

POOR
ORIGINAL

1. Report Number: 50-244/74-1
- 2a. Report Date: January 28, 1974
- 2b. Occurrence Date: January 18, 1974
3. Facility: R. E. Ginna Nuclear Power Plant, Unit No. 1
4. Identification of Occurrence:

This abnormal occurrence is the type defined by Technical Specifications Article 1.9f: "Uncontrolled or unanticipated changes in reactivity greater than 1% delta k/k".

5. Conditions Prior to Occurrence:

At the time of the abnormal occurrence, the unit was in a cold shutdown condition with the residual heat removal system in operation and the loops partially drained to permit access to the steam generators.

On January 1, 1974 the plant was shut down due to the failure of a blade in one of the low pressure turbines. At this time the primary coolant boron concentration was approximately 400 ppm. On January 2, 1974 the reactor coolant system was borated to a hot shutdown condition of 667 ppm boron. On January 4, 1974 the primary coolant was borated to 913 ppm and the plant was placed in cold shutdown with the residual heat removal system in operation. When it became apparent that the unit would be down for several weeks, the boron concentration in the reactor was increased to greater than 2000 ppm on January 8, 1974 in anticipation of a refueling outage.

An air eductor was installed on the reactor head vent to pull air through the pressurizer vent and the partially drained loops and was discharging through the containment exhaust duct. The primary coolant level was being continuously monitored on control room and local indicators. As has been noted in similar occasions in the past, the steam generators had "burped" several times after the level was lowered, releasing some of the primary coolant held in the inverted U-tubes in the steam generators.

6. Description of Occurrence:

On January 18, 1974, workmen removed the manway cover and insert from the "A" steam generator hot leg section. As the insert was removed, there was an in-rush of air to the "A" steam generator causing an unbalance of pressure on the water still in the steam generator tubes. Some of the water came through the manway and the balance drained into the loops, mixing with the primary coolant being recirculated by the residual heat removal system.

7. Designation of Apparent Cause of Occurrence:

The primary coolant in the steam generator tubes was at approximately 913 ppm boron concentration, established when going to cold shutdown. The residual heat removal system takes its suction from the "A" main coolant

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loop hot leg and discharges to the "B" main coolant loop cold leg. This circulates and mixes water through the reactor but not the steam generator. When the 913 ppm boron water in the steam generator drained into the loops and mixed with the 2123 ppm boron water being circulated by the residual heat removal system, the resulting concentration was 1863 ppm boron. This was calculated to reduce the shutdown reactivity margin from approximately 16% to 13%, a change in reactivity of approximately 3% which exceeds the 1% value for uncontrolled or unanticipated change in reactivity reportable as an abnormal occurrence.

8. Analysis of Occurrence:

Analysis by the Plant Operations Review Committee on January 19, 1974 and review by the Nuclear Safety Audit and Review Board on January 22, 1974 concluded the following:

- a. Personnel radiation exposure was low due to the low radiation level of the primary coolant. The degassed beta-gamma activity of the primary coolant at the time of the occurrence was 1.5×10^{-2} micro-curies/gram.
- b. The Nuclear Engineering Department will analyze the potential consequences of introducing primary coolant of low boron concentration from the loop and steam generators into the reactor core and its effect on the shutdown margin under various plant conditions.

9. Corrective Action:

- a. Immediate action was taken to determine the radiation exposure of the personnel involved and the boron concentration of the primary coolant in the reactor. Personnel exposure due to the incident was negligible. Boration was immediately started and the concentration raised from 1863 ppm to 2108 ppm in approximately two hours.
- b. Corrective action to prevent recurrence includes review and changes to existing procedures that (1) Ensure thorough mixing of reactor coolant throughout the primary system after boration and (2) Provide a detailed inventory of primary coolant to ensure that the steam generators are drained prior to opening the steam generator manway covers. In addition, an investigation of the primary coolant boration procedures will be conducted to determine whether or not a Technical Specification change should be requested.

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