ATTACHMENT 32

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MEMORANDUM FOR: Darrell G. Eisenhut, Director
Division of Licensing

FROM: G. C. Lainas, Assistant Director
for Safety Assessment
Division of Licensing

SUBJECT: INDIAN POINT 2: LICENSING BASIS FOR REACTOR PRESSURE VESSEL AND CONTAINMENT FAN COOLER SYSTEM - FSAR AND CURRENT NRC REQUIREMENTS

This is in response to your request to determine the relationship to the licensing basis for the reactor vessel and containment fan cooler system for Indian Point 2 of the recent event at that plant as described by PNO-80-154 and PNO-80-154A. Also, we have checked current NRC requirements (i.e., SRP) in consultation with the cognizant NRR branches for these components.

Enclosures A and B to this memo addressing the reactor pressure vessel and containment fan cooler system, respectively, delineate the results of our determinations. In summary, we conclude that:

1. The licensing basis for the reactor vessel was exceeded and before resuming power operation, the licensee will be required to perform a thermal and stress analysis of vessel and submit it to the NRC for review. In addition, the inspection of pertinent areas in the lower head region covered by the water and other affected areas will be required.

2. By having the individual radiation and flow monitors associated with the fan cooler system and sump level indicators the system meets the current requirements regarding leakage; except, SRP 5.2.5 requires alarms in the control room for sump level indicators. Only within the last week has IP-2 installed such alarms in the control room.

SRP 5.2.5 also requires that the airborne particulate radiation monitors be capable of withstanding the SSE and the leakage detection equipment be tested and evaluated in accordance with IEEE-279. To the best of our knowledge, IP-2 does not meet these criteria; however, we understand that meeting IEEE-279 is not reviewed currently.

Original signed by

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Reactor Vessel Integrity - Design and Operational Requirements

Indian Point 2 FSAR Requirements

The vessel loadings considered in the FSAR do not include the external cooling of the reactor vessel by flooding or spr g it with relatively cold water while the primary system is at hot operating conditions. The vessel is not intended to accomodate these conditions. Rather, it is assumed that events such as these are precluded by "protective devices" (SRP 5.3.3). In the recent IP-2 flood-up case, the protection devices were supposed to have been the sump pumps and sump level indicators.

Current NRC Criteria

The ASME code (10 CFR Part 50.55a) requires that reactor vessels be designed to accomodate normal and anticipated loads (pressure, bolt-up, etc.) and to accomodate a specified number of fatigue cycles (transient loads). The thermal and loading cycles specified for Indian Point 2 are provided in Table 4.1-8 of the IP-2 FSAR (copy attached). The vessel is expected to maintain its structural integrity and leak tightness under certain postulated accident conditions such as a LOCA. These postulated accidents are analyzed and described in an FSAR and reviewed by the NRC.

The postulated adverse events affecting the vessel normally analyzed and reviewed involved rapid cooling of inner surface of the vessel (thermal shock) by safety injection water and/or by excessive heat removal from the primary coolant via the steam generators. The limiting vessel region is usually the beltline, however, nozzles, flanges and head regions are also considered and evaluated.

During normal operation, including anticipated transients, the vessel integrity is maintained by adherance to pressure/temperature limits incorporated in the Technical Specifications.

Conclusion

It is concluded that the Indian Point 2 reactor vessel was designed and analyzed in accordance with appropriate ASME and NRC criteria which do not, at present, include a requirement to consider the vessel being flooded externally with relatively cold water especially while the primary system is at operating temperature and pressure. Reliance is placed on detection with corrective action. In this case our review would have relied on the sump monitoring instrumentation to detect the condition with appropriate operator action (see Enclosure B).

TABLE 4.1-8

THERMAL AND LOADING CYCLES

Transient Condition	Design Cycles†
1. plant heatup at 100°F per hour	200 (5/yr*)
2. plant cooldown at 100°F per hour	200 (5/year)
3. plant loading at 5% of full power per minute	14,500 (1/day)
4. plant unloading at 5% of full power per minute	14,500 (1/day)
5. Step load increase of 10% of full power (but not to exceed full power)	2,000 (1/week)
6. step load decrease of 10% of full power	2,000 (1/week)
7. step load decrease of 50% of full power	200 (5/year)
8. reactor trip	400 (10/year)
9. hydrostatic test at 3110 psig pressure, 100°F temperature	5 (pre-operational)
10. hydrostatic test at 2485 psig pressure and 400°F temperature	40 (post-operational)

11. steady state fluctuations - the reactor coolant average temperature for purposes of design is assumed to increase and decrease a maximum of 6°F in one minute. The corresponding reactor coolant pressure variation is less than 100 psig. It is assumed that an infinite number of such fluctuations will occur

† Estimated for equipment design purposes (40-year life) and not intended to be an accurate representation of actual transients or to reflect actual operating experience.

* This transient includes pressurizing to 2235 psig.

FAN COOLERS

INDIAN POINT, UNIT 2

FSAR Design

Indian Point, Unit 2 has five fan coolers that are used during both normal plant operation and under accident conditions to control containment temperature and pressure. Each fan cooler has an individual radiation and flow monitor.

Under normal power plant operation leakage from the fan coolers or service water piping should be identified through level indicators in the containment sump. During accident conditions, leakage into or out of the service water piping or fan coolers should be identified by the individual radiation and flow monitors. Manual valves located outside containment are capable of isolating any of the fan coolers that are malfunctioning.

NRC Current Requirements

Standard Review Plan 6.2.2, "Containment Heat Removal Systems," and 6.2.4, "Containment Isolation System" gives the staff's licensing requirements regarding the design of the fan cooler system.

SRP 6.2.2 states that instrumentation should be provided to monitor containment heat removal system and system component performance under normal and accident conditions. The instrumentation should be capable of determining whether a system is performing its intended function, or a system train or component is malfunctioning and should be isolated. The instrumentation should have adequate range, accuracy and response to assure that the parameters can be tracked and recorded.

SRP 6.2.4 states that a closed system inside containment such as the fan cooler system should have provisions to allow the operator in the main control room to know when to isolate the fluid system. Such provisions may include instruments to measure flow rate, sump water level, temperature, pressure and radiation level.

SRP 5.2.5, "Reactor Coolant Pressure Boundary Leakage Detection" bases its acceptance criteria on Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems" which provides the acceptable methods to identify the source of reactor coolant leakage to the extent practical. It requires that leakage to the primary reactor containment from both identified and unidentified sources during normal operation should be collected or isolated so that a small unidentified leakage that is of concern will not be masked by a larger acceptable identified leakage. The primary detection method should be sump level and flow monitoring. A proper monitoring of flow rates and rate changes to the containment sumps should be able to identify this unexpected leakage from sources other than RCPB. SRP 5.2.5 also requires alarms in the control room for sump level indicators. The airborne particulate radiation monitors should be capable of withstanding the SSE and the leakage detection equipment be tested and calibrated in accordance with IEEE-279.

Conclusion

1. By having the individual radiation and flow monitors associated with the fan cooler system and sump level indicators the system meets the current requirements regarding leakage; except, SRP 5.2.5 requires alarms in the control room for sump level indicators. Only within the last week has IP-2 installed such alarms in the control room.

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