

BRUNSWICK UNIT 2

Southport, NC

Owner: Carolina Power & Light Company

Outage dates (duration): April 21, 1992 to May 15, 1993 (1.1 years)

Reactor type: Boiling water reactor

Reactor age when outage began: 16.5 years

Commercial operations began: November 3, 1975

Fleet status: Second oldest of four reactors owned by the company

Synopsis

A special NRC inspection uncovered irregularities in the construction of the building housing the emergency diesel generators. For example, NRC inspectors determined that 85 percent of the bolts supporting one wall were either fraudulent or non-conforming. The NRC inspectors also determined that Carolina Power & Light Company (CP&L) had known about the irregularities for at least five years. The NRC findings prompted the “voluntary” shutdown of both reactors at Brunswick.

Process Changes

The Brunswick outages resulted in few, if any, changes within the industry and the NRC.

Commentary

The emergency diesel generators are among the most important safety systems in a nuclear power plant. Consequently, they are examined frequently by plant workers and NRC inspectors. How could dozens, if not hundreds, of inspections conducted since the first Brunswick reactor began operating in 1975 have missed such glaring signs of trouble as bolt heads being welded onto structural steel instead of being threaded onto bolts? The good news is that the signs were not missed. The bad news is that the signs were seen but tolerated rather than fixed. The year-plus outages at Brunswick were required not only to fix the structural problems but to also rectify the systemic problems that first created the structural issues and then allowed them to be tolerated for so long.

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
01/1981	2	3	2	2	2	2	2	2	2	n/a	n/a
09/1982	3	3	3	2	2	3	2	n/a	3	2	n/a
06/1983	3	2	3	3	1	3	1	3	3	3	n/a
08/1984	2	1	2	2	1	2	1	1	2	2	n/a
01/1986	2	2	2	2	2	2	1	2	2	2	n/a
01/1988	2	2	2	1	2	2	1	2	2	2	2
	Operations	Radiological Controls	Maintenance/Surveillance Testing		Emergency Preparedness	Security		Engineering and Technology		Safety Assessment and Quality Verification	
12/1988	2	2	2		2	1		3		3	
12/1989	2	2	2		2	1		2		2	
12/1990	2	2	2		2	1		3		2	
12/1992	2	2	3		2	2		2		2	
12/1993	2	2	3		2	2		2		2	
	Operations		Maintenance		Engineering			Plant Support			
12/1993	2		2		1			1			
06/1995	1		1		1			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 6, 1992: The NRC proposed a \$125,000 fine against CP&L for two violations: (1) improper alignment of a valve and failure to follow procedures resulting in the independent verification of proper alignment not being performed, and (2) adjustments to an air intake valve on the emergency diesel generator being performed without a governing procedure or supervision.¹

March 26, 1992: The NRC proposed a \$100,000 fine against CP&L for a violation involving inadequate control over maintenance of an emergency diesel generator. Workers used a degreasing solvent with water to clean a side of the emergency diesel generator, including the fuel control racks. The maintenance procedure specified that the fuel control racks be lubricated following cleaning, but workers skipped that step. A crystalline adhesive bond formed when the cleaning solvent dried, disabling the fuel control racks and causing the emergency diesel generator to fail to run the next time it was started.²

March 30–April 10, 1992: An NRC engineering team conducted a special inspection. The team found the building housing the emergency diesel generators lacked the structural integrity it needed. Among other things, the NRC team found that heads had been cut off bolts and then attached to the steel frame of the building during construction to make it appear that the bolts supported the walls in event of an earthquake. For one wall, the NRC determined that more than 85 percent of the bolts were either fraudulent or otherwise failed to meet design requirements. The NRC team also learned that CP&L had known about the problems since at least 1987, but had not corrected them.³

April 21, 1992: Workers shut down Unit 2 for correction of the structural defects in the emergency diesel generator building. CP&L originally scheduled this outage to last one week.⁴

June 1, 1992: The NRC issued Information Notice 92-42 to other nuclear power plant owners alerting them to the fraudulent bolt problems at Brunswick.⁵

July 2, 1992: The NRC placed Brunswick Units 1 and 2 on its watch list. Among the factors cited by the NRC as justification: (a) more than 80 management changes at Brunswick in the past two years, and (b) initial construction problems, such as structural steel installation deficiencies, that were not part of the NRC's inspection efforts in the past.⁶

August 1992: The North Carolina Utilities Commission staff initiated an investigation into the Brunswick outages. More than 10,000 man-hours would be expended on the investigation in the next year.⁷

January 22, 1993: The NRC proposed a \$50,000 fine against CP&L for violations stemming from an event on September 22, 1992, where a container holding radioactive material was cut open on the refueling floor without proper controls to prevent internal contamination of the workers.⁸

February 10, 1993: The NRC proposed a \$225,000 fine against CP&L for having identified on February 13, 1987, that bolts required to make the emergency diesel generator building intact against earthquakes had not been properly installed, but failing to correct the deficiency until prompted by the NRC to do so in April 1992. The NRC noted the original February 1987 warning about bolt problems had been raised again by CP&L workers in April 1988 and September 1989 with equal futility.⁹

March 1993: In an internal report, CP&L reported that the NRC regional administrator had informed the NRC commissioners that Brunswick was on the watch list because "performance over the years has been cyclical and has continued to decline due to inadequate management involvement, lack of leadership, poor communication of management expectations and standards to the staff, weak self-assessment and corrective action programs."¹⁰

May 15, 1993: Unit 2 was connected to the electrical grid to end its extended outage. Since the shut down in April 1992, workers inspected more than 345,000 individual structural components and completed major upgrades.¹¹

July 29, 1993: The North Carolina Utilities Commission staff released a report from its year-long investigation into the problems at Brunswick. Among the report's conclusions:

"Equipment at the plant was allowed to deteriorate and corrode due to poor maintenance practices and inadequate work control.

Many repairs were not performed when required, resulting in an unmanageably high backlog of repair items that overstressed the plant's resources.

Management lacked the leadership needed to improve the plant and to perform a critical self-assessment of the problems at Brunswick.

An inflexible budgetary process resulted in funds not always being allocated to the most critical areas.

*Problems were allowed to recur at the plant due to CP&L's failure to identify these problems and implement corrective action."*¹²

Notes

- ¹ Nuclear Regulatory Commission (NRC). 1992a. NRC staff proposes \$125,000 fine against CP&L for alleged violation at Brunswick. Press Release No. 92-4. Washington, DC. January 6.
- ² NRC. 1992b. NRC staff proposed \$100,000 fine against CP&L for alleged violation of NRC requirements at Brunswick. Press Release No. 92-49. Washington, DC. March 26.
- ³ NRC. 1992c. Fraudulent bolts in seismically designed walls. Information Notice No. 92-42. Washington, DC. June 1.
- ⁴ Public Staff. July 29, 1993. *Brunswick Investigation, Volume One*. Raleigh, NC: North Carolina Utilities Commission.
- ⁵ NRC, 1992c.
- ⁶ Franklin, B.A. 1992. A harshly judged Brunswick joins Dresden, Zion on problem plant list. *Inside NRC*, July 13.
- ⁷ Public Staff, 1993.
- ⁸ NRC. 1993. NRC staff proposes \$50,000 civil penalty against Brunswick nuclear power plant. Press Release No. 93-06. Washington, DC. January 22.
- ⁹ NRC. 1993. NRC staff proposes \$225,000 civil penalty against CP&L for alleged violations of NRC requirements at Brunswick plant. Press Release No. 93-17. Washington, DC. February 11.
- ¹⁰ Public Staff, 1993.
- ¹¹ Ibid.
- ¹² Ibid.