

PALISADES

South Haven, MI

Owner: Consumers Power Company

Outage dates (duration): August 11, 1973 to October 1, 1974 (1.1 years)

Reactor type: Pressurized water reactor

Reactor age when outage began: 1.6 years

Commercial operations began: August 7, 1966

Fleet status: Youngest of two reactors owned by the company

Synopsis

This outage started with a manual reactor shutdown because of a steam generator leak, which took Palisades' owner, Consumers Power Company, a few months longer than the originally expected three months to address. The company sought permission from the Atomic Energy Commission (AEC) to restart the reactor in spring 1974, but the agency's restart readiness inspection identified eight issues that still needed to be resolved prior to restart. It took the company until the fall to address these additional items.

Process Changes

None.

Commentary

Palisades was the first extended outage in the United States not related to a meltdown and only the second overall. It provides a template for almost all of the ensuing 49 extended outages that have occurred in this country.

The outage started with an operational event, in this case a steam generator tube leak, which Consumers Power Company believed could be corrected in a fairly short amount of time. During the outage, the AEC (which later became the NRC) identified additional problems that had to be corrected prior to restart—items that, for the most part, the agency knew (or should have known) about when the reactor was operating.

The first item on the restart list for Palisades appears on almost every subsequent restart list: fixing deficiencies in the plant's quality assurance program. Though this has been the common thread among extended outages, it has only gotten federal regulators' attention *after* the fact.

What the NRC called quality assurance in the 1970s was renamed corrective action in the 1980s and problem identification and resolution in the 1990s. The public, however, would have been better served if the NRC had spent less time coming up with new labels and more time developing a better way to evaluate the effectiveness of these programs. If the agency had paid more attention to this goal, it could have prevented the extensive erosion of safety margins that resulted in year-plus outages.

Unfortunately, the NRC still has not learned this lesson despite nearly four dozen reminders over the past 30-plus years. The agency must significantly improve its ability to accurately appraise the health of problem identification and resolution programs at operating reactors if it hopes to avoid future extended outages—or worse.

NRC Systematic Assessment of Licensee Performance (SALP) History

Not applicable (SALP had not been developed at this time).

Details

August 11, 1973: Operators manually shut down the reactor for a maintenance outage to repair the steam generators after a small primary-to-secondary leak was detected.¹

September 6, 1973: Consumers Power Company announced that Palisades would be shut down for about three months for testing and cleaning of the steam generators.²

April 25, 1974: The AEC informed Consumers Power Company of the results of the restart readiness inspection conducted at Palisades in March, concluding:

“While we recognize and acknowledge the steps being taken by Consumers Power Company to improve the management controls related to operation of the Palisades plant and to upgrade the quality assurance program for operations, we believe that certain of these matters need to be addressed and resolved prior to resumption of operation. Accordingly, the Palisades reactor should not be restarted until items 1–8 identified under Unresolved Items in the Summary of Findings Section of the enclosed report have been resolved to the satisfaction of Consumers Power Company and this office.”

Items 1 through 8 were listed as:

1. Resolve quality assurance deficiencies
2. Revise administrative procedures to conform with ANSI 18.7 or Safety Guide 1.33
3. Revise general operating procedures to resolve identified deficiencies
4. Revise emergency procedures to conform with Safety Guide 1.33
5. Incorporate recent organizational changes into routine supervisory/management practices
6. Complete revisions to surveillance testing procedures
7. Upgrade process for routine evaluations of system performance
8. Complete implementation of changes in the safety audit and review board function³

August 28, 1974: Consumers Power Company informed the AEC that it had used pump heat to operate the plant with the reactor shut down, and primary coolant temperatures ranging up to 532 degrees Fahrenheit for two weeks to remove chemical impurities from the steam generators. The company requested permission from the AEC to restart the reactor and operate it at power levels up to 60 percent of rated power to complete the removal of chemical impurities.⁴

August 28, 1974: Consumers Power Company filed suit in federal court, charging Combustion Engineering, Ingersoll-Rand, the Wolverine Tube division of Universal Oil Products, and Bechtel Corporation with having provided defective equipment and services to its Palisades plant.⁵

August 30, 1974: The AEC approved Consumers Power Company’s request to restart the reactor and operate it for an interim period at power levels up to 60 percent of rated power to remove impurities from the steam generators.⁶

September 5, 1974: Operators took the reactor to criticality as part of the restart plan.⁷

September 6, 1974: While operators prepared to place the turbine/generator online by admitting steam to the turbine, excessive tube leakage through the feedwater heaters enabled water to enter the turbine and damage its blades. Operators shut down the reactor as a result.⁸

October 1, 1974: The unit was connected to the electrical grid, ending its extended outage.⁹

October 2, 1974: Operators tripped the reactor as part of a planned overspeed test of the main turbine. Restart was delayed until October 3 when electrical relay problems required additional examination.¹⁰

October 7, 1974: The reactor automatically tripped from about 15 percent power due to a recurring problem with the turbine protection circuits.¹¹

October 8, 1974: Operators restarted the reactor.¹²

October 17, 1974: Operators manually shut down the reactor for scheduled AEC operator licensing demonstrations and repairs to leaking condenser tubes.¹³

October 27, 1974: Operators restarted the reactor.¹⁴

November 1, 1974: Operators manually shut down the reactor due to excessive condenser tube leaks. The reactor remained shut down the remainder of the year while the original admiralty condenser tubes were replaced with 90 percent copper/10 percent nickel tubes.¹⁵

Notes

- ¹ Sewell, R.B. 1975. Palisades plant 8th semiannual. Letter to Nuclear Regulatory Commission, February 25. Ralph B. Sewell was nuclear licensing administrator at Consumers Power Company.
- ² *New York Times*. 1973. Abstracts, September 7.
- ³ Keppler, J.C. 1974. Letter to R.C. Youngdahl, executive vice president, Consumers Power Company, April 25. James C. Keppler was a regional director at the Atomic Energy Commission.
- ⁴ Youngdahl, R.C. 1974. Palisades plant. Letter to Atomic Energy Commission, August 28. R.C. Youngdahl was senior vice president at Consumers Power Company.
- ⁵ *New York Times*. 1975. Abstracts, August 29.
- ⁶ Sewell, 1975.
- ⁷ Ibid.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Ibid.
- ¹¹ Ibid.
- ¹² Ibid.
- ¹³ Ibid.
- ¹⁴ Ibid.
- ¹⁵ Ibid.