Indian Point Unit 3

Buchanan, NY

Owner: New York Power Authority

Outage dates (duration): February 27, 1993 to July 2, 1995 (2.3 years)

Reactor type: Pressurized water reactor

Reactor age when outage began: 16.5 years

Commercial operations began: August 30, 1976

Fleet status: Youngest of two reactors owned by the company

Synopsis

The New York Power Authority (NYPA) voluntarily shut down Indian Point Unit 3 on February 27, 1993, to address problems with the AMSAC (anticipated transient without scram mitigation system actuation circuitry). NYPA took the reactor to cold shutdown on March 7 and elected to enter a 21-day maintenance outage that had originally been planned for May 1993. On March 26, NYPA submitted its action plan for correcting conditions at Unit 3 to the NRC. The NRC invoked its Manual Chapter 0350 process for reactors in extended outages on April 6, 1993. Plant workers and NRC inspectors identified numerous surveillance testing deficiencies, fire protection program deficiencies, and design errors. The NRC issued a Confirmatory Action Letter on June 17, 1993, documenting the agreed-upon tasks for restart. The NRC sent NYPA a more comprehensive list of items to be completed prior to restart on August 17, 1993. It took NYPA nearly two years to complete those items and restart Unit 3 on July 2, 1995.

Process Changes

The only specific action directly undertaken by either the NRC or the industry because of the Unit 3 extended outage was the issuance of Information Notice 93-49 by the NRC in July 1993. This notice alerted other plant owners to the problem discovered at Unit 3 in December 1992 in which uncontrolled software had been improperly reloaded into the AMSAC and prevented the auxiliary feedwater pumps from starting as needed in event of an accident.

Commentary

NYPA waited until after its other nuclear power plant, James A. FitzPatrick in Scriba, NY, restarted on January 23, 1993, before volunteering to shut down Unit 3. The litany of safety problems corrected at Unit 3 is remarkably similar to those corrected at FitzPatrick. The NRC would not allow NYPA to restart FitzPatrick until these problems were corrected, yet the agency allowed NYPA to continue operating Unit 3 with full knowledge that it had the same, or similar, problems. The NRC tolerated known safety problems at Unit 3 too long and had sufficient reason to believe there were many undetected safety problems.

The NRC was unjustifiably tolerant with NYPA about safety conditions at Unit 3. But once the NRC got involved, it was effective. The restart action plan issued by the NRC to NYPA in August 1993 covered specific and programmatic problems. The NRC ensured these items were completed before allowing NYPA to restart Unit 3 in July 1995. It is not clear why the NRC rated operations and engineering as 3 (the lowest rating possible) in its SALP assessment issued in April 1996 if the programmatic problems had indeed been corrected. The NRC allowed NYPA to restart Indian Point 3 before correcting all of the problems that had plagued the reactor.

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
4/1/1981	2	3	3	2	2	2	3	2	2	n/a	n/a
8/1/1982	2	1	1	1	2	1	2	n/a	n/a	2	n/a
8/1/1983	1	1	1	1	1	1	1	1	n/a	3	n/a
12/1/1984	1	1	1	1	1	n/a	1	1	2	2	n/a
3/1/1986	2	1	1	1	1	n/a	1	1	2	2	2
2/1/1988	2	1	1	1	1	n/a	1	n/a	2	1	2
	Operations	Radiological Controls	Maintenance/Surveillance Testing		Emergency Preparedness		Security	Engineering and Technology		Safety Assessment and Quality Verification	
1/1/1989	2	1	2		1		1	3		2	
7/1/1990	2	1	2		1		3	2		2	
	Operations		Maintenance		Engineering			Plant Support			
10/1/1991	2		2		2			1/1/2			
12/1/1992	2		2		3			1/2/2			
4/1/1996	3		2		3			1			

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

January 30, 1992: The NRC issued Information Notice 92-09, "Overloading and Subsequent Lock Out of Electrical Buses During Accident Conditions," to all plant owners alerting them to a problem reported by NYPA on November 21, 1991, in which plant procedures directed operators to reconnect non-essential power loads to emergency power supply buses during an accident even though calculations showed the power supply buses could not handle all of those loads.

May 22, 1992: The NRC proposed to fine NYPA $225,000 for failing to correct a known overloading problem for a vital power supply bus at the plant. NYPA had reported the problem to the NRC twice in the previous year, but had not fixed it.[1] The problem prompted the NRC to issue Information Notice 92-09 to all plant owners, including NYPA, in January 1992 and NYPA failed to heed even this reminder.

July 9, 1992: NYPA informed the NRC that a 125-volt DC coordination study identified design errors in which several single failures could disable the emergency diesel generators.[2]

July 20, 1992: NYPA informed the NRC that a design error prevented containment isolation valves on the component cooling water return header from closing in event of an accident. The springs in these motor-operated valves were undersized.[3]

July 24, 1992: NYPA informed the NRC that a design error cause a control power fuse to blow and disable emergency diesel generator 31.[4]

December 7, 1992: NYPA informed the NRC that 20 percent of the fire dampers in ventilation ducting failed to shut properly when tested due to improper installation.[5]

December 10, 1992: The NRC proposed to fine NYPA $137,500 for three violations: (a) providing NRC staff with inaccurate information during an enforcement conference on April 10, 1992, about inoperable heating elements around a pipe containing a boric acid solution, (b) allowing a licensed operator to access the plant after having tested positive for illegal drug use, and (c) not periodically re-testing another licensed operator who returned to work after completing a drug rehabilitation program.[6]

December 24, 1992: NYPA informed the NRC that electrical cable routing failed to meet design criteria for compliance with fire protection requirements under Title 10 of the Code of Federal Regulations, Part 50 (10 CFR 50), Appendix R.[7]

February 27, 1993: NYPA "voluntarily" shuts down Unit 3 to address problems with the AMSAC system.[8]

March 3, 1993: NYPA informed the NRC that the power supply cable to the lubricating oil pump for the main boiler feed pump was improperly routed through cable trays of both safe shutdown trains.[9]

March 7, 1993: NYPA took Unit 3 to cold shutdown to resolve programmatic weaknesses in the surveillance testing program. This outage replaced a 21-day scheduled maintenance outage planned to begin on May 1, 1993.[10]

March 12, 1993: NYPA informed the NRC that a December 31, 1992, test of the AMSAC system failed because the 40-second time delay failed to operate.[11]

March 12, 1993: NYPA informed the NRC that design errors resulted in inadequate emergency lighting in areas where manual actions are needed to safely shut down the reactor in event of a fire.[12]

March 26, 1993: NYPA submitted an action plan to the NRC committing to complete numerous tasks and not to restart the reactor until the NRC concurs that it is ready.[13]

April 6, 1993: The NRC invoked Inspection Manual Chapter 0350, "Staff Guidelines for Restart Approval," for Unit 3 due to its extended outage.[14]

April 16, 1993: NYPA informed the NRC that inadequate procedures and poor communications resulted in the reactor coolant system level indication being disabled at a time when the coolant had been reduced below the normal level.[15]

June 8, 1993: NYPA informed the NRC that emergency diesel generator 33 was declared inoperable because preventative maintenance tasks due on December 12, 1987, had not been performed.[16]

June 17, 1993: The NRC issued a Confirmatory Action Letter to NYPA agreeing that the items listed in the March 26 action plan are to be completed prior to restart.[17]

July 6, 1993: NYPA informed the NRC that the surveillance test performed for electrical tunnel fire protection sprinkler zone 15 failed to ensure its operability.[18]

July 8, 1993: The NRC issued Information Notice 93-49, "Improper Integration of Software into Operating Practices," to all plant owners alerting them to a problem discovered during testing of the AMSAC at Unit 3 on December 31, 1992. The problem would have prevented the auxiliary feedwater pumps from automatically starting when called upon during an accident. During maintenance conducted on July 8, 1992, a technician reloaded software from an unauthorized and obsolete source that created the problem.

July 9, 1993: NYPA informed the NRC that emergency diesel generator 32 was declared inoperable because of long overdue preventative maintenance tasks.[19]

July 9, 1993: NYPA informed the NRC that surveillance tests conducted since April 17, 1989, of the control room toxic gas monitor had failed to check for chlorine or ammonia as they should have done.[20]

July 19, 1993: NYPA informed the NRC that a design error created the potential for a single failure in the boric acid heat trace panel to cause a loss of multiple safety-related power supplies.[21]

July 22, 1993: The NRC proposed to fine NYPA $300,000 for two sets of violations. The first set, garnering a $100,000 fine, involved the installation of the AMSAC system in June 1989 but not discovering until February 1993 that this safety system would not work. The second set of violations, garnering a $200,000 fine, involved deliberately shutting off the only means of measuring the coolant level in the reactor coolant system on March 19, 1993, after having first deliberately lowering the water level far below the normal level to allow a maintenance activity.[22]

July 23, 1993: NYPA informed the NRC that the local control panels for the emergency diesel generators had not been properly installed and could cause the diesel generators to fail in the event of an earthquake.[23]

August 17, 1993: The NRC issued a letter to NYPA defining 15 technical, 9 programmatic, and 8 management issues that must be corrected before restart.[24]

The technical issues were:

(1) fix the AMSAC system;
(2) resolve emergency diesel generator problems;
(3) resolve fire protection problems;
(4) resolve cable separation problems;
(5) resolve reactor missile block deficiencies;
(6) resolve orifice plate orientation problems;
(7) resolve fuse control problems;
(8) ensure the weld channel and containment penetration system nitrogen backup supply meets design requirements;
(9) resolve the backup service water biofouling problem;
(10) resolve the manual valve handwheel problem so emergency operating procedures can be performed;
(11) implement the required actions of NRC Bulletin 93-02, "Debris Plugging of ECCS Strainers";
(12) ensure the control room ventilation system meets design requirements;
(13) resolve the power-operated relief valve problem;

(14) resolve the instrument bus voltage fluctuation problem; and
(15) resolve the main turbine overspeed issue.

The programmatic issues were:

(1) resolve the corrective action program problems;
(2) resolve the commitment tracking problems;
(3) resolve the surveillance testing program problems;
(4) resolve the retest program problems;
(5) resolve the instrumentation calibration problems;
(6) upgrade critical procedures needed for restart;
(7) resolve the temporary change program problems;
(8) ensure that preventative maintenance tasks are being conducted per vendor recommendations; and
(9) enhance the justification for continued operation process.

The management issues were:

(1) develop a process to ensure NRC commitments are completed;
(2) resolve startup and mode change problems;
(3) resolve contractor oversight control problems;
(4) ensure management's expectations on procedure compliance are clearly understood;
(5) provide operability determination training to all applicable personnel;
(6) re-establish Quality Assurance as an effective oversight group;
(7) review all backlog items and assess the safety impact of the deferred items; and
(8) assess NYPA staff attitude about performance improvement.

August 19, 1993: NYPA informed the NRC that unapproved and improper materials had been used for fire penetration seals and fire barriers.[25]

September 20, 1993: NYPA informed the NRC that the motors for two safety-related motor-operated valves could generate sufficient thrust to damage the valves.[26]

October 4, 1993: NYPA informed the NRC that the technical specification limits for minimum emergency diesel generator fuel oil inventory did not ensure sufficient supply for operation following design basis events.[27]

October 6, 1993: NYPA informed the NRC that it had not been performing preventative maintenance on the emergency diesel generators as recommended by the vendor.[28]

October 8, 1993: NYPA informed the NRC that the surveillance test for one of the automatic turbine trip circuits failed to ensure the instrumentation was properly calibrated.[29]

October 29, 1993: NYPA informed the NRC that fire barrier wrap had not been properly installed in some areas as required to protect electrical cables in the event of a fire.[30]

November 17, 1993: NYPA informed the NRC that numerous orifice plates installed in piping throughout the plant could have prevented safety functions from occurring in event of an accident.[31]

November 20, 1993: NYPA informed the NRC that a pneumatically controlled damper in the central control room ventilation system was designed to fail to the closed position upon loss of the non-safety-related instrument air system.[32]

December 3, 1993: NYPA informed the NRC that the control isolation valves in the reactor coolant pump seal injection piping were improperly designed.[33]

December 15, 1993: NYPA informed the NRC that air-operated valves in safety systems would fail due to a design error that allowed excessive air pressure to their solenoid valves.[34]

January 26, 1994: NYPA informed the NRC that due to a design error, there was inadequate emergency lighting in areas where manual actions are needed to safely shut down the reactor in the event of a fire.[35]

September 26, 1994: NYPA informed the NRC that the central control room ventilation system was inoperable because of degraded seismic supports for the air conditioning units.[36]

September 30, 1994: NYPA informed the NRC that a design error during a modification to the control circuit for the central control room ventilation system created the potential for a single failure to disable the entire system.[37]

December 15, 1994: NYPA informed the NRC that an inadequate operating procedure resulted in the operating license being violated while the reactor was shut down. The operating license required the reactor coolant system to be protected from overpressurization during low temperature conditions, but the operating procedures failed to block open relief valves as required.[38]

January 9, 1995: NYPA informed the NRC that due to a design error, a 10-inch diameter fire pipe in the control building was not properly supported. In the event of an earthquake, the fire pipe could break and flood the 480-volt switchgear room.[39]

January 18, 1995: NYPA informed the NRC that due to a design error, both the normal and emergency lighting in the central control room would be lost in the event of a fire in the lower cable tunnel.[40]

February 13, 1995: NYPA informed the NRC that component cooling water system pump 32CCWP would not be able to function as required in the event of a fire due to a design error that improperly sized the electrical fuses in the power supply circuit.[41]

March 4, 1995: NYPA informed the NRC that an as-built drawing review identified a single failure vulnerability in which a relay in the carbon dioxide fire suppression system could fail and disable ventilation to the switchgear rooms and lead to the failure of 480-volt buses 2A, 3A, 5A, and 6A.[42]

April 8, 1995: NYPA informed the NRC that isolation valves in the main feedwater system would not close as required during accident conditions due to insufficient thrust for the differential pressure conditions that would be present.[43]

April 19, 1995: NYPA informed the NRC that a review of the Appendix R fire protection program identified 58 deficiencies, the most significant being the potential for safety-related equipment overheating and failing following a loss of ventilation due to false actuation of the carbon dioxide fire suppression system.[44]

May 5, 1995: NYPA informed the NRC that a single failure could cause loss of ventilation to the 480-volt switchgear room and prevent the plant from responding successfully during design basis events.[45]

May 19, 1995: NYPA informed the NRC that manual valve SI-898 in the safety injection pump room may become inaccessible following an accident due to high radiation levels. Operators need to access the valve to establish the alternate low to high head flow path following an accident. The plant's emergency procedures directed operators to open the valve, but had failed to consider that radiation levels may prevent this necessary action.[46]

May 26, 1995: NYPA informed the NRC that an improper relay in the control circuit for the auxiliary feedwater pumps could have prevented them from automatically starting at lower water levels in the steam generators. The improper relay was either installed during maintenance in April 1992 or during initial construction of the plant.[47]

July 2, 1995: NYPA restarted the reactor to end the extended outage.

Notes

[1] Nuclear Regulatory Commission (NRC). 1992. NRC staff proposes $225,000 fine against Indian Point 3 Nuclear Power Plant in New York. News Release No. 92-81, May 22.
[2] New York Power Authority (NYPA). 1992. Licensee Event Report No. 92-006-00, July 9.
[3] NYPA. 1992. Licensee Event Report No. 92-008-00, July, 20.
[4] NYPA. 1992. Licensee Event Report No. 92-010-00, July 24.
[5] NYPA. 1992. Licensee Event Report No. 92-017-00, December 7.
[6] NRC. 1992. NRC staff proposes $137,500 fine for alleged violations of NRC requirements at its Indian Point Unit 3. News Release No. 92-181, December 10.
[7] NYPA. 1992. Licensee Event Report No. 92-018-00, December 24.
[8] Cooper, R.W., and J.A. Calvo. 1993. Indian Point 3 restart action plan. Memo to Thomas T. Martin, regional administrator, NRC, July 20. Richard W. Cooper and Jose A. Calvo were staffers at the NRC.
[9] NYPA. 1993. Licensee Event Report No. 93-006-00, March 3.
[10] Cooper and Calvo, 1993.
[11] NYPA. 1993. Licensee Event Report No. 93-005-00, March 12.
[12] NYPA. 1993. Licensee Event Report No. 93-007-00, March 12.
[13] Cooper and Calvo, 1993.
[14] Ibid.
[15] NYPA. 1993. Licensee Event Report No. 93-011-00, April 16.
[16] NYPA. 1993. Licensee Event Report No. 93-019-00, June 8.
[17] Cooper and Calvo, 1993.
[18] NYPA. 1993. Licensee Event Report No. 93-022-00, July 6.
[19] NYPA. 1993. Licensee Event Report No. 93-024-00, July 9.
[20] NYPA. 1993. Licensee Event Report No. 93-023-00, July 9.
[21] NYPA. 1993. Licensee Event Report No. 93-026-00, July 19.
[22] NRC. 1993. NRC staff proposes $300,000 fine against NYPA for alleged violations of NRC requirements at Indian Point 3 nuclear plant. News Release No. 93-101, July 22.
[23] NYPA. 1993. Licensee Event Report No. 93-027-00, July 23.
[24] Cooper, R.W. 1993b. Indian Point 3 restart action plan. Letter to Ralph E. Beedle, NYPA, August 17. Richard W. Cooper was project engineer at the NRC.
[25] NYPA. 1993. Licensee Event Report No. 93-029-00, September 16.
[26] NYPA. 1993. Licensee Event Report No. 93-030-00, September 20.
[27] NYPA. 1993. Licensee Event Report No. 93-033-00, October 4.
[28] NYPA. 1993. Licensee Event Report No. 93-019-01, October 6.
[29] NYPA. 1993. Licensee Event Report No. 93-034-00, October 8.
[30] NYPA. 1993. Licensee Event Report No. 93-038-00, October 29.
[31] NYPA. 1993. Licensee Event Report No. 93-043-00, November 17.
[32] NYPA. 1993. Licensee Event Report No. 93-045-00, November 20.
[33] NYPA. 1993. Licensee Event Report No. 93-047-00, December 3.
[34] NYPA. 1993. Licensee Event Report No. 93-050-00, December 15.

[35] NYPA. 1994. Licensee Event Report No. 93-055-00, January 26.
[36] NYPA. 1994. Licensee Event Report No. 94-009-00, September 26.
[37] NYPA. 1994. Licensee Event Report No. 94-006-01, September 30.
[38] NYPA. 1994. Licensee Event Report No. 94-011-01, December 15.
[39] NYPA. 1995. Licensee Event Report No. 93-051-01, January 9.
[40] NYPA. 1995. Licensee Event Report No. 94-012-00, January 18.
[41] NYPA. 1995. Licensee Event Report No. 95-002-00, February 13.
[42] NYPA. 1995. Licensee Event Report No. 95-003-00, March 4.
[43] NYPA. 1995. Licensee Event Report No. 95-005-00, April 8.
[44] NYPA. 1995. Licensee Event Report No. 95-006-00, April 19.
[45] NYPA. 1995. Licensee Event Report No. 95-003-01, May 5.
[46] NYPA. 1995. Licensee Event Report No. 95-008-00, May 19.
[47] NYPA. 1995. Licensee Event Report No. 95-010-00, May 26.