This document is a redacted publicly available version. In February 2025, the NRC staff identified information within this document that may be Critical Electric Infrastructure Information (CEII) as defined by the Federal Energy Regulatory Commission (FERC). The original file is non-public, designated as CEII, in ADAMS ML25050A479.

NRC staff actions were taken in accordance with:

- The Memorandum of Understanding Between US NRC and FERC Regarding Treatment of Critical Energy/Electric Infrastructure Information found at: https://www.nrc.gov/reading-rm/doc-collections/memo-understanding/2024/index.html.
- The FERC definition of CEII found at: https://www.ferc.gov/ceii, and, https://www.ferc.gov/enforcement-legal/ceii/designation-incoming-dam-safety-documents.

The Oconee 2006 first quarter inspection report contains 2 URIs related to flooding of the SSF and 1 URI related to the calculated massive number of lifts of the MSSVs for events where the SSF is needed. There is also 1 LIV related to the foreign material found in the Unit 2 emergency sump suction lines.

SSF Flooding URI number 1

> An unresolved item (URI) was identified for failure to maintain design control of a Standby Shutdown Facility (SSF) flood protection barrier, which resulted in the creation of a 6" x 10" pathway for external flood waters to enter the SSF and render its equipment inoperable. This issue is designated as a URI pending further inspection and assessment of the effect of the breached flood protection barrier on SSF equipment.
>
> The flooding is related to a Jocasse Dam failure. It appears that the flood protection walls were added to eliminate 80% of the flood risk. The observed opening was below the wall. It was calculated that the opening would allow unacceptable flooding of the SSF in about 6 minutes. The licensee does not think that a Jocasse Dam break and flooding are part of their licensing basis. However, Section 9.6.4.7 of the UFSAR discusses "Flooding Reviews" with respect to SSF System Evaluations, and states that, "The structure meets the requirements of GDC 2 [Design bases for protection against natural phenomena], and the guidelines of Regulatory Guide 1.102 [Flood Protection for Nuclear Power Plants] with respect to protection against flooding."
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> Section 2.2.5.2.2 of the SSF ASW DBD, External Flooding Due To Jocassee Dam Failure, states that, " . . . a [redacted] external flood wall was added around the SSF entrances to reduce the consequences of a Jocassee Dam failure. This [redacted] wall was not intended to bound all flood scenarios but was deemed adequate to protect the SSF from the more likely flood scenarios.
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> A December 10, 1992 Jocassee Dam Failure Inundation Study, Federal Energy Regulatory Commission Project No. 2503, predicted that a Jocasee Dam failure could result in flood waters of approximately [redacted] deep at the Oconee Nuclear Site.

SSF URI number 2

> An URI was identified for failure to promptly identify the inadequate design of the SSF Building Sewer system, which resulted in an open pathway for external flood waters to enter the SSF and render its equipment inoperable. This issue is designated as a URI pending further inspection and assessment of the effect of inadequately designed SSF Building Sewer system.
>
> The sewer system is presently isolated. Flooding from this source was calculated to take 41 minutes. The inspectors had previously noted that the lift station frequently overflowed. So a detailed review was performed on the sewage system into the SSF. The vent for the lift station was noted to be below grade.

MSRV URI

An unresolved item (URI) was identified for the failure to undertake adequate corrective actions to ensure that the excessive cycling of the Main Steam Relief Valves (MSRVs) during an event requiring the use of the SSF ASW System was minimized, thereby lowering the possibility of a MSRV failure. This issue is designated as a URI pending further inspection and assessment of the effect of excessive cycling on a MSRV during an SSF ASW-related event.

This issue was first identified by the licensee in May 2005. The inspectors questioned the number of lifts (1600), because they appeared to be unreasonable. The licensee stated that the number of lifts were very conservative and the analysis would be re-run. After several months the re-analysis was completed and it was noted that there would be approximately 2000 lifts. This appeared to be risk significant.

The licensee argues that they meet their licensing basis. The UFSAR states that "SG pressure should be regulated by the main steam code safety valves, which will relieve at their setpoints." However, the 1982 RAI Question 17 asked "If the steam generator safety valves are the sole means of pressure control, provide the basis that the valves are capable of operation for three and ½ days at the required duty cycle." The Response section stated "These valves are expected, based on their operating history, to perform as designed and to maintain the SG within an acceptable pressure range for standby shutdown operation." The inspectors found little operating history and the licensee was using a different model relief valve that had cycled about 200 times as their "basis that the valves were capable of operation for 3.5 days". The design specifications for the valves do not address excessive cycle or give a value for acceptable lifts.

2000 lifts in a 3 day period are a potential problem. Following the latest trip, one MSRV stuck open and SG pressure had to be reduced to reach closure. There are no other valves of this model that can be tested. There are no spare parts for Oconee's valves and a new model valve will likely be installed around 2010. There appear to be problems with the present testing (not in accordance with IST program) and the exact blowdown settings are unknown. Design specs say 2-4 %, and if true would indicate a greater that 3% lift discrepancy for last weeks trip. These are presently under review. A failed open MSRV would render the SSF inoperable. MUP cannot keep up with cooldown. Does not appear that MSRVs are designed for 2000 lifts and history appears to support problems at low number of lifts.

Use of the ADVs buy time, but at present would present problems with SG pressure and level control since both are manual. Observation of ADV control during simulator scenario appeared to be dismal. Control from the SSF would likely be more of a problem. Licensee needs to submit a LAR to use the ADVs. Told licensee this was still under review, need to re-exit.

Crosscutting Untimely resolution of licensing and design basis issues.

LIV for nut in LPI piping.

4OA7 The inspectors determined that there was a licensee identified violation of 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures and Drawings, which is implemented by NSD 104, Material Condition/Housekeeping, cleanliness/foreign Material Exclusion and Seismic Concern, for the exclusion of foreign material from systems and components. The violation occurred because adequate material exclusion controls had not been implemented in the past which allowed various debris to enter the reactor building emergency sump LPI suction lines. The risk significance and enforcement aspects of this issue were discussed in detail in Inspection Report 05000270/200500005, and Section 4OA5 of this report.

4OA5 This issue was discussed in detail in Inspection Report 05000269,270,287/2005005 and was left unresolved pending further inspection and performance of a SDP Phase 3 review. Subsequently, a regional Senior Reactor Analyst performed a Significance Determination Process Phase 3 evaluation and concluded the finding was of very low safety significance (Green). The risk quantification was performed with the licensee's full scope model and the NRC's computerized model. The evaluation was based on an exposure time of at least one year, with foreign material inside of the B train suction lines from the reactor building emergency sump (RBES) to the B low pressure injection (LPI) pump. Internal and external events that resulted in large or medium break LOCA were the dominant accident sequences . Based on the weight and geometry of the hex nut it was determined that there would only be sufficient flow during these conditions to transport the nut to the suction of the B pump, causing the pump to fail. The failure would not be recoverable.

4OA1 The inspectors concluded that the licensee's analysis did not provide an adequate basis to demonstrate that the 2B LPI pump would have remained functional during certain LOCA events with the nut in the emergency sump suction piping. Based on this, the inspectors determined that the hours in which the 2B LPI train was required to be available between June 15, 2004 and October 22, 2005 are considered to be fault exposure hours and should be added as unavailable time for the train.

This would result in greater than green in the old PI process and greater than green in the new PI process.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed the UFSAR sections 2.4, Hydrologic Engineering, and 9.6, Standby Shutdown Facility, and the SSF ASW Design Basis Documents sections 2.2.5, Design Events, and 2.3.13, Flood, with regards to protecting SSF from external flooding. The inspectors performed a walkdown of the SSF to examine its flood protection features and barriers including: the flood walls and watertight door at the North and South entrances of SSF, accessible cable and piping penetration seals, structural integrity of the building with regards to external flooding, and the building's floor drain and sump system.

b. Findings

(1) Breach of Standby Shutdown Facility (SSF) Flood Protection Barrier

Introduction: An unresolved item (URI) was identified for failure to maintain design control of a Standby Shutdown Facility (SSF) flood protection barrier, which resulted in the creation of a 6" x 10" pathway for external flood waters to enter the SSF and render its equipment inoperable. This issue is designated as a URI pending further inspection and assessment of the effect of the breached flood protection barrier on SSF equipment.

Description: On August 13, 2003, per work order (WO) 98609803, the licensee removed an access cover on the bolted cover that surrounds the CO_2 supply pipe located in the Southwest corner of the SSF Response Room. This 6" x 10" cover is a passive flood protection barrier and was removed to route temporary power cables into the SSF for an SSF outage.

The inspectors observed the breached flood protection barrier and reported it to the licensee, and on June 2, 2005, the licensee generated PIP O-05-3820, which documents that the flood protection barrier was breached to route temporary power cables into the SSF in support of modification work. On August 3, 2005, the licensee generated PIP O-05-4978, which once again, documented that the deficient condition still existed, as the temporary power cables were still routed through the breached flood protection barrier, located on the South wall of the SSF and below the top of the flood barriers at the North and South entrances to the SSF. PIP O-05-4978 goes on to state that, "Based on discussions with . . . Severe Accident Analysis Group, the bolted cover over the CO_2 supply pipe should be installed because it is part of the flood barrier that protects the SSF. While this flood barrier is not required for SSF operability, it is important to PRA [Probabilistic Risk Assessment] (similar to flood gate at the South Entrance to the SSF)." On August 3, 2005, per work request (WR) 98352428, the temporary power cables were removed and the flood protection barrier was restored to its design configuration.

As a result of a licensee investigation into the breached flood protection barrier, the licensee updated section 2.2.5.2.2 of the SSF auxiliary service water (ASW) design basis document (DBD), External Flooding Due To Jocassee Dam Failure, to read, "In order to protect the SSF from flooding due to a Jocassee Dam failure which results in flood levels < the [redacted] SSF flood barrier [at the South entrance of the SSF], . . . The bolted cover that surrounds the CO_2 supply pipe located in the Southwest corner of the SSF Response Room must be installed. The bolted access panel that is located on the CO_2 supply pipe

bolted cover must also be installed." Additionally, the licensee posted signage next to the access cover which states, "Do not remove bolted cover that surrounds CO2 supply pipe in SSF Response Room when the SSF is operable. Bolted cover is a flood barrier for the SSF."

PIPs O-05-4978 and O-05-6642 document that the Maintenance Rule expert panel changed the maintenance rule function of providing external flood protection barriers for SSF to High Safety Significant, and included the bolted cover that surrounds the CO_2 supply pipe and its access cover in this function. The licensee's decided to classify this event as a maintenance preventable functional failure for external flood protection of the SSF. The Maintenance Rule portion of PIP O-05-4978 states that, "When the flood barrier for the CO_2 supply pipe located inside the SSF Response Room is not installed, the SSF is vulnerable to external flood water that exceeds the height of the resulting opening. Since the height of the opening that is present when the flood barrier . . . is removed is below the height of the flood gate provided at the South entrance to the SSF, a functional failure of the SSF flood protection barrier would occur for flood levels that reach the height of the opening."

Licensee calculation OSC-2240, Verification of SSF Sump System Parameters - NSM ON-1012, documents that the SSF sump pumps cannot be relied upon to operate following a Jocassee Dam failure, as the pump's are incapable of developing sufficient head to overcome the backpressure developed by the depth of the flood waters and that approximately 5920 gallons of water in the SSF pump room will render the SSF inoperable.

Section 9.6.4.7 of the UFSAR discusses "Flooding Reviews" with respect to SSF System Evaluations, and states that, "The structure meets the requirements of GDC 2 [Design bases for protection against natural phenomena], and the guidelines of Regulatory Guide 1.102 [Flood Protection for Nuclear Power Plants] with respect to protection against flooding."

However, section 2.2.5.2.2 of the SSF ASW DBD, External Flooding Due To Jocassee Dam Failure, states that, " . . . a [redacted] external flood wall was added around the SSF entrances to reduce the consequences of a Jocassee Dam failure. This [redacted] wall was not intended to bound all flood scenarios but was deemed adequate to protect the SSF from the more likely flood scenarios. A recently completed flood analysis indicates that a Jocassee Dam failure could result in an external flood height of at least [redacted]." However, the deficient flood protection barrier was located below the top of the [redacted] flood protection wall located at the South entrance of the SSF, and would have provided a flowpath for external flood waters whose depth was greater than [redacted] to enter the SSF.

Additionally, a December 10, 1992 Jocassee Dam Failure Inundation Study, Federal Energy Regulatory Commission Project No. 2503, predicted that a Jocasee Dam failure could result in flood waters of approximately [redacted] deep at the Oconee Nuclear Site.

Analysis: During an external flooding event, the breached flood protection barrier could have provided a flowpath for flood waters to enter the SSF. This could impact the safety function of the SSF during accident scenarios that require the use of SSF equipment to mitigate the consequences of the event, as the flood waters could have rendered the

SSF equipment inoperable.

Enforcement: This issue remains unresolved pending further inspection and assessment to determine what impact the breached flood protection barrier may have had on SSF equipment during a postulated event requiring the use of the SSF. Accordingly, it will be identified as: URI 05000269,270,287/2006002-01, Failure to Maintain Design Control of SSF Flood Protection Barrier. This issue is in the licensee's corrective action program as PIPs O-05-3820, O-05-4978 and O-05-6642.

1R06 Flood Protection Measures

.2 Failure to Promptly Identify Flood Protection Deficiencies in the Design of the SSF Sewer System

a. Inspection Scope

The inspectors reviewed the UFSAR sections 2.4, Hydrologic Engineering, and 9.6, Standby Shutdown Facility, and the SSF ASW Design Basis Documents sections 2.2.5, Design Events, and 2.3.13, Flood, with regards to protecting SSF from external flooding. The inspectors performed a walkdown of the SSF to examine its flood protection features and barriers including: the flood walls and watertight door at the North and South entrances of SSF, accessible cable and piping penetration seals, structural integrity of the building with regards to external flooding, and the building's floor drain and sump system.

Introduction: An URI was identified for failure to promptly identify the inadequate design of the SSF Building Sewer system, which resulted in an open pathway for external flood waters to enter the SSF and render its equipment inoperable. This issue is designated as a URI pending further inspection and assessment of the effect of inadequately designed SSF Building Sewer system.

Description: On January 19, 2006, while performing an extent of condition investigation for the breached SSF flood protection barrier discussed above, the inspectors discovered an apparent pathway, via the SSF Building Sewage System, for external flood waters to enter the SSF. The licensee's flow diagrams indicated the existence of a flowpath from the continuously vented sewage system lift station, which was located two feet beneath the yard grade elevation of 796 feet for the site, and through the main sewage line into the SSF which contained no check valves. Oconee Engineering was contacted concerning the identification of the potential design deficiency, and the inspectors were told that the potential issue would be examined.

On February 8, 2006, the inspectors again contacted Oconee Engineering regarding the apparent pathway for external flood waters to enter the SSF. The inspectors were told that the potential issue would be examined that day. Later that same day, the SSF was declared inoperable and PIP O-06-0740 was generated.

As stated by the SSF System Engineer and documented in PIP O-06-0740, "This problem could affect operation of the SSF ... following a Jocassee dam failure (PRA Event)." In concurring with the operability assessment documented in PIP O-06-0740, the Operations Shift Manager stated that, "...the SSF sanitary lift station [has been] removed from service and the vent line in the sewage ejector has been capped (white-tagged by Maintenance) to prevent flooding in the SSF during the postulated Jocassee dam failure (PRA event)."

Licensee calculation OSC-2240, Verification of SSF Sump System Parameters - NSM ON-1012, documents that the SSF sump pumps cannot be relied upon to operate following a Jocassee Dam failure, as the pump's are incapable of developing sufficient head to overcome the backpressure developed by the depth of the flood waters and that approximately 5920 gallons of water in the SSF pump room will render the SSF inoperable.

Section 9.6.4.7 of the UFSAR discusses "Flooding Reviews" with respect to SSF System Evaluations, and states that, "The structure meets the requirements of GDC 2 [Design bases for protection against natural phenomena], and the guidelines of Regulatory Guide 1.102 [Flood Protection for Nuclear Power Plants] with respect to protection against flooding."

However, section 2.2.5.2.2 of the SSF ASW DBD, External Flooding Due To Jocassee Dam Failure, states that, " . . . a [redacted] external flood wall was added around the SSF entrances to reduce the consequences of a Jocassee Dam failure. This [redacted] wall was not intended to bound all flood scenarios but was deemed adequate to protect the SSF from the more likely flood scenarios. A recently completed flood analysis indicates that a Jocassee Dam failure could result in an external flood height of at least [redacted]." However, the inadequately designed SSF Sewage system was located below the top of the [redacted] flood protection wall located at the South entrance of the SSF, and would have provided a flowpath for all external flood waters to enter the SSF.

Additionally, a December 10, 1992 Jocassee Dam Failure Inundation Study, Federal Energy Regulatory Commission Project No. 2503, predicted that a Jocasee Dam failure could result in flood waters of approximately [redacted] deep at the Oconee Nuclear Site.

Analysis: During an external flooding event, the open pathway provided by the inadequately designed SSF Sewer system could have provided a flowpath for flood waters to enter the SSF. This could impact the safety function of the SSF during accident scenarios that require the use of SSF equipment to mitigate the consequences of the event, as the flood waters could have rendered the SSF inoperable.

Enforcement: This issue remains unresolved pending further inspection and assessment to determine what impact the inadequate SSF Sewer system design may have had on SSF equipment during a postulated event requiring the use of the SSF. Accordingly, it will be identified as: URI 05000269,270,287/2006002-02, Failure to Promptly Identify an Inadequate SSF Building Sewer System Design. This issue is in the licensee's corrective action program as PIP O-06-0740.

4OA2 Identification and Resolution of Problems

2 Focused Review

a. Inspection Scope

The inspectors performed an in-depth review of two issues entered into the licensee's corrective action program. The samples were within the mitigating systems cornerstone and involved risk significant systems. The inspectors reviewed the actions taken to determine if the licensee had adequately addressed the following attributes:

- Complete, accurate and timely identification of the problem
- Evaluation and disposition of operability and reportability issues
- Consideration of previous failures, extent of condition, generic or common cause implications
- Prioritization and resolution of the issue commensurate with safety significance
- Identification of the root cause and contributing causes of the problem
- Identification and implementation of corrective actions commensurate with the safety significance of the issue.

The following issue and its associated corrective actions were reviewed:

- Excessive Cycling of the Main Steam Relief Valves during SSF-related events requiring the use of the SSF ASW System

b. Findings

Introduction: An unresolved item (URI) was identified for the failure to undertake adequate corrective actions to ensure that the excessive cycling of the Main Steam Relief Valves (MSRVs) during an event requiring the use of the SSF ASW System was minimized, thereby lowering the possibility of a MSRV failure. This issue is designated as a URI pending further inspection and assessment of the effect of excessive cycling on a MSRV during an SSF ASW-related event.

Description: On May 31, 2005, the licensee generated PIP O-05-3770, which documented MSRVs operability concerns during certain SSF-related events. During an event that requires operation of the SSF ASW System, the two Main Steam Relief Valves (MSRVs) with the lowest set pressure are required to lift and reseat as needed to remove decay heat from the RCS. PIP O-05-3770 documents the impact of an initial thermal-hydraulic analysis on the applicable MSRVs during the previously mentioned event. The PIP documents that,"... the MSRVs could be expected to cycle open and closed approximately 990 times over a 72 hour period...If a single SG is fed, the corresponding MSRV may be cycled ... over 1600 cycles in 72 hours."

The licensee consulted with the MSRV manufacturer, Anderson Greenwood Crosby, " . . . to determine if the MSRVs are capable of performing their design basis function during

an accident that requires operation of the SSF given the number of times that they must cycle open and closed. The manufacturer stated that, "...if the valve were subjected to this type of scenario, there would be a potential for seat leakage but there should be no concern structurally." This statement is based on testing performed on different AG Crosby MSRV (MSRV installed on BWR applications) where the valve was cycled up to approximately 200 times. The licensee

The inspectors reviewed the April 3, 1968 design specification for the MSRVs, OS-254, the MS System DBD and the Oconee UFSAR. However, no additional information supporting the ability of the valves to withstand not specify the number of cycles a MSRV can withstand prior to failing open, or leaking excessively. The licensee was also unable to provide any addition information concerning the reliability of the MSRVs during any event in which the relief valves were required to cycle excessively except for the operability assessment documented in PIP O-05-3770, as stated above.

The inspectors expressed their concerns to the licensee regarding the MSRVs ability to be excessively cycled without failing, and the use of extremely limited test data on a different relief valve to justify operability and continues operation. On June 1, 2005, the licensee initiated two corrective actions related to this issue as documented in PIP O-05-3770. Corrective action (CA) #4 requested that the Duke General Office perform a refined thermal-hydraulic analysis to determine how many times MSRVs must cycle in an event requiring the use of the SSF ASW System, and that this analysis be completed by June 20, 2005. CA #5 directed the creation of "...guidance for controlling MS pressure using the atmospheric dump valves [ADVs] during an SSF event, as desired to limit MSRV cycling. It would direct MS pressure to be maintained below the MSRV lift setpoint but high enough to prevent RCS inventory problems." The creation of the guidance document was assigned an initial completion date of June 16, 2005.

On February 23, 2006, the licensee documented the completion of the refined thermal-hydraulic analysis in PIP O-05-3370. The refined analysis showed that the initial analysis was non-conservative, in that, the applicable MSRVs could be expected to cycle up to 2000 times during the 72 hour mission time of the SSF.

Analysis: During an event requiring the use of the SSF ASW System, the MSRVs with the lowest set pressure on each steam header could be expected to cycle open and closed up to 2000 times over the 72 hour mission time of the SSF. This could result in a failed MSRV, thereby impacting the safety function of the SSF during accident scenarios that require the use of SSF ASW System.

Enforcement: This issue remains unresolved pending further inspection and assessment to determine what impact excessive cycling of the MSRVs during a postulated event requiring the SSF ASW System may have had on the effected MSRV(s) and the Oconee unit requiring the operation of the SSF. On April 17, 2006, the licensee implemented operator guidance directing the utilization of the manually operated MS Atmospheric Dump Valves to limit the cycling of the MSRVs, as such this finding does not represent an immediate safety concern. Accordingly, it will be identified as: URI 05000269,270,287/2006002-XX: Failure to take Adequate Corrective Action to Ensure Survivability of Main Steam Relief Valves During an Event Requiring SSF ASW System. This issue is in the licensee's corrective action program as PIP O-05-3770.

4OA5 Other Activities

(Closed) URI 05000270/200500002, Inadequate Foreign Material Exclusion Controls for the A and B Train Reactor Building Emergency Sump Suction Lines.

This issue was discussed in detail in Inspection Report 05000269,270,287/2005005 and was left unresolved pending further inspection and performance of a SDP Phase 3 review. Subsequently, a regional Senior Reactor Analyst performed a Significance Determination Process Phase 3 evaluation and concluded the finding was of very low safety significance (Green). The risk quantification was performed with the licensee's full scope model and the NRC's computerized model. The evaluation was based on an exposure time of at least one year, with foreign material inside of the B train suction lines from the reactor building emergency sump (RBES) to the B low pressure injection (LPI) pump. Internal and external events that resulted in large or medium break LOCA were the dominant accident sequences . Based on the weight and geometry of the hex nut it was determined that there would only be sufficient flow during these conditions to transport the nut to the suction of the B pump, causing the pump to fail. The failure would not be recoverable. Based on the initiating events and performance deficiency considered, there was no increase in LERF.

Because of the very low safety significance of this issue, because it has been entered into the licensee's corrective action program as PIP O-05-06829 and because it was identified by the licensee, this violation is being treated as a licensee identified NCV, documented in Section 4OA7 of this report.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcemetn Policy, NUREG-1600, for being dispositioned as a NCV.

- The inspectors determined that there was a licensee identified violation of 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures and Drawings, which is implemented by NSD 104, Material Condition/Housekeeping, cleanliness/foreign Material Exclusion and Seismic Concern, for the exclusion of foreign material from systems and components. The violation occurred because adequate material exclusion controls had not been implemented in the past which allowed various debris to enter the reactor building emergency sump LPI suction lines. The risk significance and enforcement aspects of this issue were discussed in detail in Inspection Report 05000270/200500005, and Section 4OA5 of this report.

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors reviewed the circumstances related to the discovery by the licensee that a relatively large nut was left in the emergency sump suction of the Unit 2 "B" train LPI/RBS pumps. In particular the inspectors reviewed this item to determine if unavailability hours associated with the B Train LPI pump were included in the Residual Heat Removal System PI reporting data. The inspectors reviewed PIP O-05-06829

which documented the discovery of the nut and other debris in the emergency sump on October 24, 2005, and other documentation which indicated that the nut would not transport from the emergency sump piping to the LPI pump.

b. Findings

During the Unit 2 fall 2005 refueling outage, the licensee discovered debris in the containment emergency sump suction lines to the LPI/RBS pumps. Because of the design of the emergency sumps, the debris could only enter the lines during an outage when cover plates are removed from the sump. It was concluded that the debris was in the suction lines for at least one full operating cycle (June 15, 2004 to October 22, 2005).

In PIP O-05-06829, the licensee stated that "It is virtually certain that a nut that is transported by the fluid would settle into the disk guide rail cavity of this valve" (LP-20, emergency sump suction valve). The licensee had calculated that the nut would likely be traveling at 5.5 ft/second. Additional calculations by Region II DRS indicated that the nut could be traveling at velocities greater than 5.5 ft/second. Based on the velocity of the nut in the LPI piping, the turbulence of the flow in the LPI piping, and the configuration and size of the valve guide, the resident inspectors, the DRS expert, and NRC headquarters inspectors concluded that it would be very unlikely that the nut could be captured in the emergency sump suction isolation valve (LP-20) and that the nut most likely would enter the LPI pump suction and cause unacceptable pump damage. The SRA noted in the Phase III evaluation that "Based on the weight and geometry of the hex nut it was determined that there would only be sufficient flow during these conditions (large break LOCA) to transport the nut to the suction of the B pump, causing the pump to fail. The failure would not be recoverable."

The licensee's conclusion relied on engineering judgement and their belief that the nut would be captured by the valve guide. The inspectors with support from Region II DRS and NRC headquarters, concluded that the licensee's analysis was overly simplistic and that there were too many uncertainties to confidently predict that the nut would not transport to the LPI pump suction. Based on this, it was concluded that reasonable assurance had not been provided to show that the LPI pump would have remained available.

The inspectors concluded that the licensee's analysis did not provide an adequate basis to demonstrate that the 2B LPI pump would have remained functional during certain LOCA events with the nut in the emergency sump suction piping. Based on this, the inspectors determined that the hours in which the 2B LPI train was required to be available between June 15, 2004 and October 22, 2005 are considered to be fault exposure hours and should be added as unavailable time for the train.