation.

The licensee modified the plan “to delay the 15-minute classification time by waiting for the dispatch of personnel and the notification of a fire from the field,” the NRC said. “This change indefinitely extended the start of the 15-minute emergency classification clock beyond a credible notification that a fire is occurring or indication of a valid fire detection system alarm.”

The NRC treated the matter as of low-level safety significance because the issue involved the unusual event level, but not any of the other higher classifications, and because the matter “could delay classification but would not prevent classification.”

On April 8, 2011, Exelon implemented the plan in accordance with NRC enforcement policy, the NRC said.

Because of the age of the issue in question, the NRC said, “it was not determined to be reflective of current licensee performance.”

Nov. 2, 2011 – The NRC issued a non-cited violation after it was determined that a contractor had deliberately failed to report a June 2010 arrest on a personal history questionnaire.

The contractor, who worked at TMI from Aug 4-25, 2010, was granted unescorted access authorization at the plant.

The NRC report said the contractor also worked at the Browns Ferry Nuclear Plant and Cooper Nuclear Station after completing his assignment at TMI. In April 2011, the individual applied for unescorted access authorization at the Salem Nuclear Generating Station, which identified the person’s June 2010 arrest through a background check. (TMI conducted a background check, but the person’s arrest was not part of the database at that time.) The NRC said the contractor failed to report a June 13, 2010, arrest involving drug-related and driving under the influence charges.

The NRC said the contractor “deliberately caused” TMI licensee Exelon to violate standards. It determined that the violation would be classified as a severity level IV in

accordance with its enforcement policy. However, the NRC said a “non-cited violation is appropriate in this case because, subsequent to the violation being identified, Exelon took appropriate corrective actions, including notifying the NRC and identifying the individual’s action to other power reactor licensees through the personnel access data system.

Nov. 4, 2011 – The NRC issued its inspection report for Unit 1 completed for the third quarter ending Sept. 30, 2011. No findings of significance were identified.

Feb. 8, 2012 – The NRC issued a report on its quarterly inspection of Unit 1 at Three Mile Island conducted for the period ending Dec. 31, 2011.

In the report, the NRC noted there were two issues of very low safety significance. One was treated as a non-cited violation. The NRC said another matter was left unresolved.

In one of its findings, the NRC said plant operator Exelon “did not effectively manage and control Unit 1 reactor coolant letdown and clean-up” during a refueling and maintenance outage in late October 2011. It noted that the flow rate during the shutdown resulted in “radioactive crud

(from fuel deposits) being deposited at higher levels within the steam generators than previously encountered, causing elevated occupational radiation dose rates and unintended occupational radiation exposure.”

Exelon began a cool-down of the reactor coolant system on Oct. 24, 2011. As that was occurring, the letdown flow rate decreased from an expected flow rate of 110 gallons per minute (gpm) to less than 40 gpm to a subsequent flow rate of approximately 20 gpm, the NRC said. “Exelon personnel had recognized that coolant letdown-flow had decreased but no effective action was taken to restore letdown flow and maximize reactor coolant letdown” until about 20 hours later “when it was realized that additional system valves could be open ... to maintain letdown flow and maximize reactor coolant clean-up.”

The NRC noted that Exelon determined that “management did not monitor primary system effectiveness during cool down ... The issue resulted in additional collective occupational radiation exposure that Exelon could have reasonably avoided had sufficient attention been directed to effective management and control of reactor coolant letdown.” The NRC added that the lack of adequate flow “effectively resulted in an estimated additional 37 person-rem of occupational radiation exposure during its 2011 refueling and maintenance outage.

“Exelon promptly initiated various actions to mitigate potential occupational radiation doses associated with the increased radiation levels,” the NRC added. “These activities included suspension of work activities pending evaluation and implementation of mitigating activities, work rescheduling” and other actions, the NRC said.

“The finding is that Exelon did not meet a performance standard to minimize occupational radiation exposure that was reasonably within Exelon’s ability to foresee and prevent,” the NRC said. “This finding is not subject to traditional enforcement in that it was not willful and did not involve an actual violation.” It was found to be of very low safety significance.

The NRC treated as a non-cited violation a matter regarding a revised river discharge analysis. The NRC noted that Exelon “did not recognize that the revised river discharge analysis resulted in a lower flow-based river shutdown level.”

The NRC treated the matter as a non-cite violation because it was of very low safety significance and was entered into Exelon’s corrective action program.

The unresolved item stemmed from the inspection of reactor coolant system flange joints during a shutdown. The NRC said Exelon did not conduct an inspection of the joints while the plant was at hot shutdown. Instead, the inspection was performed when the reactor coolant system was “cold, depressurized and drained.” The inspection said a significant amount of boric acid was observed on the flange and on the pump’s discharge piping inside the containment.

“Because this inspection was not completed at operating pressure as specified, Exelon had missed an opportunity to determine the actual leak rate of the component because the reactor coolant system was drained and depressurized when the leakage evidence was discovered,” the NRC said. The report said that Exelon subsequently provided to the NRC information of past Exelon practices regarding these inspections. “To completely resolve this issue,” the NRC said, “the inspectors need additional information from the licensee to evaluate the issue against the current licensing basis and determine if the apparent performance deficiency is more than minor.”

One issue the NRC wants to understand is “Exelon’s justification that inspecting the reactor coolant pump flange at hot shutdown conditions was unsafe or impractical.” The NRC added that the plant historically performed these inspections at hot shutdown in accordance with procedures.

The NRC also commented on a non-cited violation regarding changes in the start-time for reporting fire emergencies at the plant. (The NRC commented on this matter in a report on Sept. 12, 2011.)

The NRC said Exelon had decreased the effectiveness of its emergency plan by extending the start of a 15-minute emergency classification clock when a fire is occurring. The change required the dispatch of personnel and the notification of a fire from the field to kick off the 15-minute period. The change was made in January 2008.

In its recent report, the NRC noted that Exelon corrected its procedures. “The inspectors determined that Exelon’s response and corrective actions were reasonable and appropriate to address the (non-cited violation) and finding, and their underlying performance deficiency,” the NRC said. “The NRC considers this issue closed.”

May 1, 2012 – The NRC issued a report on its quarterly inspection of Unit 1 for the period from Jan 1, to March 31, 2012.

In the report, the NRC listed three NRC-identified findings and one self-revealing finding of very low safety significance. Three of them were treated as non-cited violations. The report also listed one licensee-identified violation that also was determined to be of very low safety significance.

One non-cited violation involved lack of specific written instructions for boric acid inspection of the reactor coolant pump. This contributed to the failure to detect reactor coolant system leakage from the thermal barrier flange of a reactor coolant pump prior to November 2011.

The plant licensee, Exelon, “did not provide specific technical guidance on the desired inspection scope and the criteria to be used to report results to ensure that the reactor coolant pump thermal barrier flanges were visually inspected for the complete 360 degrees of both the upper and lower flanges of all four reactor coolant pumps,” the NRC report said.

During a fall 2011 refueling outage, Exelon identified dried boric acid leakage residue on the thermal barrier flanges. “Because a complete 360-degree inspection was not completed and because not all indications had been recorded and dispositioned, the probability of detecting the leakage ... at smaller leakage rates had been reduced,” the NRC said.

It added that the “lack of appropriate written procedural guidance and oversight contributed to the failure to detect the leakage.”

It was subsequently determined that the leakage was due to a crushed gasket in the upper thermal barrier flange.

A self-revealing finding identified inadequate performance monitoring of an instrument air compression unit that resulted in recurring drive-motor overload trips and unplanned unavailability on Sept. 28, Oct. 8, and Nov. 29 in 2011. Maintenance technicians repaired the air leaks and subsequent air loading decreased, the NRC report said.

An air compressor unexpectedly tripped on drive motor overload on Sept. 28 and Oct 8, 2011. An evaluation was initiated after the third overload on Nov. 29, 2011. The evaluation determined that the performance monitoring criteria for the instrument air compressor number four were “inadequate to identify an adverse trend in system performance.” the report said.

The report added that Exelon did a focused inspection of the related piping system, and it found 15 previously unidentified air leaks. Maintenance personnel repaired the leaks.

Another NRC-identified violation involved the failure of Exelon to return some breakers to their correct position within the seven-day allotted outage time. Specially, Exelon failed to return Appendix R breakers to their correct position on May 10, 2010, the NRC said.

During an inspection in March 2012, it was determined that a heat exchanger did not have its nuclear river water inlet and outlet valve breakers in the off position as required. It was subsequently determined that this event stemmed from May 2010 when the heat exchanger was removed from service for 10 days.

Heat exchangers provide cooling to essential plant systems and components. TMI has four such exchangers, the NRC report said.

The other NRC-identified violation was for failure to perform an adequate risk assessment during maintenance of the decay heat removal drop line valve on Jan. 16, 2012. The drop line valve performs safety functions in the closed and open position that support the operability of the decay heat removal system.

The violation identified by Exelon stemmed from a March 14, 2012, diagnostic testing of a heat cooler shell bypass. During the testing, it was discovered that a manual handwheel drive gear was detached from the valve stem and had been since April 19, 2006. Repairs were made on April 3, 2012.

May 7, 2012 – The NRC issued a report after completing a first quarter 2012 inspection at Units 2 and 3 at the Peach Bottom Atomic Power Station. The report listed one NRC-identified and two self-revealing findings of very low safety significance that were treated as non-cited violations. There was also a licensee-identified violation determined to be of very low safety significance and treated as a non-cited violation.

According to the report, inspectors determined that the plant did not establish measures to promptly identify and correct a condition related to the emergency diesel generator control power circuit.

On Feb. 18, 2012, according to the report, a replacement bulb failed within a few seconds after installation at the emergency diesel generator. “The inside of the panel was inspected, and it was identified that the light socket short circuited, which caused significant damage to the socket, melted the wiring on the neutral side of the socket, and also caused collateral damage to nearby wiring inside the control panel,” the report said. No fire resulted.

However, inspectors observed that there were several similar instances over a number of years, particularly since 2009. The NRC said plant operator Exelon “did not establish measures to promptly identify and correct a condition adverse to the quality of the emergency diesel generator control power circuit.”

The report also found that the plant did not promptly identify and correct residual heat removal heat exchanger graphoil gasket leaks. This self-revealing finding was discovered on Feb. 16, 2012, but problems had been observed from 2007 to early 2012.

Another finding stemmed from a NRC-identified problem regarding taking timely corrective actions dealing with the spent fuel pool. “Specifically, “ the report said, Peach Bottom “has been aware of degradation of neutron absorbing material (Boraflex) within the spent fuel pool storage rack since at least 1996 and did not take effective measures to adequately monitor or manage the degradation to assure sufficient margin to criticality was maintained.

“Rather, in 2010, Peach Bottom deferred corrective actions in the spent fuel pools until 2014 based on an operability determination that concluded sufficient margin would exist until that time.” However, the report noted, that determination did not accurately project the rate of boron degradation. In June 2011, Peach Bottom declared 117 cells in the Unit 2 spent fuel pool (out of a total of 3,819) inoperable since the estimated Boraflex degradation exceeded standards.

May 8, 2012 – The NRC issued a report of a component design bases inspection conducted by four NRC inspectors and two NRC contractors. The report listed four findings of very low safety significance. The violations were entered into Exelon’s corrective action program and were treated as non-cited violations.

July 5, 2012 – The NRC completed an inspection on May 25, 2012, relating to whether personnel were effective in identifying and resolving problems. The NRC identified one finding of very low safety significance that was treated as a non-cited violation.

In the finding, the NRC noted that plant operator Exelon failed to implement prompt corrective actions after identifying a degraded emergency safeguards actuation system emergency diesel generator block load relay. The NRC said the Exelon staff did not perform a relay replacement in a timely manner, resulting in a block load relay failing in a surveillance test on April 24, 2012. The relay was replaced on May 31, 2012, after the problem was entered into the plant's corrective action program.

The relay was originally supposed to be replaced during the week of April 23, 2012. However, in late 2011, Exelon officials deferred the replacement work until the week of July 23, 2012 "due to insufficient resources," the NRC said. "The inspectors identified that Exelon staff did not document a technical justification or evaluation to support continued operability of the degraded relay when the relay replacement schedule was deferred in December 2011," the NRC report said. "The inspector's review also noted it was not clear that engineering was engaged in the decision to defer the relay replacement."

In other aspects of the report, the NRC observed that inspectors "determined that Exelon personnel identified problems and entered them into the corrective action program at a low threshold." The report noted that TMI Unit 1 initiated approximately 20,000 inspection reviews between June 2010 and April 2012.

July 25, 2012 – Chemistry technicians at TMI said they found a slightly elevated level of tritium in one monitoring well on the site near the plant. They said the level was contained onsite and posed no health or safety risks, and subsequent samplings showed declining concentrations.

The monitoring well is one of 55 on the island. No unusual levels of tritium were found at the other wells.

Aug. 1, 2012 – The NRC said it completed a second quarter inspection of Unit 1 and identified no findings.

Sept. 20, 2012 – Unit 1 at the plant shut down automatically due to an unexpected actuation of a relay switch on a reactor coolant pump. Personnel replaced the relay and installed additional monitoring capabilities of the relay. Unit 1 returned to service two days later.

Oct. 2, 2012 – The NRC issued a report on a security inspection at the plant that was completed on Sept. 10, 2012.

Based on the inspection, the NRC identified two findings of very low safety significance that were treated as non-cited violations. Details of the findings were not disclosed because they involved security-related matters.

Nov. 14, 2012 – The NRC issued a report on its three-month inspection of the Unit 1 reactor at Three Mile Island. The period covers July through September.

In the report, the NRC documented one finding of very low safety significance that was treated as a non-cited violation. The issue involved storing eight bags of trash/combustible materials within 50 feet of the borated water storage tank. This was discovered on July 11, 2012.

The report notes that technicians performed planned maintenance activities on equipment in the borated water storage tank tunnel in June 2012. The work involved removal of pipe insulation in a contaminated area in the tunnel. The work generated eight bags of trash.

“The maintenance work group coordinated with radiation waste technicians to have the transient combustibles removed; however, the timeliness of the removal was not adequately communicated and the transient combustibles remained in the tunnel after the work was completed for nearly a month,” the report said.

Inspectors notified plant operator Exelon of the materials, which were “promptly removed,” the report said

Feb. 11, 2013 – The NRC issued its inspection report covering a three-month period from October through December 2012, although some issues materialized before that period. . In the report, the NRC noted three findings relating to flooding protection at the Unit 1 plant. Two of the findings were of very low safety significance and were treated as non-cited violations. The other issue involved an apparent violation concerning missing floodseals in conduits located in the air intake tunnel. “The significance of the degraded external flood barrier is to be determined and cannot accurately be calculated until additional testing and analysis of the as-found configuration is complete,” the NRC said.

In August 2012, the NRC found numerous couplings with “visible external degradation due to being exposed to a wet environment” during a walkdown of the air intake tunnel, a safety-related structure that is mostly below grade and provides an outside air source for the ventilation system of safety-related structures.

“Upon further review,” the NRC report added, “the inspectors recognized that Exelon (the plant licensee) had prior opportunities to identify the degraded flood seal condition during previous focused flood barrier walkdowns. Specifically, in 2010, Exelon performed a comprehensive review and inspection of all TMI Unit 1 external flood barriers.”

However, Exelon failed to identify and address the degraded conditions in the couplings in the air intake tunnel, the NRC said. The NRC said the issue has been entered into Exelon’s corrective action program and it will determine an appropriate action on the apparent violation in the future.

The other issues involved the failure of Exelon to establish measures to ensure that the seismic gap flood seal was adequate to remain watertight during a probable Maximum Flood Event, and the failure to identify and correct problems with 13 unsealed penetrations through the intake screen and pump house floor barriers. These two matters were treated as non-cited violations.

The report noted that Exelon “was unable to recover additional design information or installation records to demonstrate that the seismic gap seal was properly installed and configured to the requirements specified, or was otherwise qualified as a watertight seal.” The report added that when Exelon completed laboratory tests on the seal on Sept. 5, 2012, the results concluded, “The installed configuration would not satisfy the requirement for a watertight seal design.”

On the other issue, the NRC identified 13 unsealed penetrations in the floor of the intake screen and pump house. This would allow “river water access during a Probable Maximum Flood to enter the protected pump cubicle area,” the report said.

Both issues have been entered into Exelon’s corrective action program.

March 4, 2013 – In an annual assessment letter for 2012, the NRC said it determined that Unit 1 “operated in a manner that preserved public health and safety and met all cornerstone objectives.”

April 4, 2013 – The NRC issued a preliminary finding report over an external flood barrier system problem (see report dated Feb. 11, 2013).

The NRC said it has preliminarily determined the issue to be a white finding with low to moderate significance that may require additional NRC inspection.

The finding was based on the “degradation of the external floor barrier system designed to mitigate a flooding initiating event.”

The NRC said it felt it had enough information to make a final determination, but was giving plant licensee Exelon an opportunity to respond to this finding.

The matter concerns missing floodseals in conduits located in the air intake tunnel.

April 16, 2013 – The NRC issued an information notice alerting holders of spent nuclear fuel to potential safety issues concerning water damage to spent fuel storage cask structures, according to the June 2013 issue of Nuclear News. The notice is the result of issues previously noted from instances involving Peach Bottom and TMI. (Exelon is the licensee of both facilities.)

At Peach Bottom, the cask was found to be leaking helium above regulatory limits. It was determined that portions of the aluminum-clad cask lid seal and lid bolts had corroded. The cask had been in use since June 2000 at the independent spent fuel storage installation at Peach Bottom. The leakage was first identified in October 2010, and repairs were made.

The instance connected to TMI involved horizontal storage modules at Idaho National Laboratory, which holds spent fuel and core debris from the crippled Unit 2 TMI reactor. Cracks in the concrete modules were first noticed in 2000, but further investigation was initiated in 2007. It was determined that water had entered anchor bolt blockout holes on the roof of the vault, and that recurring freeze and thaw cycles had formed the cracks, according to Nuclear News. Repairs were made.

April 29, 2013 – The NRC issued a report over its first quarter inspection of Unit 1. It said there was one finding of very low safety significance. It treated the finding as a non-cited violation due to its very low safety significance and because it was entered into the plant’s corrective action program.

The finding stemmed from plant licensee Exelon’s storage of combustible materials too close to a condensate storage tank, a safety-related above-ground water tank. On Jan 9, 2013, inspectors found a portable on-demand storage container within 50 feet of the storage tank. The container had combustible materials such as wood and plastic, and also snow removal equipment with gasoline in the fuel tanks.

Exelon relocated the container after being notified by NRC inspectors. Exelon entered the matter into its corrective action program that includes “additional postings around the safety-related above-ground tanks” and site-wide notifications, the NRC report said.

June 10, 2013 – The NRC approved a request from plant operators Exelon for an alternative to certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

Exelon had proposed to install a “full structural weld overlay as an alternative repair technique for the lower cold leg letdown nozzle dissimilar metal welds and Alloy 600 safe-end,” the NRC report said. The NRC said it reviewed the proposed alternative and concluded that it “provides an acceptable level of quality and safety.”

July 18, 2013 – The NRC issued a letter relating to an inspection involving cyber security.

The letter said the inspection report, which is not disclosed publicly, documented two violations for which the NRC is “exercising enforcement discretion.” The NRC added that it is not taking enforcement action for the violations because they meet the “criteria established in an NRC memorandum” from the director of cyber security.

July 12, 2013 – The NRC issued a report on a completed inspection relating to safety and compliance issues. Based on the two-week inspection, no findings were identified.

July 18, 2013 – The NRC issued a report involving TMI’s cyber security program. The report mentioned the investigation found two violations, but the NRC was not taking any enforcement action.

Oct. 22, 2013 – The NRC completed a supplemental inspection pursuant to flood barrier issues identified in a report dated Feb. 11, 2013.

“Based on the results of the inspection, the inspectors concluded that (plant operator) Exelon had adequately performed a root cause analysis of the event. and completed and /or planned corrective actions were reasonable to address the related issues,” the NRC report said.

Oct. 28, 2013 – The NRC issued a report on a three-month inspection. Based on results of the inspection, no findings were identified.

Feb. 10, 2014 – The NRC issued a report on its quarterly inspection of Unit 1 at Three Mile Island. The report covers the fourth quarter from October through December 2013.

In the report, the NRC said it identified two findings of very low safety significance that were being treated as non-cited violations. There also was a licensee-identified violation, also determined to be of very low safety significance that was treated as a non-cited violation.

One NRC finding involved plant operator Exelon’s failure to establish “an adequate program that leak tested components penetrating the primary containment pressure boundary.” Specifically, the NRC said, Exelon “failed to perform leak rate testing of the reactor building normal closed loop cooling piping and failed to identify the degraded piping condition that impacted the containment isolation function.”

The NRC further determined that “neither leak rate testing nor visual inspection of the piping at design pressure was performed on the reactor building normal cooling closed loop piping system since 1991.”

The NRC said the finding was associated with barrier integrity, but “determined that the finding did not represent an actual open pathway in the physical integrity of reactor containment isolation system, not did it involve an actual reduction in function of hydrogen recombiners in the reactor containment.” Therefore, the NRC said, the finding was screened as of very low safety significance.

The other NRC finding involved Exelon’s failure to implement procedures governing storage of equipment in Class 1 structures. It said Exelon stored unsecured materials, such as a roll of sheeting and three plastic sheets, in the reactor building during power operations. “This resulted in unsecured material in a location that has the potential, during a large break loss of coolant accident, to be transported to and adversely impact the performance of the emergency core cooling system,” the NRC said.

In the report, the discovery was made on Oct. 28, 2013, during a planned shutdown for a refueling outage. “During the hot shutdown inspection,” the NRC report said, “the inspectors identified that Exelon had stored unsecured plastic sheathing material inside the reactor building ... The inspectors determined that the identified plastic material was stored contrary to the equipment storage data sheet requirements.”

The licensee-identified violation stemmed from a Nov. 28, 2013, incident with a breaker for a bypass valve that was in the “on” position, not the required “off” position. “It was determined

that the breaker was in the incorrect position for six days,” the NRC said. “The cause of the mispositioned breaker was determined by Exelon to be auxiliary operator distraction from multiple work activities and failure to restore the breaker to its expected position following post-maintenance testing during the fall refueling outage.”

In others matters addressed in the report, the NRC said its inspectors found “significant improvement in fire and flood protection awareness regarding work activities and risk management. Plant markings, training and other correction actions have been effective in correcting prior adverse trends in these areas.”

The report also discussed previous findings regarding transient combustibles. “The inspectors found that Exelon appropriately identified the root cause of the issue,” the report said. “The licensee determined the root cause to be management’s failure to establish the correct standards, behaviors, and accountability requirement to address gaps previously identified in the transient combustible program. A contributing cause was determined to be management’s failure to enforce proper storage of transient combustible material inside radiological controlled areas.”

The NRC said Exelon addressed the issue with actions such as painting floors of all transient combustible free zones to help plant personnel identify areas where those items should not be stored, and better training procedures.

March 4, 2014 - The NRC issued a letter of its annual assessment of Unit 1 at TMI. In the letter, the NRC determined that Unit 1 “operated in a manner that preserved public health and safety and met all cornerstone objectives.” It added that the reactor was in the “Regulatory Response Column” of the NRC’s oversight process until the fourth quarter of 2014. That’s because of issues tied to a “degraded external flood barrier system that was identified during the fourth quarter of 2012.” (Information is contained in previous NRC reports.)

The NR added that it determined that TMI returned to the more benign, “Licensee Response Column” in the third quarter of 2013 and remained there during the fourth quarter after completing a successful response to the flood barrier finding.

May23, 2014- The inspectors identified a finding of very low safety significance involving an NCV of Title 10 of the Code of Federal Regulations (10 CFR) 50, Appendix B, Criterion XVI, Corrective Action, because Exelon did not take adequate corrective actions to address a condition adverse to quality that caused the failure of two primary containment isolation valves. Specifically, the corrective actions implemented after the failure of CA-V-13 in 2010 and WDL-V-303 in 2013 did not ensure that the deficient basic work practices that resulted in the valve failures were corrected. Exelon documented this issue in the corrective action program as issue report (IR) 1664529 and took prompt actions to validate the operability of valves with similar actuators that had been worked since refueling outage T1R19. In addition, Exelon is performing a cause evaluation to fully understand the causes of the issue and implement actions to correct the condition adverse to quality prior to the next valve maintenance window. The finding is associated with the Barrier Integrity cornerstone and is more than minor because if left uncorrected it could lead to a more significant safety concern. Specifically, the uncorrected deficient basic work practices could result in additional primary containment isolation valve

failures. In accordance with IMC 0609.04, Initial Characterization of Findings, and Exhibit 3 of IMC 0609, Appendix A, The Significance Determination Process for Findings At-Power, issued June 19, 2012, the inspectors determined that the finding was of very low safety significance (Green) because it does not represent an actual open pathway in the containment and did not impact the hydrogen igniters. The finding has a cross-cutting aspect of evaluation in the problem identification and resolution area because Exelon did not thoroughly evaluate the condition to ensure that corrective actions addressed the cause. Specifically, Exelon identified that deficient basic work practices during valve actuator reassembly were the probable cause of the WDL-V-303 failure in 2013 and had been previously identified as the cause of the CA-V-13 failure in 2010, but Exelon did not evaluate the effectiveness of the corrective actions completed after the CA-V-13 failure or the need for additional corrective actions to address the probable cause. [P.2 Evaluation] [Section 4OA2.1.c.(1)]

May 23, 2014- The inspectors concluded that Exelon was generally effective in identifying, evaluating, and resolving problems. Exelon personnel identified problems, entered them into the corrective action program at a low threshold, and prioritized issues commensurate with their safety significance. Exelon appropriately screened issues for operability and reportability, and performed causal analyses that appropriately considered extent of condition, generic issues, and previous occurrences. The inspectors also determined that Exelon typically implemented corrective actions to address the problems identified in the corrective action program in a timely manner. However, the inspectors identified one violation of NRC requirements in the area of effectiveness of corrective actions.

The inspectors concluded that Exelon adequately identified, reviewed, and applied relevant industry operating experience to TMI operations. In addition, based on those items selected for review, the inspectors determined that Exelon's self-assessments and audits were thorough. Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employee concerns program issues, the inspectors did not identify any indications that site personnel were unwilling to raise safety issues nor did they identify any conditions that could have had a negative impact on the sites safety conscious work environment.

June 27, 2014 – The NRC issued a report on an inspection relating to the identification and resolution of problems at the plant.

Based on the inspection, the NRC said the Exelon, the plant operator, “was generally effective in identifying, evaluating and resolving problems.” The NRC identified one finding of very low safety significance that it treated as a non-cited violation.

The finding stemmed from Exelon not taking “adequate corrective actions to address a condition adverse to quality that caused the failure of two primary containment isolation valves,” the NRC report said.

“Since May 18, 2010, the measures established by Exelon’s corrective action program did not assure that the condition adverse to quality that caused two primary containment isolation value failures was promptly corrected,” the report said. “Specifically, Exelon did not take adequate

corrective actions to address deficient basic work practices that it had determined caused” the actuator failures on May 18, 2010, and Aug. 20, 2013.”

June 30, 2014

The inspectors identified a finding of very low safety significance (Green) involving a non-cited violation (NCV) of 10 CFR Part 50.65(a)(4), Requirements for monitoring the effectiveness of maintenance at nuclear power plants, because Exelon did not implement risk management actions (RMAs) to manage risk associated with the nuclear service river pump B (NR-P-1B) during excavation for fire service piping replacement. Specifically, the excavation exposed a cable conduit duct bank containing safety-related cables for nuclear service river valve 1B (NR-V-1B) without having adequate RMAs in place to ensure NR-V-1B cabling would remain protected from a tornado generated missiles. Exelon entered the condition into their corrective action program as IR 1670876 and took immediate corrective actions to modify the work instructions to include RMAs for soil restoration over the conduit duct bank in the event of a tornado. The performance deficiency is more than minor because it is associated with the Protection Against External Factors attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstones objective to ensure the availability and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors evaluated the findings using IMC 0609.04, Initial Characterization of Findings. The finding involved the licensee's management of risk in accordance with 10 CFR 50.65(a)(4) therefore, the inspectors evaluated the significance using IMC 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process. The inspectors determine that this performance deficiency was of very low safety significance (Green) because the finding was associated with RMAs only and the incremental core damage probability (IDCP) was not $>1E-6$. This finding has a cross-cutting aspect in the area of Human Performance, Work Management; because Exelon did not manage risk associated with the underground piping replacement project and did not effectively communicate job activities between work groups to ensure the RMAs would be implemented as required. (H.5) (Section 1R13)

July 17, 2014 – The NRC issued a notice of enforcement discretion to plant operator Exelon Generation Company because it took longer than expected to repair a small leak from a welded connection to a valve. Technical specifications required the leak to be fixed within 72 hours. If that couldn't be accomplished, the reactor is to be placed in a hot shutdown condition within six hours.

The NRC letter noted that during early repair work, it was determined that it would take 46.5 hours beyond the stipulated 72 hours to complete the repairs. The repair work was completed on July 15, 2014.

The NRC letter added, “As stated in the NRC Enforcement Policy, action will be taken, to the extent that any violation was involved, for the root cause that led to the noncompliance for which this Notice of Enforcement Discretion was necessary.”

Aug. 4, 2014 – The NRC issued a report of its quarterly inspection completed June 30, 2014. In the report, the NRC documented two findings of very low safety significance that are being treated as non-cited violations.

One of the findings was classified as a Severity Level IV violation “because TMI personnel did not update the Updated Final Safety Analysis Report (UFSAR) with information consistent with plant conditions.” Specifically, the NRC said, the plan was not updated to reflect “current plant conditions with regard to maximum hypothetical accident doses at the main control room, exclusion area boundary, or low population zone.”

The NRC report explained that in May 2014, the inspectors identified that a section in the UFSAR “remained inconsistent with current plant conditions and should have been updated in a timeframe consistent with the standards and expectations delineated “by Exelon procedures. “The inspectors identified that the issue was originally identified in March 2012 and that actions assigned to correct the issue were not appropriately tracked or were assigned completion dates after the six month cut-off date for the April 2014 UFSAR update.”

The other finding involved a failure to implement risk management actions during excavation for fire service piping replacement. The NRC said the excavation exposed a cable conduit duct bank containing safety-related cables for nuclear service river valve without having an action in place to ensure the cabling would remain protected.

“Before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities,” the NRC letter said. “Contrary to the above, from May 28, 2014 to June 13, 2014, Exelon incorrectly addressed the risk to the station because they did not adequately manage the risk management actions ... to ensure the nuclear river pump would remain available and undamaged from potential tornado conditions.”

September 30, 2014- Green. The inspectors identified an NCV of Title 10 of the Code of Federal Regulations (10 CFR) 50.54(q)(2), 10 CFR 50.47(b)(10), and 10 CFR 50, Appendix E, Section IV.4, for failing to maintain the effectiveness of the Three Mile Island Nuclear Station (TMI) emergency plan as a result of failing to provide the station evacuation time estimate (ETE) to the responsible offsite response organizations (OROs) by the required date. Upon identification, Exelon entered this issue into its corrective action program (CAP) as issue reports (IRs) 1525923 and 1578649. Exelon submitted a third ETE for TMI on April 4, 2014, and the NRCs review of that ETE is documented in section 1EP4 of this report.

The finding is more than minor because it is associated with the Emergency Preparedness cornerstone attribute of procedure quality and adversely affected the cornerstone objective of ensuring that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. The ETE is an input into the development of protective action strategies prior to an accident and to the protective action

recommendation decision making process during an accident. Inadequate ETEs had the potential to reduce the effectiveness of public protective actions implemented by the OROs. The finding is determined to be of very low safety significance (Green) because it is a failure to comply with a non-risk significant portion of 10 CFR 50.47(b)(10). The cause of the finding is related to cross-cutting aspect of Human Performance, Documentation, because Exelon did not appropriately create and maintain complete, accurate and, up-to-date documentation [H.7]. (Section 1EP5)

February 17, 2015- The NRC identified an NCV of Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix B, Criterion XVI, Corrective Action, for failure to promptly identify and correct degraded borated water storage tank (BWST) level transmitter instrument line cold weather protection equipment. Specifically, station personnel performed periodic maintenance and testing activities to verify the adequacy of cold weather protection for the BWST level transmitters prior to the onset of cold weather, but did not identify existing uninsulated sections of the instrument lines or degraded heat trace circuit continuity. Consequently, on February 15, 2015, the sensing line for BWST level transmitter DH-LT-808 froze which challenged the operator's capability to successfully perform a critical design basis manual action. Namely, switchover from the injection to recirculation phase of ECCS operation following a LOCA. Immediate actions included entering the applicable technical specification (TS) limiting condition of operation (LCO), thawing the frozen instrument line, restoring DH-LT-808 to service, and exiting the TS LCO. Exelon entered the cold weather protection issue into their corrective action program as issue reports (IR) 2445164, 2451342, 02452858, and 02454925.

This finding was more than minor because it was associated with the equipment and human performance attributes of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined that the finding was of very low safety significance because it did not affect design or qualification, did not represent a loss of system, did not cause at least one train of BWST level instrumentation to be inoperable for greater than its TS LCO allowed outage time, and did not involve external event mitigation systems. The team assigned a cross-cutting aspect in the area of Human Performance, Procedure Adherence (aspect H.8), because station personnel did not follow processes, procedures, and work instructions when performing maintenance and operational activities that should have identified degraded BWST level instrument cold weather protection equipment associated with missing insulation and loss of heat trace circuit continuity. (Section 1R21.2.1.2)

Inspection Report# : 2015007 (pdf)

February 27, 2015- The NRC identified an NCV of Title 10 of the CFR, Part 50, Appendix B, Criterion III, Design Control, for failure to establish and implement adequate design control measures to assure that the reactor building (RB) fan assemblies were capable of performing their design function to mitigate a design basis loss of coolant accident (LOCA) event. Specifically, testing and design calculations used a non-conservative RB ventilation system alignment to determine the brake horsepower of the RB fan motors during a LOCA. As a result, engineers had not evaluated the capability of the RB fan motors to operate above their nameplate full load rating to perform their intended safety function. Additionally, RB fan motor electrical overload protection analyses were incorrect. Immediate corrective actions included interim calculations which demonstrated that the RB fan assemblies would remain capable of performing their safety functions and that the emergency diesel generators were

capable of supplying the additional electrical load requirements. Exelon entered the issues into their corrective action program as IRs 2458932, 2458929, and 2451855.

This finding was more than minor because it was associated with the design control attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective of ensuring the operational capability of the containment barrier to protect the public from radionuclide releases caused by accidents or events. Additionally, the finding was similar to example 3.j in Appendix E of IMC 0612, in that the engineering calculation error resulted in a condition where there was reasonable doubt of the operability of the RB fan assemblies to perform their safety function during a design basis LOCA. The team determined the finding was of very low safety significance because it: did not affect the reactor coolant system (RCS) boundary; did not affect the radiological barrier function of the control room, auxiliary building, or spent fuel pool systems or boundaries; and did not represent an actual open pathway in containment or involve a reduction in the function of hydrogen igniters. This finding was not assigned a cross-cutting aspect because the underlying cause was not indicative of current performance in that the non-conservative calculation error occurred in 1993. (Section 1R21.2.1.1)

November 29, 2017 - Letter dated November 29, 2017, the Nuclear Regulatory Commission issued a letter to Senior Vice President, Bryan Hanson of Exelon Generation Company with the subject of: Three Mile Island Nuclear Generating Station, Unit 1 problem identification and resolution cyber security inspection report 05000289/2017405

On November 16, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a cyber security related Problem Identification and Resolution inspection at the Three Mile Island Nuclear Generating Station – Unit 1 (TMI). The inspection covered one or more of the key attributes of the Security cornerstone of the NRC's Reactor Oversight Process. The enclosed inspection report documents the inspection results, which were discussed on November 16, 2017, with Mr. Ed Callan, Site Vice President, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed station personnel.

The NRC inspectors did not identify any finding or violation of more than minor significance.

March 31, 2018 - A violation of Exelon's site-specific licensing basis for tornado-generated missile protection was identified. Because this violation was identified during the discretion period covered by Enforcement Guidance Memorandum 15-002, Revision 1, "Enforcement Discretion for Tornado Generated Missile Protection Non-Compliance" (ML16355A286), and because Exelon is implementing appropriate compensatory measures, the NRC is exercising enforcement discretion by not issuing an enforcement action and is allowing continued reactor operation.

In addition, the NRC reviewed Licensee Event Report 05000289/2017-003-00, which described the circumstances associated with the simultaneous opening of both airlock doors of the equipment hatch. The opening of both doors constitutes a violation of the Unit 1 Technical Specification 3.6.12. Inspection staff performed a risk evaluation and determined the issue was

of very low safety significance (Green). Although this issue constitutes a violation of NRC requirements, the NRC determined that the failure mechanism of the containment door interlock was not within Exelon's ability to reasonably foresee and correct. As a result, the NRC did not identify a performance deficiency associated with this condition. The NRC's assessment considered Exelon's maintenance practices, industry operating experience, vendor and industry maintenance and testing recommendations, and Exelon's corrective actions.

Based on the results of the NRC's inspection and assessment, I have been authorized, after consultation with the Director, Office of Enforcement, to exercise enforcement discretion in accordance with NRC Enforcement Policy Section 2.2.4, "Exceptions to Using Only the Operating Reactor Assessment Program," and Section 3.10, "Reactor Violations with No Performance Deficiencies." The Region I Regional Administrator was also consulted regarding enforcement discretion for this issue.

May 2, 2018 – Letter dated May 2, 2018, the Nuclear Regulatory Commission issued a letter to Senior Vice President, Bryan Hanson of Exelon Generation Company with the subject of: Three Mile Island Station, Unit 1 – integrated inspection report 5000289/2018001 and exercise of enforcement discretion.

On March 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Three Mile Island, Unit 1 (TMI). On April 17, 2018, the NRC inspectors discussed the results of this inspection with Mr. Ed Callan, Site Vice President, and other members of the staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented a licensee identified violation which was determined to be of very low safety significance in this report. Because of the very low safety significance and because it has been entered into your corrective action program, the NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

A violation of Exelon's site-specific licensing basis for tornado-generated missile protection was identified. Because this violation was identified during the discretion period covered by Enforcement Guidance Memorandum 15-002, Revision 1, "Enforcement Discretion for Tornado Generated Missile Protection Non-Compliance" (ML16355A286), and because Exelon is implementing appropriate compensatory measures, the NRC is exercising enforcement discretion by not issuing an enforcement action and is allowing continued reactor operation.

In addition, the NRC reviewed Licensee Event Report 05000289/2017-003-00, which described the circumstances associated with the simultaneous opening of both airlock doors of the equipment hatch. The opening of both doors constitutes a violation of the Unit 1 Technical Specification 3.6.12. Inspection staff performed a risk evaluation and determined the issue was of very low safety significance (Green). Although this issue constitutes a violation of NRC requirements, the NRC determined that the failure mechanism of the containment door interlock was not within Exelon's ability to reasonably foresee and correct. As a result, the NRC did not identify a performance deficiency associated with this condition. The NRC's assessment considered Exelon's maintenance practices, industry operating experience, vendor and industry maintenance and testing recommendations, and Exelon's corrective actions.

Based on the results of the NRC's inspection and assessment, I have been authorized, after consultation with the Director, Office of Enforcement, to exercise enforcement discretion in accordance with NRC Enforcement Policy Section 2.2.4, "Exceptions to Using Only the

Operating Reactor Assessment Program,” and Section 3.10, “Reactor Violations with No Performance Deficiencies.” The Region I Regional Administrator was also consulted regarding enforcement discretion for this issue.

If you contest the violations or significance of the non-cited violation (NCV), you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Three Mile Island.

Inspection Report – inspection dates January 1 through March 31,2018

Tracking items:

1. Items Nonconforming to Design for Tornado Missile Protection
 - a. Description: Resulting from a systematic review of plant design and licensing basis Exelon determined four nonconforming conditions where components that could be depended upon to safely shutdown the reactor were not adequately protected from tornado missiles. These conditions include diesel fuel oil and day tank vents, borated water supplies, and once through steam generator pressure control isolation valves.
 - b. Corrective Action(s): In accordance with the guidance in Regulatory Issues Summary 2015-06 Tornado Missile Protection (ML15020A419) and EGM 15-002, Revision 1, “Enforcement Discretion for Tornado Generated Missile Protection Non-Compliance,” (ML16355A286) the licensee implemented compensatory measures to maintain the equipment in a degraded but operable condition.
 - c. These actions include verifying that procedures, training, and equipment are in place to take appropriate action in the event of a tornado watch or warning and establishing a heightened level of awareness and preparedness to tornado missile vulnerabilities. To restore full compliance, the licensee intends to evaluate the vulnerabilities utilizing approved methodologies and submitting a license amendment request per the timeline in Enforcement Guidance Memorandum 15-002, Revision 1.
 - d. Corrective Action Reference(s): Issue Reports 04081290, 04085589, 04085596, 04085607
 - e. Violation: 10 CFR 50, Appendix B, Criterion III, “Design Control,” requires, in part, that measures shall be established to assure that the applicable regulatory requirements and the design basis for SSCs are correctly translated into specifications, drawing, procedures, and instructions.
 - f. Contrary to the above, from April 19, 1974, until December 6, 2018, Exelon failed to correctly translate the design basis for protection against tornado-generated missiles into their specifications and procedures. Specifically, Exelon did not adequately protect TMI Unit 1 diesel fuel oil and day tank vents, borated water supplies, and once through steam generator pressure control isolation valves from tornado generated missiles.
 - g. Severity/Significance: For violations warranting enforcement discretion, Inspection Manual Chapter 0612 does not require a detailed risk evaluation, however, safety significance characterization is appropriate. The NRC Enforcement Policy, Section 2.2.1 states, in part, that, whenever possible, the NRC uses risk information in assessing the safety significance of violations.

Accordingly, the NRC concluded that this issue is of low risk significance based on a generic and bounding risk evaluations performed in support of the resolution of tornado- generated missile non-compliances.

- h. Basis for Discretion: Because this violation was identified during the discretion period covered by EGM 15-002, Revision 1, and because Exelon has implemented compensatory measures, the NRC is exercising enforcement discretion, is not issuing enforcement action, and is allowing continued reactor operation.
2. Primary Containment Declared Inoperable Due to Both Airlock Doors Open Simultaneously
 - a. Description: On September 5, 2017, Three Mile Island Unit 1 was operating at 100% power and preparing for a scheduled maintenance and refueling outage. During a planned entry through the primary containment personnel airlock of the equipment hatch, the inner and outer doors were open simultaneously for less than one minute due to a failure of the interlock mechanism. The breach was immediately recognized by the operator and the inner door of the equipment hatch airlock was closed. Exelon determined the opening of both airlock doors constituted a violation of Technical Specification 3.6.12, "Personnel or emergency air locks." The event was reported under 10 CFR 50.73(a)(2)(ii)(A) due to a principal safety barrier being seriously degraded, 10 CFR 50.73(a)(2)(v)(C) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material, and 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specification.
 - b. Corrective Actions: Corrective actions included repairing the affected portion of the interlock mechanism and retesting its operation. An extent of condition was performed on the containment personnel hatch doors resulting in no similar issues.
Corrective Action Reference(s): Issue report 04049166
 - c. Violation: Three Mile Island Technical Specification 3.6.12, "Personnel or emergency air locks," states "at least one door in each of the personnel or emergency air locks shall be closed and sealed during personnel passage through these air locks."
 - d. Contrary to the above, on September 5, 2017, at least one door of a Three Mile Island Unit 1 personnel or emergency air lock was not closed and sealed during personnel passage through the air lock. Specifically, as the result of a failure of the interlock mechanism, the inner and outer equipment hatch emergency air lock doors were simultaneously opened for less than one minute.
 - e. Severity/Significance: For violations warranting enforcement discretion, Inspection Manual Chapter 0612 does not require a detailed risk evaluation, however, safety significance characterization is appropriate. The NRC Enforcement Policy, Section 2.2.1 states, in part, that, whenever possible, the NRC uses risk information in assessing the safety significance of violations. The inspectors determined that finding was of very low safety significance (Green).
 - f. Basis for Discretion: The inspectors determined that both containment hatch doors opening simultaneously was not within Exelon's ability to foresee and prevent. As a result, no performance deficiency was identified. The inspector's assessment considered previous surveillances performed on the equipment hatch doors and interlock mechanisms. The inspectors reviewed all recent surveillances performed on the equipment and personnel inner and outer doors

for timeliness and any abnormal results. No abnormalities were discovered and all surveillances were completed within periodicity.

- g. The NRC determined that it was not reasonable for Exelon to have been able to foresee and prevent this violation of NRC requirements, and as such, no performance deficiency existed. Therefore, the NRC has decided to exercise enforcement discretion in accordance with Sections 2.2.4 and 3.10 of the NRC Enforcement Policy and refrain from issuing enforcement action for the violation of technical specifications (EA-18-038). Further, because Exelon's actions did not contribute to this violation, it will not be considered in the assessment process or the NRC Action Matrix.
 - h. Inspectors elected to inspect the cause evaluation and corrective action determination related the issue described in LER 2017-003 as a selected annual sample. Exelon evaluated the condition and determined the cause of the event to be the failure of the outer door pawl to engage, providing a false indication that the outer door was closed prior to opening the inner door. The inspectors placed additional inspection focus to evaluate additional maintenance activities on the containment door mechanism, prior to outage activities where the door is cycled on a frequent basis with many new operators on site. Existing procedures and maintenance activities do not specify any subcomponent replacements until there is a failure or indication of damage. In addition to performing repairs to the outer door pawl, Exelon reviewed the current preventative maintenance activities for scheduling adequacy with the focus on high usage periods, evaluating additional maintenance activities that would include preventative subcomponent replacements, and reviewing industry operational experience for similar failures and corrective actions prior to the next refueling outage. Exelon documented the inspectors' observation in issue report 04049166.
3. Licensee Identified Non-Cited Violation
- a. Violation: 10 CFR 50.63(c)(2) states, in part, that the alternate ac power source will constitute acceptable capability to withstand station blackout provided an analysis is performed which demonstrates that the plant has this capability from onset of the station blackout until the alternate ac source and required shutdown equipment are started and lined up to operate. The time required for startup and alignment of the alternate ac power source and this equipment shall be demonstrated by test. If the alternate ac source can be demonstrated by test to be available to power the shutdown buses within 10 minutes of the onset of station blackout, then no coping analysis is required. The Three Mile Island Unit 1 Station Blackout Evaluation Report 990-1879 identifies the station blackout (SBO) diesel generator as the alternate ac power source for the unit.
 - b. Contrary to the above, from January 11, 2018, to January 12, 2018, the Three Mile Island Unit 1 alternate ac power source did not constitute acceptable capability to withstand station blackout. Specifically, during this timeframe, the SBO diesel generator was rendered unavailable due to fire service valve FS-V-225 being closed with no dedicated operator to reopen the valve. The time required for startup and alignment of the SBO diesel generator in this configuration had not been demonstrated by test to be available to power the shutdown buses within 10 minutes of the onset of station blackout.
 - c. Significance/Severity Level: The inspectors evaluated this finding using IMC 0609.04, "Initial Characterization of Findings," and IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions." The inspectors determined that the finding required a detailed risk evaluation due it representing an actual loss of

function of one non- Technical Specification train of equipment designated as high safety-significance for more than 24 hours. A Region I senior reactor analyst completed the detailed risk evaluation and estimated the increase in core damage frequency (CDF) associated with this performance deficiency to be $7E-8$ /yr or of very low safety significance (Green). The senior reactor analyst used the Systems Analysis Programs for Hands-On Evaluation (SAPHIRE) Revision 8.1.6, Standardized Plant Analysis Risk (SPAR) Model, Version 8.54, for evaluating the increase in risk. The analyst performed the assessment by failing the station blackout diesel generator for an exposure period of 30 hours due to its assumed unavailability. The dominant core damage sequence involved a steam line break in the turbine building (SLBTB) with a failure to isolate the steam line break, a loss of reactor coolant pump (RCP) seal cooling, failure of rapid secondary depressurization, failure of the RCP seal stage 2 integrity and failure of the High Pressure Injection mitigating function. In accordance with IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," Figure 5.1, the increase in core damage frequency per year was below $1E-7$ /yr and therefore the Large Early Release Frequency (LERF) contribution was determined not to have an effect on the very low safety significance determination.

- d. Corrective Action Reference(s): CR 04093302

July 31, 2018 – email dated July 31 2018 to Frederick Paul Mascitelli and James Danna from Justin Poole with the subject of: Request for additional information related to amendment regarding decommissioning ERO staffing changes

By letter dated March 19, 2018, Exelon Generation Company, LLC (Exelon), submitted changes to the emergency plan for the Three Mile Island Nuclear Station (TMI) for NRC review and prior approval, pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54(q). The proposed changes would revise the emergency plan to change the staffing for certain emergency response organization (ERO) positions, based on receipt by the NRC of certification under 10 CFR 50.82(a)(2) that the TMI, Unit 1, reactor has permanently ceased operations and permanently removed fuel from the reactor vessel. Upon docketing of these certifications, the 10 CFR Part 50 licensee for TMI Unit 1 will no longer authorize operation of the reactor or emplacement or retention of fuel into the reactor vessel. In reviewing Exelon's application, the NRC staff had developed a DRAFT request for additional information (RAI).

On July 24, 2018, the NRC staff sent Exelon the DRAFT RAIs to ensure that the questions are understandable, the regulatory basis is clear, there is no proprietary information contained in the RAI, and to determine if the information was previously docketed. On July 25, 2018, you called to say that the questions were understandable and that Exelon did not have a need for a clarification call with the NRC staff. During the call, Exelon requested a 30-days from the date of this email to respond. The NRC staff informed Exelon that the timeframe was acceptable. The attached contains the final version of the RAIs. These RAIs will be put in ADAMS as a publicly available document.

Attachment:

REQUESTS FOR ADDITIONAL INFORMATION
RELATED TO LICENSE AMENDMENT REQUEST REGARDING PROPOSED CHANGES TO
THE THREE MILE ISLAND EMERGENCY PLAN FOR POST-SHUTDOWN AND

PERMANENTLY DEFUELED CONDITION EXELON GENERATION COMPANY, LLC
THREE MILE ISLAND NUCLEAR STATION UNIT 1 AND 2

By letter dated March 19, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML18078A578), Exelon Generation Company, LLC (Exelon), submitted changes to the emergency plan for the Three Mile Island Nuclear Station (TMI) for NRC review and prior approval, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(q). The proposed changes would revise the emergency plan to change the staffing for certain emergency response organization (ERO) positions, based on receipt by the NRC of certification under 10 CFR 50.82(a)(2) that the TMI, Unit 1, reactor has permanently ceased operations and permanently removed fuel from the reactor vessel. Upon docketing of these certifications, the 10 CFR Part 50 licensee for TMI Unit1 will no longer authorize operation of the reactor or emplacement or retention of fuel into the reactor vessel.

TMI, Unit 2, has a possession only license and is currently maintained in accordance with the NRC approved SAFSTOR condition (method in which a nuclear facility is placed and maintained in a condition that allows it to be safely stored and subsequently de-contaminated) known as Post-Defueling Monitored Storage. Exelon maintains the emergency planning responsibilities for TMI, Unit 2, which is owned by First Energy Corporation, through a service agreement.

The requests for additional information (RAIs) listed below are necessary to facilitate the technical review. A timely and thorough response to these RAIs is requested in order to meet the proposed deadline requested by the licensee.

TMI-RAI-1

Section 5.2.4, "Major Functional Area: Radiological Accident Assessment and Support of Operational Accident Assessment," Item e. "Major Task: Chemistry," of Attachment 1 (pages 25-26), states, in part:

Plant activities that could potentially cause mechanical damage (i.e., fuel moves in the SFP [spent fuel pool]) will require that the radiation monitor as listed in the gaseous effluent EALs [emergency action levels] be in service or that a Chemistry Technician be onsite, thereby alleviating a potential delay in sample analysis to determine EAL applicability. Applicable fuel handling procedures will be revised to incorporate this as a prerequisite prior to fuel handling activities.

Please provide clarification as to why an equivalent statement was not included in Attachment 5, "Summary of Regulatory Commitments," of the TMI license amendment request to capture this commitment.

TMI-RAI-2

Section 5.2.11, "Major Functional Area: Public Information," Item c. "Major Task: Media Monitoring and Rumor Control," of Attachment 1 (page 42), states in part:

The Media Monitoring Staff and Rumor Control staff is listed in the TMI SEP [site emergency plan] as full augmentation positions that are ***filled on an as needed basis***.

However, in Section 5.3.6, “Joint Information Center (JIC),” of Attachment 1 (pages 54-55), those positions are simply referred to as Non-Minimum Augmented Staff “proposed to be removed from the SEP and will be managed and controlled by EPIPs [emergency plan implementing procedures]. The full augmented positions **will still be assigned to ERO teams, be expected to maintain Fitness-for-Duty during assigned duty weeks, and are required to respond to the EOF** [emergency operations facility] **at an Alert or higher classification.**”

Please clarify which of the above highlighted parameters apply to the Media Monitoring Staff and Rumor Control Staff.

TMI-RAI-3

Section 5.3.5, “Emergency Operations Center (EOF),” of Attachment 1 (pages 52-54), lists the Regulatory Liaison and Dose Assessor positions as part of the current EOF ERO “Non-Minimum Augmented Staff.” However, shortly thereafter the following statement is included:

As stated above the proposed change made the following **minimum Staff positions** ERO Non-Minimum Augmented Staff:

- Environmental Coordinator
- Regulatory Liaison
- Dose Assessor

The Environmental Coordinator position is included in Table 5.3 (page 54), “Emergency Response Organization EOF Minimum Staffing Positions” as being “Relocated to EPIP as Full Augmentation.” The other two positions are not referenced as Minimum Staff in the table.

Please provide additional perspective on, what appears to be, contradictory statements.