

NINE MILE POINT UNIT I

Lycoming, NY

Owner: Niagara Mohawk Power Corporation

Outage dates (duration): March 20, 1982 to July 5, 1983 (1.3 years)

Reactor type: Boiling water reactor

Reactor age when outage began: 12.3 years

Commercial operations began: December 1, 1969

Fleet status: Oldest of two reactors owned by the company

Synopsis

During preparations to restart Nine Mile Point Unit 1 from a short maintenance outage, an NRC resident inspection identified water dripping from a recirculation system pipe. That discovery led to the identification of two through-wall pinholes in the recirculation pump safe ends. The plant's owner, Niagara Mohawk, immediately opted to replace all of the safe ends with a more resistant material. Subsequent discovery of numerous cracks in the recirculation piping led Niagara Mohawk to replace all of the piping.

Process Changes

This outage led to substantial changes in the nuclear power industry. The plant's inspection programs for recirculation system piping were upgraded and the results from these improved programs led to repairs and/or replacements of piping and welds at many plants.

This outage also prompted the NRC to issue a series of Information Notices and Bulletins about inspection programs and intragranular stress corrosion cracking, but did not appreciably alter how the NRC conducted its oversight function.

Commentary

The NRC's regulatory performance at Nine Mile Point was very good. It was an NRC resident inspector, not a utility worker, who identified the leaks, and as the agency received information from Niagara Mohawk regarding the cause and extent of the cracking, it took steps to make other plant owners address potentially similar problems at their facilities. As information from these facilities came into the NRC, it adjusted its requirements accordingly.

The only blot on the agency's record in this case is its regulatory flip-flop in July 1983 when NRC commissioners first agreed to a staff recommendation to shut down reactors for safety inspections, then agreed the following day to an industry request to forego the shutdowns due to economic reasons. Regulatory inflexibility is not good, but switching from one end of the regulatory spectrum to the other in so little time is worse.

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
5/1/1981	2	3	2	2	3	2	2	2	2	n/a	n/a
9/1/1982	2	3	2	2	2	2	1	1	n/a	1	n/a
8/1/1983	2	2	2	n/a	n/a	1	1	1	n/a	1	n/a
9/1/1984	3	2	2	2	1	1	1	1	n/a	2	n/a
8/1/1985	1	1	2	1	1	1	1	n/a	n/a	1	n/a
7/1/1987	2	2	3	2	1	n/a	1	2	3	1	2
7/1/1988	2	2	2	2	1	n/a	1	n/a	3	2	2
	Operations	Radiological Controls	Maintenance/Surveillance Testing	Emergency Preparedness		Security	Engineering and Technology		Safety Assessment and Quality Verification		
7/1/1987	3	2	3	1		1	3		3		
7/1/1988	3	2	3	1		1	2		3		
	Operations		Maintenance	Engineering			Plant Support				
8/1/1991	2		2	2			2/1/1				
10/1/1992	2		2	2			2/1/1				
9/1/1993	2		2	1			2				
3/1/1995	1		2	2			2				
7/1/1996	1		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

March 20, 1982: Unit 1 was shut down for a scheduled maintenance outage.^{1,2}

March 22, 1982: During pressure tests conducted for the reactor coolant pressure boundary prior to restart, an NRC resident inspector discovered a leak of about five gallons per minute from the recirculation pump safe ends. Removal of insulation revealed two pinhole leaks in a component that had passed an ultrasound examination only nine months earlier. The leaks were located in furnace-sensitized steel safe ends that General Electric had determined to be vulnerable in its early boiling water reactors (BWRs) and were replaced with a more resistant material in later BWR designs.³

July 1, 1982: After finding numerous cracks in the recirculation system piping, Niagara Mohawk informed the NRC that it would replace all of the original high-carbon stainless steel piping with Type 316 low-carbon stainless steel.⁴

October 14, 1982: The NRC issued Bulletin 82-03 to BWR owners, requiring them to conduct more extensive inspection of recirculation piping.⁵

March 4, 1983: The NRC issued Bulletin 83-02 to BWR owners, reporting that the recirculation piping inspections required by Bulletin 82-03 had identified through-wall leaks at two plants and cracking at three others. The NRC required owners to expand their in-service inspection programs and upgrade training for inspectors.⁶

July 5, 1983: Unit 1 was connected to the electrical grid, ending its extended outage.⁷ The recirculation piping replacement reportedly cost \$65 million⁸ (\$130 million in 2006 dollars⁹).

July 14, 1983: Based on inspection results showing extensive cracking, NRC Director of Engineering Richard Vollmer and Director of the Office of Nuclear Reactor Regulation Harold Denton briefed commissioners on the staff's plan to order the remaining BWRs shut down for inspections. The commissioners agreed.¹⁰

July 15, 1983: Industry representatives briefed NRC commissioners on the economic hardships they would face if they had to shut down their reactors for safety inspections. The commissioners agreed, and the NRC staff's shutdown plan was shelved.¹¹

Notes

- ¹ Associated Press. 1982. Nuke plant to be out of service for a year due to water leak, March 25.
- ² Yacker, J. 1982a. Fallout from Nine Mile Point-1 leaks extends beyond Niagara Mohawk. *Nucleonics Week*, April 1.
- ³ Ibid.
- ⁴ Yacker, J. 1982b. The discovery of recirculation pipe cracking at Nine Mile Point-1. *Nucleonics Week*, July 22.
- ⁵ Nuclear Regulatory Commission (NRC). 1982. Stress corrosion cracking in thick-wall, large-diameter, stainless steel, recirculation system piping at BWR plants. Information Notice No. 82-03, October 14.
- ⁶ NRC. 1983. Stress corrosion cracking in large-diameter stainless steel recirculation system piping at BWR plants. Information Notice No. 83-02, March 4.
- ⁷ *Nuclear News*. 1983. Outage notes, August.
- ⁸ Associated Press. 1983. Nuke plants have cracks, July 15.
- ⁹ Bureau of Labor Statistics. 2006. Inflation calculator. Washington, DC: U.S. Department of Labor. Online at <http://data.bls.gov/cgi-bin/cpicalc.pl>.
- ¹⁰ *New York Times*. 1983. Fast reversal by the NRC, July 28.
- ¹¹ Ibid.