LaSalle Unit 1

Seneca, IL

Owner: Commonwealth Edison

Outage dates (duration): September 22, 1996 to August 18, 1998 (1.9 years)

Reactor type: Boiling water reactor

Reactor age when outage began: 12.7 years

Commercial operations began: January 1984

Fleet status: Seventh oldest of 12 reactors owned by the company

Synopsis

A declining performance trend spanning two years prompted the NRC to send a Safety System Operational Performance Inspection (SSOPI) team to LaSalle in September 1996 to assess the service water system. An operational event in June 1996 exposed potential problems with this system and prompted this NRC follow-up. The NRC team's findings raised doubts about whether the system could fulfill its safety mission in event of an accident. Both reactors at LaSalle were shut down at the time—Unit 1 due to unrelated turbine control problems and Unit 2 for refueling—and Commonwealth Edison (ComEd) had to resolve the NRC's findings prior to restarting either unit.

An Independent Self Assessment Team chartered by ComEd to examine the causes for declining trends at Zion (in Waukegan, IL) and LaSalle released its findings in November 1996. ComEd broadened the scope of its efforts from just resolving the SSOPI team's findings about the service water system to also addressing programmatic problems. In response to the expanded scope, the NRC invoked its Manual Chapter 0350 process and formed a Restart Oversight Panel for LaSalle. It took nearly two years to resolve all the internal and external items and restart Unit 1.

Process Changes

LaSalle Units 1 and 2 were shut down throughout all of 1997—the year the NRC revamped its reactor oversight process. LaSalle was not solely responsible for this NRC effort, but NRC Region III personnel were significantly involved in the process and incorporated its lessons learned.

Commentary

The NRC made ComEd use up all its "get out of jail free" cards. The agency tolerated signs of bad performance beginning prior to January 1994 and accepted repeated promises of improvements only to watch the frequency of the warning signs quicken and their magnitude grow. Finally, the NRC sent in an SSOPI team to examine the service water system. The team's findings prevented the restart of both reactors until broad, systemic problems were addressed.

The NRC certainly gave ComEd ample opportunities to get its act together at LaSalle. ComEd simply failed to take advantage of the many chances given to avoid the extended shutdowns. The problems that took nearly two years to fix did not magically appear in September 1996; they had been there for a long time while LaSalle operated. The poor performance at LaSalle eventually exhausted the NRC's patience and the agency stepped in and forced ComEd to fix the problems.

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
11/1982	n/a	2	2	3	2	2	3	n/a	2	n/a	n/a
07/1983	2	2	1	3	2	2	3	1	n/a	2	n/a
08/1984	3	2	2	2	2	2	2	1	2	2	n/a
02/1986	3	2	3	3	2	1	2	n/a	3	2	n/a
04/1987	2	2	2	2	2	2	2	2	2	2	2
06/1988	2	2	2	2	2	2	2	2	2	1	2

	Operations	Radiological Controls	Maintenance/Surveillance Testing	Emergency Preparedness	Security	Engineering and Technology	Safety Assessment and Quality Verification
10/1989	1	2	2	1	2	2	2
11/1990	1	2	2	2	2	2	2

	Operations	Maintenance	Engineering	Plant Support
02/1991	1	2	2	2/2/2
03/1992	1	2	2	2/1/1
09/1993	2	2	2	2/2/1
12/1994	2	3	2	3
10/1996	3	3	3	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

January 1994: The NRC issued a trending letter to ComEd because of declining performance at LaSalle.[1]

April 6, 1994: The NRC proposed a $75,000 fine against ComEd for failing to take effective corrective actions at LaSalle. NRC inspections in November and December 1993 determined that repetitive problems with electrical circuit breakers had been caused by improper lubrication. Additionally, the NRC inspectors identified ineffective corrective actions for problems with isolation dampers in the reactor building ventilation system.[2]

May 20, 1994: The NRC proposed a $225,000 fine against ComEd for three violations of radiation protection requirements at LaSalle. Two of the violations involved the deliberate placement of radioactive material on the stored personal clothing of employees while they were working in the plant. The third violation involved the collection of a highly radioactive liquid sample from a tank without a prior survey of the area to determine the radiation levels and potential hazards.[3]

June 1994: The NRC issued another trending letter to ComEd because of declining performance at LaSalle.[4]

February 19, 1995: During a planned shutdown of the Unit 2 reactor for a refueling outage, the control room operator was unable to close two outboard main steam isolation valves. Later, one of the outboard main steam isolation valves on LaSalle Unit 1 failed to close within the technical specification limit. The root cause was determined to be the presence of a lubricant and thread sealant on the internal parts of the solenoid valves for the main steam isolation valves that caused the valves to stick open.[5]

June 19, 1996: The differential pressure across the non-essential service water strainers increased. Operators backwashed the strainers to restore the differential pressure to the normal range. Workers attributed the differential pressure increase to sandblasting material that became entrained in the service water and blocked the strainers.[6]

June 24, 1996: The differential pressure across the non-essential service water strainers increased. Operators backwashed the strainers to restore the differential pressure to the normal range. In addition, a diesel-powered fire pump experienced high coolant temperature during a routine test. This time, workers attributed the difference pressure increase to polymer foam material being used to repair cracks in the concrete intake structure. They concluded that the foam would float at or near the surface of the water in the intake structure where it could impair the non-essential service water system but not challenge the emergency service water system, which drew water from the lower part of the intake structure.[7]

June 28, 1996: Operators manually shut down the Unit 1 reactor due to problems caused by debris in the water at the plant's intake structure. The debris was a polymer foam material being used to repair cracks in the concrete intake structure in May and June 1996. Bits of foam were found first at the surface of the water and then near the bottom of the water supply, raising the concern that the debris could block essential cooling water flow in event of an accident.[8]

July 1, 1996: The NRC announced it was dispatching an Augmented Inspection Team to LaSalle to evaluate the conditions causing both reactors to be shut down in late June.[9]

July 10, 1996: The NRC announced that ComEd had cleaned the debris from the intake structure area and tested the cooling water systems to demonstrate they were fully operational.[10]

Fall 1996: ComEd tasked an Independent Self Assessment Team to evaluate causes of performance declines at the Zion and LaSalle nuclear power plants.[11]

September 22, 1996: Operators manually shut down the reactor due to turbine control valve problems.[12]

September 24, 1996: An NRC SSOPI of the service water system raised concerns about the operability of one of the components cooled by the service water system, the residual heat removal service water heat exchanger. That finding prompted ComEd to take Unit 1 to cold shutdown.[13]

October 17, 1996: The NRC issued its SALP report for LaSalle to ComEd. The NRC rated performance in operations, maintenance, and engineering as 3 (the lowest score possible) and rated performance in plant support as 2. In the prior SALP, the NRC had evaluated performance in operations and engineering as 2 and maintenance and plant support as 3.[14]

October 26, 1996: A General Electric (GE) type SBM control switch on a Unit 1 reactor recirculation pump breaker failed. Troubleshooting indicated that a part within the switch had cracked. GE had notified ComEd and other users that switches manufactured between July 1972 and May 1975 were susceptible to cracking due to contamination by lubricants. GE inspected type SBM switches at LaSalle in 1979 and identified susceptible switches. Many were replaced, but 106 were not, including the one that failed on October 26, 1996. Further investigation revealed that other switches were near or beyond their service lifetimes.[15]

November 19, 1996: ComEd management and members of the Independent Self Assessment Team briefed NRC Region III management and staff about the self-assessment process ongoing at Zion and LaSalle.[16]

December 1996: ComEd decided to extend the outages of both LaSalle units to address performance issues identified by the NRC and the Independent Self Assessment Team.[17]

December 12, 1996: The LaSalle site vice president announced that the organization would be transformed into an organization with dedicated staff for each of the two reactors.[18]

December 23, 1996: Representatives of the ComEd Independent Self Assessment Team briefed the NRC Region III regional administrator on the preliminary fundamental cause assessment for performance declines at the Zion and LaSalle nuclear power plants.[19]

December 30, 1996: ComEd sent the NRC a list of issues to be resolved prior to restart.[20]

January 1997: The NRC placed LaSalle on its Watch List.[21]

January 24, 1997: The NRC proposed a $650,000 fine against ComEd for the June 1996 foam sealant event at LaSalle.[22]

March 7, 1997: The NRC formed a Restart Oversight Panel for LaSalle.[23]

March 28, 1997: ComEd submitted to the NRC its plans to remedy the following four causes of the performance declines at LaSalle:[24]

1. Ineffective management oversight
2. Insufficient resources
3. Lack of high standards
4. Inconsistent incorporation of lessons learned from industry experience

April 14, 1997: The NRC formed the Plant Performance Review Panel to oversee activities leading to the LaSalle restart.[25]

April 14, 1997: The NRC issued Confirmatory Action Letter RIII-96-008B requiring ComEd to submit its plan for restarting LaSalle.[26]

May 22, 1997: ComEd submitted the LaSalle Restart Plan to the NRC.[27]

August 25, 1997: The NRC briefed the U.S. House of Representatives Commerce Committee Subcommittee on Oversight and Investigations on the status of LaSalle restart activities.[28]

August 27, 1997: ComEd submitted Revision 1 of the LaSalle Restart Plan to the NRC.[29]

September 16, 1997: ComEd submitted a supplemented Revision 1 of the LaSalle Restart Plan to the NRC.[30]

November 20, 1997: The NRC issued its Restart Action Plan and Case-Specific Checklist.[31]

July 24, 1998: The NRC announced it had authorized ComEd to restart LaSalle Unit 1.[32]

August 13, 1998: Unit 1 was connected to the electrical grid to end its extended outage. ComEd reportedly spent approximately $200 million to upgrade the plant during the outage[33] ($244 million in 2006 dollars[34]).

Notes

[1] Nuclear Regulatory Commission (NRC). 1997a. NRC manual chapter 0350 restart action plan for LaSalle County Station, July 24.

[2] NRC. 1994. NRC staff proposes $75,000 fine against Commonwealth Edison for failing to take adequate corrective actions at LaSalle Nuclear Station. Press Release No. 94-56, April 6.

[3] NRC. 1994. NRC staff proposes $225,000 fine against Commonwealth Edison Co. for radiation protection violations at LaSalle Nuclear Station. Press Release No. 94-84, May 20.

[4] NRC, 1997a.

[5] NRC. 1995. Failures of main steam isolation valves as a result of sticking solenoid pilot valves. Information Notice No. 95-53, December 1.

[6] NRC. 1996. NRC inspection team issues report on foam sealant material found in equipment cooling system at LaSalle Nuclear Power Station. Press Release No. RIII-96-44, August 7.

[7] Ibid.

[8] NRC. 1996. NRC dispatches inspection team to LaSalle nuclear plant after shutdowns for potentially degraded equipment cooling systems. Press Release No. RIII-96-34, July 1.

[9] Ibid.

[10] NRC. 1996. NRC augmented inspection team to present findings at LaSalle nuclear power plant. Press Release No. RIII-96-39, July 10.

[11] O'Connor, J.J. 1997. Commonwealth Edison Company's (ComEd) response to the U.S. Nuclear Regulatory Commission (NRC) request for information pursuant to 10 CFR 50.54(f) regarding safety performance at ComEd. Letter to the NRC, March 28. James J. O'Connor was chairman and chief executive officer at the Commonwealth Edison Company.

[12] Ray, D.J. 1996. LaSalle County Station Units 1 and 2 / Monthly performance report / NRC docket numbers 50-373 and 50-374. Letter to the NRC, October 9. D.J. Ray was station manager, LaSalle County Station at the Commonwealth Edison Company.

[13] O'Connor, 1997.

[14] NRC. 1996. LaSalle Nuclear Station Rated "Acceptable" in Three Areas, "Good" in Fourth Area in Latest NRC Assessment Report. Press Release No. RIII-96-64, October 18.

[15] Knox, F., K. Nelson, S. Jaffery, and P. Lucky. 1997. *LaSalle County Station SBM switch replacement project root cause investigation report.* April 1. Commonwealth Edison: Seneca, IL.

[16] O'Connor, 1997.

[17] NRC, 1997a.

[18] O'Connor, 1997.

[19] Ibid.

[20] NRC, 1997a.

[21] O'Connor, 1997.

[22] NRC. 1997b. $650,000 fine proposed for violations associated with injecting foam sealant into equipment cooling system at LaSalle Station. Press Release No. RIII-97-07, January 24.
[23] NRC, 1997a.
[24] O'Connor, 1997.
[25] NRC, 1997a.
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] Ibid.
[31] Ibid.
[32] NRC. 1998. NRC staff finds sufficient improvements for restart of Unit 1 of the LaSalle Nuclear Power Station. Press Release No. RIII-98-46, July 24.
[33] Associated Press. 1998. LaSalle plant producing electricity again, August 13.
[34] Bureau of Labor Statistics. 2006. Inflation calculator. Washington, DC: U.S. Department of Labor. Online at *http://data.bls.gov/cgi-bin/cpicalc.pl.*