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Attorney Work Product Memorandum

To: Terry Lodge et al
From: Arnie Gundersen
Date: August 3, 2021
Re: Point Beach Scram

Confidential Attorney Work Product
Point Beach Scram

Summary:

The SCRAM (officially named Reactor Trip) at Point Beach on July 31, 2021, was not an everyday occurrence, and in fact, was complicated by numerous equipment failures. Fairewinds has identified at least four problems, all of which appear to be caused by aging components. The NRC defines Scram as "the sudden shutting down of a nuclear reactor, usually by rapid insertion of control rods, either automatically or manually by the reactor operator. Also known as a "reactor trip".[1]

Background:

When a Uranium atom splits (fissions is the technical term), it gives off vast amounts of energy. About 93% of the power generated at Point Beach comes from splitting the Uranium nucleus. However, radioactive rubble (fission fragments) remains, creating 7% of the total heat after the fission stops. While 7% may not sound like much, at Point Beach, it is 126 MW (megawatts) of thermal energy that must be cooled somehow after the atom-splitting fission stops. To envision the 7% of remaining heat: it is equal to 170,000 horsepower of decay heat, equivalent to the heat output of almost 1,000 car engines. After the reactor has gone into complete shutdown, the hot decay heat remains to accelerate and potentially cause severe ramifications.

[1] https://www.nrc.gov/reading-rm/basic-ref/glossary/scram.html

As we have discussed, Point Beach is past its design and equipment lifetime. Before its 1970 startup, Point Beach was designed and engineered in 1965, and then its components were purchased and installed. Metallurgy was different than today, so metal components, electrical wiring designed for 40-years, rubber parts, and the original analog features [well before digital] have either failed, are failing, or have been or must be replaced. On July 31, 2021, operators at Point Beach scrammed the Unit 1 reactor (reactor trip), which stopped any new uranium chain reactions. Still, they encountered a series of serious problems cooling the remaining 126 MW of heat (170,000 horsepower or almost 1,000 car engines of heat) that remained in the radioactive fission fragments that Fairewinds calls hot radioactive rubble.

Event Problems Summarized:

1. **Problem 1:** One of two feedwater pumps failed while operating at full power. When that pump broke, it created cascading events causing only half of the required cooling water to enter the reactor. Thus, Point Beach could not be cooled as it was engineered and constructed to do. To envision the setting, know that these pumps are massive, much larger than a human being.

2. **Problem 2:** Normally, control circuitry would cause the reactor to reduce its power automatically. However, reactor operators had to intervene and manually Scram (shut down) the reactor. This stopped the ongoing chain reaction, but the decay heat from the radioactive rubble continued unabated.

3. **Problem 3:** Typically, the 170,000 horsepower of decay heat would be sent to the condenser and discharged into Lake Michigan for cooling in such an unexpected event. However, a vital valve called the Condenser Steam Dump Valve became stuck in a partially open/partially closed position. As a result, operators had to manually intervene to close other valves.

4. **Problem 4:** A Feed Regulating Valve should automatically take control and send the excess waste heat to the condenser via an alternate route. Unfortunately, this valve, which was engineered to work automatically, failed to operate. Therefore, operators had to manually intervene by taking control of the computer system.

5. **In summation**, rather than cooling the Point Beach reactor by sending its waste heat into the condenser and then into Lake Michigan, the 170,000 horsepower of waste heat was dumped directly into the atmosphere through what the nuclear industry calls an atmospheric dump via a large pipe that exhausts hot steam directly into the environment. Apparently, it appears that there were no leaks in the Point Beach steam generator, so at this time, Point Beach claims that this atmospheric dump is not radioactive.

Recommendation:

We recommend that PSR-WI requests that the NRC send an Augmented Inspection Team to the site to evaluate the root cause of this recent SCRAM. Fairewinds believes this SCRAM was caused by a failure to adequately monitor and maintain the aging and outmoded components in the Point Beach reactor. We believe that the recent Scram of Point Beach Unit 1 was complicated by the failure of aging components in the reactor and its accessories at a nuclear power plant that is already 50-years-old with a 40-year engineered, design, and fabricated life for its components as well as its buildings, pipes, electricals, etc.

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Event Text from NRC

MANUAL REACTOR TRIP OF UNIT 1

"At 1646 [CDT] on 7/31/21, with Unit 1 in Mode 1 at 100 percent power, the reactor was manually tripped due to control board indications of a Unit 1 'B' Main Feed Pump trip. After the reactor trip, one of the Condenser Steam Dump valves cycled to intermediate and remained stuck. The Condenser Steam Dump Valve was isolated locally using manual isolation valves. The 'B' Feed Regulating Bypass Valve did not control in automatic and was taken to manual to control the level in 'B' Steam Generator. The Auxiliary Feedwater System automatically actuated as designed when the valid actuation signal was received. Operations stabilized the plant in Mode 3. Decay heat is being removed by atmospheric dump valves due to condenser unavailability. Unit 2 is unaffected. This event is being reported pursuant to 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A).

"The NRC Resident Inspector has been notified."

During the transient, all control rods inserted into the core. There is no known primary to secondary leakage. During the transient, no relief valves or safeties lifted. The plant is currently maintaining normal operating temperature and pressure with all safety equipment available. The plant is in its normal shutdown electrical lineup.