

FITZPATRICK

Scriba, NY

Owner: New York Power Authority

Outage dates (duration): November 27, 1991 to January 23, 1993 (1.2 years)

Reactor type: Boiling water reactor

Reactor age when outage began: 16.3 years

Commercial operations began: July 28, 1975

Fleet status: Oldest of two reactors owned by the company

Synopsis

The New York Power Authority (NYPA) voluntarily shut down the FitzPatrick reactor on November 27, 1991, to comply with terms of its operating license. It had been determined that isolation valves in the core spray system could not be assured of closing to prevent the release of radioactivity from containment in the event of an accident. NYPA elected to transition from this forced maintenance outage into a refueling outage and to undertake inspections and upgrades to fire protection features. The NRC helped NYPA volunteer for this shutdown by conducting a Diagnostic Evaluation Team (DET) inspection at FitzPatrick in October and November 1991.

The DET report, issued December 3, 1991, documented programmatic deficiencies in operation, maintenance, testing, and engineering. NYPA committed to an array of plant upgrades and management changes to address the DET findings. The NRC added FitzPatrick to its Watch List of troubled nuclear plants in February 1992. Extensive fire protection problems and nearly as extensive problems with the original design for containment isolation valves extended the outage duration (and increased its cost). In September 1992, the NRC proposed to fine NYPA \$500,000 for violations grouped into five main categories. NYPA did not contest any of the violations, but appealed the amount of the fine on the basis that, after all, they were fixing the problems. NYPA restarted FitzPatrick in January 1993 and the NRC agreed the following month to trim the fine to \$300,000.

Process Changes

The only specific action directly undertaken by either the NRC or the industry because of the FitzPatrick extended outage was the issuance of Information Notice 92-26 by the NRC in April 1992. This notice alerted other plant owners to the problem discovered at FitzPatrick in July 1991 in which valve bonnets had pressurized and prevented motor-operated valves from moving.

Commentary

UCS agrees with the NRC regional administrator at the time who stated: “Many of these deficiencies had existed for several years... We have not been as insightful” as the agency should have been.¹ During the extended outage, NYPA reported literally dozens of long-standing safety problems to the NRC. The problems included many fire protection deficiencies, numerous containment isolation valve design errors, several failures to properly test safety equipment, and plenty of flawed electrical installations. Given the number of NRC inspections of fire protection, containment isolation capability, and other systems over the years, it is reasonable to have expected that at least *one* of the many unsafe conditions would have been identified by the NRC. How did so many problems get missed by so many NRC inspectors for so many years?

The NRC was late in getting into the regulatory game at FitzPatrick, but once it got off the bench the agency was very effective. NYPA had been essentially applying band-aids to problems and would likely to have continued operating FitzPatrick in this fashion had it not been for the NRC’s DET inspection in fall 1991. NYPA’s decision to “voluntarily” shut down FitzPatrick on November 27, 1991, and the issuance of the DET report on December 3, 1991, was hardly coincidental. The NRC followed up the DET inspection with a letter in January 1992 and a management meeting in February 1992 making it crystal clear to NYPA that band-aids were no longer acceptable, some real healing needed to occur. That firm regulatory stance undoubtedly helped NYPA decide to expand the scope of the outage work and thus find and fix many problems. But why did the NRC wait so long to act?

NRC Systematic Assessment of Licensee Performance (SALP) History

Date	Operations	Radiological Controls	Maintenance	Surveillance Testing	Emergency Preparedness	Fire Protection	Security	Outage Management	Quality Assurance	Licensing	Training
2/1/1981	2	3	2	2	3	3	3	2	3	n/a	n/a
9/1/1982	3	3	2	2	2	2	1	2	n/a	2	n/a
7/1/1983	2	2	2	2	1	2	1	n/a	n/a	2	n/a
12/1/1984	2	2	2	2	1	1	1	1	n/a	2	n/a
3/1/1986	2	2	2	2	1	1	1	2	2	2	n/a
7/1/1987	2	2	2	2	1	n/a	1	2	2	2	2
9/1/1988	1	2	2	2	1	n/a	1	n/a	2	2	n/a
	Operations	Radiological Controls	Maintenance/Surveillance Testing		Emergency Preparedness		Security	Engineering and Technology		Safety Assessment and Quality Verification	
5/1/1990	1	2	2		1		1	2		2	
	Operations		Maintenance		Engineering			Plant Support			
7/1/1991	2		2		2			3/1/1			
8/1/1992	3		3		3			2/1/1			
9/1/1993	2		2		3			2/1/1			
5/1/1994	2		2		2			2			
12/1/1995	2		2		2			2			

NOTE: A rating of 1 designated a superior level of performance where NRC attention may be reduced. A 2 rating designated a good level of performance with NRC attention at normal levels. A rating of 3 designated an acceptable level of performance where increased NRC attention may be appropriate.

Details

May 7, 1991: The reactor was manually shut down after both low-pressure coolant injection systems were found to be inoperable because of motor-operated valve problems.^{2,3}

May 18, 1991: Twenty percent of the licensed operators failed their NRC requalification exams.⁴

July 17, 1991: The NRC proposed a \$137,500 fine on NYPA for the inadvertent and unmonitored release of radioactive materials to the environs from a vent in the auxiliary boiler system on March 18, 1991. The release was 65 times higher than the federal limit.

August 14, 1991: NYPA informed the NRC that walk-downs had identified numerous instances in which electrical panels had not been properly anchored to the floor during construction.⁵

August 15, 1991: NYPA informed the NRC that fire dampers in the ventilation system could malfunction and lead to the failure of the emergency diesel generators to provide adequate room cooling.⁶

August 15, 1991: NYPA informed the NRC that walk-downs had identified numerous instances in which the original design of piping supports for safety-related systems was inadequate.⁷

August 19, 1991: The reactor was restarted after a three-month outage to test and repair approximately 80 motor-operated valves. These efforts cost \$2.4 million.⁸

November 25, 1991: NYPA informed the NRC that testing showed the high-pressure coolant injection (HPCI) system was unable to satisfy the requirement of full make-up flow to the reactor vessel within 30 seconds.⁹

November 27, 1991: NYPA informed the NRC that fire dampers in the ventilation system—providing cooling to the rooms housing pumps of the residual heat removal service water system and emergency service water system—could close under certain conditions and cause all of the pumps to fail.¹⁰

November 27, 1991: NYPA declared an Unusual Event at FitzPatrick and manually shut down the reactor after declaring the minimum flow valves in the core spray system inoperable with respect to their safety function of closing when required to provide containment isolation.¹¹ General Electric (GE) had warned NYPA about the potential problem via its Service Information Letter (SIL) 414, but NYPA had performed an inadequate review of the letter.¹²

November 27, 1991: The reactor was voluntarily shut down by NYPA to inspect 14,000 penetrations for fire resistance and enter a scheduled refueling outage early.¹³

November 28, 1991: The shutdown and cooldown of the reactor was not completed with the required time due to personnel error.¹⁴

December 3, 1991: The NRC issued a report on its Diagnostic Evaluation Team (DET) inspection at FitzPatrick that identified programmatic deficiencies in operations, training, maintenance, testing, and engineering.¹⁵

December 13, 1991: NYPA informed the NRC that numerous seals around electrical cable penetrations in concrete walls were insufficient to ensure that a fire on one side of the wall did not spread through to the other side of the wall.¹⁶

December 19, 1991: NYPA informed the NRC that both trains of equipment needed to safely shut down the reactor in the event of a fire could be disabled by that fire.¹⁷

December 23, 1991: NYPA informed the NRC that both channels of instruments used to monitor the water temperature inside the primary containment pressure suppression chamber could not be assured following an accident due to wiring errors.¹⁸

January 2, 1992: NYPA informed the NRC that unapproved parts were discovered in the circuits of two radiation monitors due to inadequate quality assurance.¹⁹

January 3, 1992: NYPA informed the NRC about five major initiatives to be undertaken in response to the NRC's DET findings. Among them were making capital improvements at FitzPatrick, to making management changes, and to re-organizing its engineering department.²⁰

January 16, 1992: The NRC informed NYPA of specific findings from its DET inspection that must be addressed and requested NYPA to submit its plan and schedule for resolutions.²¹

January 19, 1992: NYPA informed the NRC that the original design of the emergency service water system (which provides cooling water to safety-related components such as the emergency diesel generators) would not ensure adequate cooling during an accident.²²

January 21, 1992: NYPA informed the NRC that the original design of the instrumentation monitoring pressure inside the primary containment pressure suppression chamber could provide erroneous indications under accident conditions.²³

February 4, 1992: NYPA informed the NRC that numerous motor-operated valves would be unable to perform their safety functions in the event of an accident due to inadequate design.²⁴

February 5, 1992: FitzPatrick was added to the NRC's Watch List for the first time. "Many of these deficiencies had existed for years," said Thomas T. Martin, NRC regional administrator. "We have not been as insightful [as we should have been.]"²⁵

February 7, 1992: The NRC conducted a public meeting with NYPA to discuss plans to address the DET findings.

February 7, 1992: NYPA informed the NRC that the wrong parts had been used within containment isolation valves due to a vendor error in parts numbering and that the errors compromised safety.²⁶

February 14, 1992: NYPA informed the NRC that the fire suppression system design in the east and west cable tunnels was inadequate and did not satisfy the requirements of Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix A.²⁷

February 21, 1992: NYPA informed the NRC that the required manual closure capability of containment isolation valves in the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems had been defeated by inadequate design and maintenance practices.²⁸

March 23, 1992: NYPA informed the NRC that the normal position of the residual heat removal (RHR) pumps had not been properly set and could result in their failure in the event of an accident.²⁹

March 26, 1992: NYPA informed the NRC that the design of environmental enclosures around safety equipment conflicted with the NRC-approved design.³⁰

April 2, 1992: The NRC issued Information Notice 92-26, "Pressure Locking of Motor-Operated Flexible Wedge Gate Valves," to alert plant owners of a problem identified at FitzPatrick in July 1991.³¹

April 16, 1992: NYPA informed the NRC that 8 of the 11 safety relief valves had opened at pressures outside of the operating license limits when tested.³²

April 20, 1992: NYPA informed the NRC that reanalysis of its 10 CFR 50 Appendix R program identified seven deficiencies that each could prevent the reactor from being safely shut down in the event of a fire.³³

May 7, 1992: NYPA informed the NRC that improperly designed internal parts of the containment isolation valves in the RHR minimum flow piping could prevent their required closure under accident conditions.³⁴

May 13, 1992: NYPA informed the NRC that safety problems documented by the Quality Assurance department in an audit report issued in December 1986 had not been addressed due to personnel error.³⁵

June 3, 1992: NYPA informed the NRC that a walk-down of the carbon dioxide fire suppression system revealed portions of the system had not been built in accordance with the approved design.³⁶

June 29, 1992: The NRC lowered SALP ratings for operations, maintenance and engineering from 2 to 3. NRC regional administrator Thomas T. Martin explained that the downratings resulted from "poor site and corporate management, engineering, and technical support staff oversight of day-to-day plant operations which caused three forced plant shutdowns and a number of fire protection program deficiencies."³⁷

July 6, 1992: NYPA informed the NRC that portions of the control circuits for the containment isolation valves had never been tested due to inadequate procedures.³⁸

July 17, 1992: NYPA informed the NRC that containment isolation devices had not been properly tested due to inadequate procedures.³⁹

July 24, 1992: NYPA informed the NRC that the original design of the RCIC vacuum breaker piping failed to protect it from the environmental conditions (e.g., temperature, humidity, and radiation levels) that would be present in the area following a design basis event.⁴⁰

July 24, 1992: NYPA informed the NRC that two RHR system and two core spray system containment isolation valves could not be manually closed from the control room when needed due to design errors.⁴¹

August 18, 1992: NYPA informed the NRC that components and piping had not been tested in accordance with American Society of Mechanical Engineers (ASME) code requirements due to inadequate procedures.⁴²

September 16, 1992: The NRC proposed a \$500,000 fine on NYPA for five violations: (1) installing electrical relays in the reactor protection system without ensuring they would function; (2) failing to identify and correct root causes of conditions adverse to quality; (3) having deficiencies in the fire brigade training program; (4) failing to protect essential equipment from fire damage; and (5) filing incomplete or inaccurate information with the NRC.⁴³

October 5, 1992: NYPA informed the NRC that improperly designed fuses in the control circuits of the emergency service water system and standby gas treatment system could disable both systems following a design basis event.⁴⁴

November 9, 1992: NYPA informed the NRC that violations of cable separation requirements had been identified in the cable spreading room, relay room, and control room.⁴⁵

November 29, 1992: The outage cost \$43 million for refueling-related work, \$10 million for plant modifications, \$13 million for plant improvements, and \$25 million for fire protection improvements for a total of \$91 million⁴⁶ (\$129 million in 2006 dollars⁴⁷).

December 7, 1992: NYPA informed the NRC that the two safety-related electrical transformers had been improperly installed and might not function following an earthquake.⁴⁸

December 9, 1992: NYPA informed the NRC that its testing procedures for the emergency diesel generators were inadequate to ensure proper functioning of the diesel generators under accident conditions.⁴⁹

January 23, 1993: Operators reconnected the unit to the electrical grid to end the extended outage.⁵⁰

February 1, 1993: The NRC reduced the \$500,000 fine to \$300,000 following appeal by NYPA for mitigation.⁵¹

Notes

- ¹ Bender, P. 1992. James A. FitzPatrick plant joins list of worst nuclear reactors. State News Service, February 5.
- ² Nuclear Regulatory Commission (NRC). 1991. Daily Event Report No. 20955, May 7.
- ³ New York Power Authority (NYPA), 1991. Licensee Event Report No. 91-006-00, June 6.
- ⁴ Berman, D. 1991. 7 FitzPatrick workers fail license test. *The Post-Standard*, May 18.
- ⁵ NYPA. 1991. Licensee Event Report No. 91-011-00, August 14.
- ⁶ NYPA. 1991. Licensee Event Report No. 91-010-00, August 15.
- ⁷ NYPA. 1991. Licensee Event Report No. 91-009-00, August 15.
- ⁸ Zuercher, R.R. 1991. NYPA spends \$2.4 million to fix FitzPatrick valves after failure. *Nucleonics Week*, October 17.
- ⁹ NYPA. 1991. Licensee Event Report No. 91-015-01, November 25.
- ¹⁰ NYPA. 1991. Licensee Event Report No. 91-021-00, November 27.
- ¹¹ NRC. 1991. Daily Event Report No. 22338, November 27.
- ¹² NYPA. 1991. Licensee Event Report No. 91-026-00, December 23.
- ¹³ Zuercher, R.R. 1992. Work backlog, plant modifications further extend FitzPatrick outage. *Nucleonics Week*, August 6.
- ¹⁴ NYPA. 1991. Licensee Event Report No. 91-028-00, December 30.
- ¹⁵ Taylor, J.M. 1991. Letter to John C. Brons, vice president, NYPA, December 3. James M. Taylor was executive director for operations at the NRC.
- ¹⁶ NYPA. 1991. Licensee Event Report No. 91-024-00, December 13.
- ¹⁷ NYPA. 1991. Licensee Event Report No. 91-023-00, December 19.
- ¹⁸ NYPA. 1991. Licensee Event Report No. 91-025-00, December 23.
- ¹⁹ NYPA. 1992. Licensee Event Report No. 91-030-00, January 2.
- ²⁰ Brons, J.C. 1992. Letter to James M. Taylor, executive director for operations, NRC, January 3. John C. Brons was vice president at NYPA.
- ²¹ McCabe, B.C. 1992. Letter to Ralph E. Beedle, NYPA, January 16. Brian C. McCabe was senior project manager at the NR C.
- ²² NYPA. 1992. Licensee Event Report No. 91-031-00, January 19.
- ²³ NYPA. 1992. Licensee Event Report No. 91-033-00, January 21.
- ²⁴ NYPA. 1992. Licensee Event Report No. 92-002-00, February 2.
- ²⁵ Bender, 1992.
- ²⁶ NYPA. 1992. Licensee Event Report No. 92-003-00, February 7.
- ²⁷ NYPA. 1992. Licensee Event Report No. 92-004-00, February 14.
- ²⁸ NYPA. 1992. Licensee Event Report No. 92-005-00, February 21.
- ²⁹ NYPA. 1992. Licensee Event Report No. 92-012-00, March 23.
- ³⁰ NYPA. 1992. Licensee Event Report No. 92-013-00, March 26.
- ³¹ NYPA. 1992. Licensee Event Report No. 92-014-00, September 4.
- ³² NYPA. 1992. Licensee Event Report No. 92-016-00, April 16.

- ³³ NYPA. 1992. Licensee Event Report No. 92-015-00, April 20.
- ³⁴ NYPA. 1992. Licensee Event Report No. 92-018-00, May 7.
- ³⁵ NYPA. 1992. Licensee Event Report No. 92-020-00, May 13.
- ³⁶ NYPA. 1992. Special Report, June 3.
- ³⁷ *Inside NRC*. 1992. NYPA's "poor site and corporate management" noted at FitzPatrick, June 29.
- ³⁸ NYPA. 1992. Licensee Event Report No. 92-032-00, July 6.
- ³⁹ NYPA. 1992. Licensee Event Report No. 92-033-00, July 17.
- ⁴⁰ NYPA. 1992. Licensee Event Report No. 92-036-00, July 24.
- ⁴¹ NYPA. 1992. Licensee Event Report No. 92-037-00, July 24.
- ⁴² NYPA. 1992. Licensee Event Report No. 92-038-00, August 18.
- ⁴³ Zuercher, R.R. 1992. NRC slapped New York Power Authority for a \$500,000 fine. *Inside NRC*, September 21.
- ⁴⁴ NYPA. 1992. Licensee Event Report No. 92-043-00, October 5.
- ⁴⁵ NYPA. 1992. Licensee Event Report No. 92-044-00, November 9.
- ⁴⁶ Smith, A. 1992. FitzPatrick plant spends year cleaning up its act. *The Post-Standard*, November 29.
- ⁴⁷ Bureau of Labor Statistics. 2006. Inflation calculator. Washington, DC: U.S. Department of Labor. Online at <http://data.bls.gov/cgi-bin/cpicalc.pl>.
- ⁴⁸ NYPA. 1992. Licensee Event Report No. 92-048-00, December 7.
- ⁴⁹ NYPA. 1992. Licensee Event Report No. 92-050-00, December 9.
- ⁵⁰ *Nuclear News*, 1993. Reactor back on line after 14 months off. American Nuclear Society. March.
- ⁵¹ NRC. 1993. NRC staff reduces fine for violations at the J.A. FitzPatrick Nuclear Power Plant. News Release No. 93-10, February 1.