February 18, 2000

Mr. R. P. Powers
Senior Vice President
Nuclear Generation Group
American Electric Power Company
500 Circle Drive
Buchanan, MI 49107-1395

SUBJECT: NRC INSPECTION REPORT 50-315/99029(DRS); 50-316/99029(DRS)

Dear Mr. Powers:

From November 29, 1999, through January 5, 2000, the NRC conducted a special inspection at D. C. Cook, Units 1 and 2 reactor facilities. The intent of the inspection was to assess the ability of the Cook Nuclear Plant corrective action program to effectively resolve previously identified conditions adverse to quality. The enclosed report documents the results of the inspection.

The NRC assessment of the D. C. Cook Corrective Action Program breakdown characterized the condition as two fundamental concerns: (1) a failure to properly identify issues and problems; and (2) failure to properly resolve previously identified conditions adverse to quality. The fundamental corrective action was the retirement of the existing Corrective Action Program (along with its infrastructure) and the implementation of an entirely new program based on programs installed at other recent restart plants.

We drew our conclusion about the adequacy of your corrective action program by inspecting three important areas. First, we examined corrective actions taken to resolve programmatic deficiencies that were addressed by Restart Action Plans, and technical issues that were identified in the Confirmatory Action Letter and the Restart Action Matrix. These issues were central to the September 1997, plant shutdown. Second, we examined specific corrective actions that were part of the implementation of the new program. Third, we examined a randomly selected sample of sixty closed, recent vintage condition reports for acceptable problem resolution.

We found that the majority of the programmatic and technical issues were satisfactorily resolved; a limited number of activities had yet to be completed at the close of the inspection. As a result of these reviews, we have concluded that Confirmatory Action Letter (CAL) Item No. 1, “Recirculation Sump Inventory/Containment Dead Ended Compartments,” CAL Item No. 2, “Recirculation Sump Venting,” CAL Item No. 3, “Thirty-six Hour Cooldown with One Train of Cooling,” CAL Item No. 5, “Compressed Air Overpressure,” CAL Item No. 6, “Residual Heat Removal Suction Valve Interlock,” CAL Item No. 7, “Fibrous Material in Containment,” and CAL Item No. 8, “Refueling Water Storage Tank Mini-flow Recirculation Lines,” were adequately addressed and can be closed. We also concluded that Case Specific Checklist (CSC) Item No. 2B, “Inadequate Corrective Actions for Previously Identified Conditions Adverse to Quality,” CSC Item No. 3B, “Failure to Update the Updated Final Safety Analysis Report,” CSC Item

No. 3D, “Inadequate Consideration for System/Component Failure Modes,” CSC Item No. 8, “Resolution of Hydrogen Recombiner Operability Issues,” CSC Item No. 9, “Resolution of Distributed Ignition Technical Specification Issues,” and CSC Item No. 10, “Resolution of Containment Spray System Operability Issues,” were adequately addressed and can be closed.

Regarding corrective actions associated with implementation of the new corrective action program, we determined that they were appropriate and had been properly implemented. The new program is rigorous and contains sufficient checks and balances to ensure that corrective actions are completed and their effectiveness is subsequently assessed. We also noted that your staff has continually monitored the program’s effectiveness and adjusted it as needed to address problem areas. Regarding our review of closed condition reports, we found some cases in low significance condition reports where your staff closed issues without finding effective and complete resolutions. We also found instances of flawed problem identification, classification, and corrective action specification. However, none of the deficiencies identified in any of the condition reports was significant enough to call into question the operability or function of any safety-related system or component. Consequently, we concluded that the D. C. Cook Corrective Action Program was capable of resolving identified conditions adverse to quality in a manner sufficient to support the plant’s return to operation.

Although we concluded that the Corrective Action Program was ready to support plant startup, the deficiencies we identified in the resolution of low significance condition reports revealed the need for close management attention to generate and sustain long-term improvements. The NRC will continue to closely monitor D. C. Cook’s performance to ensure you are effectively implementing near and long-term corrective action program improvement initiatives.

In accordance with 10 CFR 2.790 of the NRC "Rules of Practice," a copy of this letter, the enclosure, and your response to this letter, if you choose to provide one, will be placed in the NRC Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA/

John A. Grobe, Director
Division of Reactor Safety

Docket Nos. 50-315; 50-316
License Nos. DPR-58; DPR-74

Enclosure: Inspection Report 50-315/99029(DRS);
50-316/99029(DRS)

See Attached Distribution

cc w/encl: A. C. Bakken III, Site Vice President
J. Pollack, Plant Manager
M. Rencheck, Vice President, Nuclear Engineering
R. Whale, Michigan Public Service Commission
Michigan Department of Environmental Quality
Emergency Management Division
MI Department of State Police
D. Lochbaum, Union of Concerned Scientists

No. 3D, “Inadequate Consideration for System/Component Failure Modes,” CSC Item No. 8, “Resolution of Hydrogen Recombiner Operability Issues,” CSC Item No. 9, “Resolution of Distributed Ignition Technical Specification Issues,” and CSC Item No. 10, “Resolution of Containment Spray System Operability Issues,” were adequately addressed and can be closed.

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50-316/99029(DRS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-315; 50-316
License Nos:	DPR-58; DPR-74
Report No:	50-315/99029(DRS); 50-316/99029(DRS)
Licensee:	American Electric Power Company
Facility:	Donald C. Cook Nuclear Generating Plant
Location:	1 Cook Place Bridgman, MI 49106
Dates:	November 29, 1999 through January 5, 2000
Inspectors:	Martin J. Farber, Reactor Engineer, Team Leader James A. Gavula, Reactor Engineer, Asst. Team Leader Robert A. Winter, Reactor Engineer Darrell L. Schrum, Reactor Engineer John Chiloyan, Consultant Raymond J. Cooney, Consultant Richard F. Ely, Consultant Michael W. Herlihy, Consultant Charles R. Jones, Consultant Robert G. Quirk, Consultant Stanley R. Spiegelman, Consultant
Approved by:	Gary L. Shear, Chief, Plant Support Branch Division of Reactor Safety

EXECUTIVE SUMMARY

Donald C. Cook Nuclear Plant, Units 1 and 2
NRC Inspection Report 50-315/99029(DRS); 50-316/99029(DRS)

In a Confirmatory Action Letter (CAL), dated September 19, 1997, the NRC listed nine specific issues affecting the operability of safety-related systems and components, which the licensee had committed to resolve prior to the startup of either unit of the Cook Nuclear Plant. This special team inspection examined licensee corrective actions intended to resolve CAL Item No. 1, "Recirculation Sump Inventory/Containment Dead Ended Compartments," CAL Item No. 2, "Recirculation Sump Venting," CAL Item No. 3, "Thirty-Six Hour Cooldown, with One Train of Cooling," CAL Item No. 5, "Compressed Air Overpressure," CAL Item No. 6, "Residual Heat Removal Suction Valve Interlock," CAL Item No. 7, "Fibrous Material in Containment," and CAL Item No. 8, "Refueling Water Storage Tank Mini-Flow Recirculation Lines."

By letter, dated September 17, 1999, the NRC transmitted the updated Case Specific Checklist (CSC) for the Donald C. Cook Nuclear Power Plant which identified specific issues requiring resolution prior to restart of the Cook Plant. This special team inspection examined licensee corrective actions for resolution of CSC Item No. 2B, "Inadequate Corrective Actions for Previously Identified Conditions Adverse to Quality," CSC Item No. 3A, "Inadequate Design Control Pertaining to Uncontrolled and/or Unintended Changes in the Plant Design," CSC Item No. 3B, "Failure to Update the Updated Final Safety Analysis Report," CSC Item No. 3D, "Inadequate Consideration for System/component Failure Modes," CSC Item No. 8, "Resolution of Hydrogen Recombiner Operability Issues," CSC Item No. 9, "Resolution of Distributed Ignition Technical Specification Issues," CSC Item No. 10, "Resolution of Containment Spray System Operability Issues," CSC Item No. 11, "Resolution of Hydrogen Mitigation System Operability and Material Condition Issues," and CSC Item No. 14E, "Electrical Protection Coordination Including Fuse/breaker Control Program Readiness for Restart" identified in Enclosure 1 of that letter. The standards applied to evaluate the acceptability for resolution of these CSC items were those described in paragraphs C.1.2, "Corrective Action Development," and C.1.3, "Corrective Action Plan Implementation and Effectiveness" of Enclosure 2 of the NRC letter transmitting the CSC.

Open items identified in NRC inspection reports and Licensee Event Reports requiring inspection/resolution prior to restart of the Cook Plant have been identified in the Restart Action Matrix (RAM) approved by the NRC Manual Chapter 0350 Oversight Panel. In the RAM, open items were identified with designated inspection priorities. The higher priority inspection issues and a sample of lower priority inspection issues received a more in-depth review during this inspection. Based on adequate corrective actions for resolution of items selected for the more in-depth review, reasonable assurance exists that corrective actions for the similar lower priority inspection issues are adequate. The intent of selecting a sample of items for more in-depth review was to improve NRC efficiency in assessing the restart readiness of the plant and to ensure an appropriate focus on the issues most important from a safety and risk perspective.

<u>Confirmatory Action Letter Issues</u>

- CAL Item No. 1 is closed. The team found the material in the submittal supporting the Technical Specification change, the associated modification packages, and the

corrective action report status to be satisfactory for closure of this issue, recognizing that physical accomplishment of the modifications remains to be accomplished as a startup constraint (Section E8.1.1).

- CAL Item No. 2 is closed. The team concluded that the specific recirculation sump ventilation holes that were the subject of the CAL Item No. 2 issue have been redrilled, and that the necessary foreign material exclusion screens have been installed within an adequate safety review framework (Section E8.1.2).

- The team recommended that CAL Item No. 3 be closed. The team concurred with the licensee's position that a 36-hour cooldown using only one train of component cooling water was not a design requirement (Section E8.1.3).

- CAL Item No. 5 is closed. The team concluded that the licensee had appropriately resolved the compressed air overpressure issue (Section E8.1.4).

- CAL Item No. 6 is closed based upon the licensee's completion of the corrective actions identified in CRs 99-04280 and 99-07144. The team reviewed the corrective action measures taken and found that they were in general agreement with C.1.2 and C.1.3 of D. C. Cook 0350 Guidelines for Restart Approval (Section E8.1.5).

- CAL Item No. 7 is closed based on the completed corrective actions and on actions committed to be completed before startup, the team determined that CAL Item No. 7 had been adequately addressed by the licensee and was closed by transfer of oversight of containment sump protection to Restart Action Plan 13B which addresses containment readiness (Section E8.1.6).

- CAL Item No. 8 is closed based on measured leakage past the CAL-specified six valves being less than the CAL-specified 10 gallons per minute rate. Verification of the actual total leakage rates, and a review of the associated operability determination will be required prior to Unit 2 startup. Review and approval of the new dose calculation is a post Unit 2 restart issue if the NRC staff determines the associated Generic Letter 91-18 operability determination was adequate to support startup (Section E8.1.7).

Case Specific Checklist Items

- CSC Item No. 2B is closed. The team concluded that the D. C. Cook Corrective Action Program was capable of acceptably resolving identified conditions adverse to quality in a manner sufficient to support the plant's return to operation. This was based on validation of satisfactory completion of the corrective actions, determination that the most significant corrective actions were among those that were completed, formal requirement for Corrective Action Review Board follow-up review of the effectiveness of corrective actions for level 1 and 2 condition reports, a record of adjustments to the program in response to identified deficiency trends, a plan for workdown of corrective action backlog, and a review of sixty condition reports that did not identify any flaws that would have called into question the operability or functionality of a safety-related system (Section E8.2.1).

- CSC Item No. 3A remains open. The team was unable to conclude that there was reasonable assurance that CSC Item No. 3A was adequately resolved. Although significant changes in the design control program were noted through the extensive new procedures, the team recommended that this item not be closed. This was based on the following: very few engineering products generated under the new design control program were included in the scope of this inspection. Of the few engineering products reviewed by the team that were generated under the new design control program, one calculation did not consider a fundamental requirement of a modification, and a modification drawing was drawn with conflicting dimension lines resulting in another calculation incorrectly analyzing the modified piping configuration (Section E8.2.2).

- CSC Item No. 3B is closed. Based on the completed corrective actions and on actions committed to be completed before startup, the team concluded that CSC Item No. 3B had been adequately addressed by the licensee (Section E8.2.3).

- CSC Item No. 3D is closed. The licensee's overall program for failure mode analysis was found to be adequate to support plant restart (Section E8.2.4).

- CSC Item No. 8 is closed. The team reviewed 18 of 30 completed actions and found that corrective actions were generally in accordance with C.1.2 and C.1.3 of Enclosure 2 of the D. C. Cook 0350 Guidelines for Restart Approval. The team determined that CSC Item No. 8 had been properly addressed by the licensee (Section E8.2.5).

- CSC Item No. 9 is closed. The team reviewed documentation for four of the six corrective actions for Unit 2, including DCP-715, which among other things provided all new ignitor boxes. Actions that were not complete at the time of the inspection were scheduled for completion in December 1999. On the basis of the documentation reviewed and the scheduled completion of remaining activities, the team concluded that CSC Item No. 9 was adequately addressed by the licensee (Section E8.2.6).

- CSC Item No. 10 is closed. The team reviewed closure documentation for five of the eight corrective actions, the most significant being completion of Configuration Control Determination 34040 which revised the normal position of the spray additive tank nitrogen supply valve. Corrective actions that were not complete at the time of the inspection were scheduled for completion and tracked. On the basis of the documentation reviewed and the scheduled completion of remaining activities, the team concluded that the licensee had adequately addressed CSC Item No. 10 (Section E8.2.7).

- CSC Item No. 11 remains open. The team identified that condition reports had been issued which raised concerns regarding the basis for resolution of the issue. The condition reports had been issued before the start of the inspection. The team concluded that the restart action plan addressing CSC Item No. 11 was incomplete and should have been revised to include relevant information. The team recommended that CSC Item No. 11 remain open until Restart Action Plan 11 is revised, corrective actions are implemented, and system performance is assured (Section E8.2.8).

- CSC Item No. 14E remains open. The team was concerned by the errors noted in two "preliminary" calculations and by the fragmented approach to the 4kV motor circuit

protection scheme. Because these calculations were under review, the errors identified by the team could have also been identified by the licensee's review. Consequently, the team could draw no conclusions about the quality of activities associated with CSC Item No. 14E. The team recommended that this item remain open, subject to reinspection at a point in time when calculations and/or the design change are formally approved (Section E8.2.9).

Restart Issues

- Twenty-one high priority restart issues from the Restart Action Matrix were examined in detail to ensure that the licensee properly addressed the issues and completed corrective action, or had them scheduled and tracked for completion prior to plant restart. Fifteen of the twenty-one, discussed specifically in this report, were considered satisfactorily completed. The remaining six required additional engineering work to resolve the issues and consequently could not be closed (Section E8.3).

- Seventy-four low priority issues from the Restart Action Matrix were examined to verify that the issues were entered in the corrective action system, that the issues were properly characterized and classified, that appropriate corrective actions had been specified, and that the corrective actions were scheduled and tracked. Sixty-six of these issues listed in the report are closed (Section E8.4).

Condition Report Review

- The team did identify cases where the licensee's staff had closed some low significance issues without finding effective and complete resolutions. While the team noted that there was some lack of consistency and thoroughness in resolving previously identified problems, no significant issues developed from the inspection of the random sample of sixty condition reports (Section E8.5).

Open Items

- Where Restart Issues involved Escalated Enforcement Issues (EEI) or Violations (VIO), the team considered whether corrective actions were appropriate as specified in the NRC's Enforcement Policy (NUREG 1600).

Report Details

Background

Both units have been in an extended shutdown since September 9, 1997.

III. Engineering

E8 Miscellaneous Engineering Issues

E8.1 Confirmatory Action Letter (CAL) Items

E8.1.1 CAL Item No. 1- Recirculation Sump Inventory/Containment Dead Ended Compartments

a. Inspection Scope

The team reviewed the supporting material accompanying a second Technical Specification (TS) change which included detailed analyses of containment water level during different accident scenarios, the modification packages being issued to increase the available water to the recirculation sump, and related corrective action documents. A walkdown of the sump area, and areas inside and outside the crane wall was performed. The area of the crane wall to be modified to increase its communication with the recirculation sump was examined.

b. Findings and Observations

In response to concerns on the adequacy of the recirculation sump level to prevent vortexing, analyses had been performed, modifications identified for accomplishment, and TS changes submitted to the Office of Nuclear Reactor Regulation (NRR) for approval. The modifications had either been issued for accomplishment in the field or were in the last stages of engineering review prior to release. One TS change associated with the issue had already been reviewed and approved by NRR.

The TS submittal included an analysis which indicated that the water level in the recirculation sump would be satisfactory following performance of modifications described in the submittal. Several of those modifications packages were examined to confirm that key parameters used in the analysis had been properly carried through to the drawings to be issued for field implementation, and to examine the general quality of these engineering products. The size of the openings being incorporated in the crane wall was important to ensure adequate communication between the annulus and the recirculation sump. In modification 2-DCP-679, Revision 0, “Crane Wall Openings,” it was confirmed that the total cross sectional area of the penetrations shown on the installation drawings was conservatively greater than that assumed in the analysis. The selection of the area chosen for the new openings to provide communication between the annulus and the recirculation sump appeared reasonable. Issues related to these new penetrations, such as potential radiation streaming, had been addressed as part of modification 2-DCP-679. Modification 2-DCP-650, Revision 0, “CEQ Fan Logic and Time Delay,” adequately translated the new fan start signal timing assumed in the

analysis into the plant design. An inconsistency in that modifications package was noted, in that the milestone for completion of calculation NEID-2-DCP-650-002, "CEQ Fan Timing Relay Setting," and "As Found," and "As Left" Value Calculation," was shown in one place as required for Return to Operation, and in a second place, as required for Mode 4. This was brought to the attention of the licensee, and Condition Report (CR) P-99-29159 issued. This error had no significant effect on the quality of the modification. The sump area walkdown performed as part of the inspection did not indicate any new concerns not addressed in the CRs and analyses on the subject of CAL Item No. 1.

c. Conclusions

Action on the TS changes was addressed by NRR through separate correspondence. On the subject of CAL Item No. 1, the team found the material in the submittal supporting the TS change, the associated modification packages, and the corrective action report status to be satisfactory for closure of this issue, recognizing that physical accomplishment of the modifications remains to be accomplished as a startup constraint. Based on this evaluation, CAL Item No. 1 is closed.

E8.1.2 CAL Item No. 2 - Recirculation Sump Venting

a. Inspection Scope

As described in NRC Inspection Report (IR) 50-315/98004(DRS); 50-316/98004(DRS), CAL Validation, CAL Item No. 2 covered several design control and modification related issues associated with the licensee's commitment that, "Venting will be re-installed in the circulation sump cover. The design will include foreign material exclusion (FME) requirements for the sump." The team evaluated several documents associated with these and closely related issues and conducted a visual inspection of the external components of the Unit 2 recirculation sump, including external screens, grates, vents, and ice condenser drains.

b. Observations and Findings

The team determined that the limited task of reinstalling the sump roof vent holes and adding mesh screen assemblies was completed. Moreover, consultant recommendations to install additional vent pipes to the inner sump volume and to redirect two ice condenser drains were eventually formally addressed and documented by the licensee.

The CAL Item No. 2 safety evaluation issues surrounding these modifications were noted in NRC IR 50-315/98004(DRS); 50-316/98004(DRS), CAL Validation, which indicated a concern with procedural non-conservatisms. The team determined that in this particular case the licensee's engineering and safety evaluation decisions had little or no actual impact on system operability and that the licensee had taken significant steps to upgrade such decisions. Some of the decisions in question would fall primarily within the appropriate application of licensee engineering judgment, although it was evident that the licensee needed to implement design control procedural refinements and more formal safety analysis processes. Finally, since the primary modification

concern of vent hole redrilling and its safety significance was also addressed, by the licensee in the associated FME screen installation modification, all issues associated with CAL Item No. 2 sump vents listed in NRC IR 50-315/98004(DRS); 50-316/98004(DRS), CAL Validation, were properly addressed.

c. Conclusions

The team concluded that the specific recirculation sump ventilation holes that were the subject of the CAL Item No. 2 issue have been redrilled and that the necessary FME screens have been installed within an adequate safety review framework. CAL Item No. 2 is closed.

E8.1.3 CAL Item No. 3 - Thirty-six Hour Cooldown, with One Train of Cooling

a. Inspection Scope

The team reviewed the CAL, associated correspondence, Updated Final Safety Analysis Report (UFSAR), TS, design documents and system descriptions for the residual heat removal (RHR) and component cooling water (CCW) systems, design change packages (DCP), related CRs, and the licensee's CAL Item No. 3 submittal to NRR. In addition, team members participated in a conference call with Westinghouse and the licensee staff.

b. Observations and Findings

CAL Item No. 3 was based on the NRC architect engineer (AE) team IR (50-315/97201; 50-316/97201) conclusion that the licensee was unable to demonstrate by existing analysis that they could achieve a TS-required 3.0.3 cooldown of 200 degrees Fahrenheit (200 ^{o}F). Reactor Coolant System (RCS) temperature in 36-hours using the design basis assumptions of one train of CCW operating at a maximum of 95 ^{o}F, with one train of RHR, at a lake temperature of 76 ^{o}F.

The licensee asserted that there was no regulatory basis for applying a design requirement to a normal unit cooldown performed to meet TS 3.0.3. The licensee's position was that the referenced Safety Evaluation Report (SER) statement generally described plant capabilities for full power operation or cooldown with only one CCW train but did not impose a design basis requirement cooldown time limit using only one CCW train.

The team reviewed the UFSAR Section 9.3, "Residual Heat Removal System." Section 9.3.3 stated, "If one of two pumps or one of the two heat exchangers or one pump and one heat exchanger is not operable, safe cooldown of the plant is not compromised; however, time for cooldown is extended." Of note to the team was that there was no specification of cooldown time with one train operable. However, a specific time (20-hours) for two trains operable was specified in Section 9.3.1, "Under normal operating conditions the Residual Heat Removal System will reduce the temperature of the reactor coolant to 140 ^{o}F within 20-hours following reactor shutdown."

UFSAR Section 9.5 was reviewed for the CCW System. Section 9.5.2 stated, "One pump and one heat exchanger are required for removal of residual and sensible heat from the reactor coolant system via the residual heat removal system during the cooldown of one unit." Of note was the lack of specificity regarding the magnitude of the heat load, leaving open the potential of cooling down from a lower temperature or use of the steam dumps or power operated relief valves to assist cooldown.

The team reviewed the Westinghouse System Description for the RHR System. The design description stated in Section 3.1, "Assuming that two heat exchangers are supplied with 5000 gallon per minute of component cooling water at 95 °F, the Residual Heat Removal System will reduce the temperature of the reactor coolant to 140°F within 20 hours following shutdown." Also Section 3.4 stated, "Loss of one unit will extend the cooldown period required, but will at no time endanger the plant." These words were silent on the period to cooldown with one loop in operation and were consistent with the words in the UFSAR.

As the designer of the CCW system, the licensee could not provide a design basis document that it used for the original design; however, it did provide a design description document that was transmitted to the licensee by Westinghouse as a reference. There was also no direct documentation to indicate that the Westinghouse design description was used by the licensee; however, Westinghouse was contacted by the team and indicated in a letter that the design was consistent with the philosophy that was used at the time of initial design.

The SER dated September 10, 1973, was reviewed and it stated:

> "9.4 Component Cooling System: The component cooling system for each unit consists of two component cooling pumps, two component cooling heat exchangers, one surge tank, and associated piping, valves, and instrumentation. One pump and one heat exchanger serve the needs of a unit during full power operation or cooldown."

This statement provided single failure capability for the CCW system. It was the responsibility of the licensee to assure that the heat load transferred from the RHR system was within the capability of the CCW system. The team did not consider that the statement restricted the licensee to use only the CCW system for heat removal from the RHR system.

A word search was performed to identify if any of the questions and answers for the original UFSAR restricted the licensee from performing phase 2 of the cooldown with only the RHR system or if phase 1 could not be extended below hot standby. No restrictions were identified by the team nor specifically identified by the AE inspection.

The team questioned the use of non-safety related equipment (the steam dump valves or the power operated relief valves) for cooldown. The licensee responded that D. C. Cook was a hot shutdown plant and that safety related equipment was not required for cold shutdown below 350°F. In addition, the dump valves and power

operated relief valves were permitted for cooldown above 350°F. The team agreed with the response.

On December 13, 1999, a teleconference with Westinghouse and the licensee staff was held to discuss the licensee position that the use of only one train was not part of the licensing basis. The following considerations were identified:

- The CCW specification was intended to provide the licensee with the Westinghouse requirements for the CCW system as it interfaced with the RHR system. It was acknowledged and stated in the transmittal letter that the specification was written for a single unit station. The Westinghouse requirements were governed by the RHR equipment specification that was later supplied. This was Westinghouse input to the licensee, not the CCW design specification.

- Westinghouse was the design organization for the RHR system whereas the licensee was the design organization for the CCW system.

- Westinghouse was unsure if NRC Branch Technical Position RSB 5-1 on RHR design applied to the licensee (later it was determined that RSB 5-1 did not apply).

- Westinghouse stated that although the plant was designed to use steaming and RHR below hot standby (350°F), Westinghouse had not had the need, to date, to take advantage of this capability in its analysis. An increase in lake temperature and decrease in maximum allowable CCW temperature would require this change.

- Westinghouse concurred with the licensee that requiring use of only CCW for cooldown was not part of the design basis. Further, steaming was currently used during the first phase of cooldown. Westinghouse stated that it had not imposed a design requirement on cooldown with one train of RHR or CCW in a 36-hour period although it did recognize a licensing basis requirement.

- Westinghouse stated that cooldown within 36-hours could be achieved with higher CCW temperatures. (The current analysis assumed 110 degrees. This will be increased to about 118 degrees in order to meet the cooldown to 140 degrees with two trains in 20-hours.) Westinghouse has performed a revised analysis using a revised model of the RHR heat exchanger.

- Westinghouse stated that there was no other safety analysis implication regarding the use of steaming below 350°F and no modeling changes were required in the safety analysis.

The team determined that the design basis of the RHR system did not restrict the cooldown time of the RHR system. It specifically identified a 20-hour cooldown requirement with two trains operable, but did not provide a time requirement for one train. The original licensee design basis of the CCW system could not be located. The Westinghouse design basis was provided to the licensee and required that one train

remain in operation; however, it did not specify a cooldown time nor prevent the use of heat removal via steaming below 350°F. The licensing basis documents (UFSAR, TSs, Licensing Questions and Answers and SER) were researched and they did not require that heat removal below 350°F be performed by only the RHR system. The team understood that the AE team evaluated a licensing "Question and Answer;" however, a reference was not cited and the "Q and A" could not be identified.

The team reviewed the Westinghouse documentation and the Westinghouse support of the licensee position, including a revised analysis and considered the position to be consistent with design basis intent. The team found no restriction in the design basis nor the licensing basis with respect to achieving a TS 3.0.3 cooldown with a combination of steaming and RHR cooling, nor a requirement to discontinue steaming at 350°F to assist RHR cooling.

c. Conclusions

Based on the above, the team concurred with the licensee position that a 36-hour cooldown using only one train of CCW was not a design requirement. The team recommends that CAL Item No. 3 be closed.

E8.1.4 CAL Item No. 5 - Compressed Air Overpressure

a. Inspection Scope

The team reviewed the CAL, IRs, associated correspondence, DCPs, related CRs, and the licensee's CAL Item No. 5 notebook. In addition, team members interviewed licensee staff involved in resolution of the issue.

An evaluation was made of actions that had been taken since the CAL Validation inspection (No. 50-315/98004; 50-316/98004) that could affect the inspection's conclusion regarding CAL Item No. 5. A walkdown was performed to assure consistency between the design changes and the physical plant. Finally, related issues were reviewed to provide reasonable assurance that those items would be closed under the D. C. Cook corrective action program.

b. Observations and Findings

CAL Item No. 5 – Compressed Air Overpressure, "Overpressure protection will be provided downstream of the 20 pounds per square inch gauge (psig), 50 psig and 85 psig control air regulators to mitigate the effects of a postulated failed regulator."

The licensee installed relief valves on air headers inside the containment under DCP No. 12-DCP-584 which was reviewed during the CAL Validation inspection. No additional changes were made to the plant air system that would affect the conclusion of the CAL Validation inspection. The team identified a concern regarding the difference between the relief valve pressure setting and the system operating pressure. The licensee set the relief valve pressures at five psig above the system pressure to stay within code allowable pressure limits. Accounting for the uncertainty of valve setting

defined in Consolidated (Dresser) Engineering Instructions, EG394, Revision 0 (Vendor Manual VTD-CONS-0025), and the manufacturer's margin for a bubble-tight seal as defined in Consolidated (Dresser) publication, SRV#1 (Vendor Manual VTD-CONS-0024), the seal might not stay bubble-tight during operation. The result would be air in-leakage to the containment building.

As a result of the above concern, the team inspected the impact of failure of an air pressure regulator in containment in calculation MD-12-CA-001-N, Revision 1, dated November 11, 1997. The team found that the method of analysis was incorrect; however, the error resulted in a conservative result. The team also noted that Revision 1 to the calculation was improperly classified as administrative rather than technical. CR-99-29023 and CR-99- 29017 were prepared by the licensee to address both the method of calculation and the classification of the change to the calculation.

During the expanded system readiness review (ESRR), other issues for the plant air system were identified. The team examined these issues to provide assurance that they were properly identified in the corrective action program and had reasonable assurance of closure. These items were being addressed in the corrective action program as follows:

- Potential failure to provide adequate pressure-relief for the 12 psig header (CR-990748 and CR 22325).

  Status: A CR response evaluated the condition and indicated that a second relief valve was not needed based on code requirements. The author of the CR was reviewing the response and stated that a follow-up CR would be written to further evaluate the CR response.

- Potential overpressurization of control air receivers due to heating from a fire or a high energy line break (HELB) (CR 99-19770).

  Status: The licensee addressed the fire hazards concern within the CR; however, the HELB concern is an open action item in the CR.

- Lock-wires were missing from the adjusting pin on several of the installed relief valves (CR 99-23947 and CR 99-23984).

  Status: During a containment walkdown, the team observed that lock wires were still missing from the safety valves. The licensee determined that the work order for the lock wire repair was currently open and was scheduled for completion prior to restart.

- Safety relief valves were not included in the Inservice Test (IST) program as they were required to function to protect safety-related components (CR 99-24153).

  Status: Review of the actions by the licensee determined that the action was open to change the IST program to include inspection of the safety valves prior to restart.

- Separation of control and protection for identified valves (CR P-99-22997).

  Status: This concern was being evaluated in the corrective action program.

The team noted that significant work remained to close the above items; however, they were incorporated into the licensee corrective action system with specific open items and actions identified for closure.

Two calculations were reviewed. One calculation pertained to containment pressure increase due to air leakage and was discussed earlier in this section. The second calculation pertained to sizing orifices to restrict airflow. The second calculation, for orifice sizing, was technically acceptable; however, was not consistent with current calculation requirements and needed to be updated.

c. Conclusions

The team concluded that the licensee had appropriately resolved the compressed air overpressure issue and considered CAL Item No. 5 closed.

E8.1.5 CAL Item No. 6 - Residual Heat Removal Suction Valve Interlock

a. Inspection Scope

Inspectors reviewed the actions of the licensee taken relating to removal of the interlock which closes RHR suction valves IMO-128 and ICM-129 on RCS pressure.

b. Observations and Findings

In June 1980, the licensee began defeating the RHR suction valve auto-closure interlock when the RHR system was operating in the normal shutdown cooling configuration. This change was in response to NRC Bulletin 80-12, “Decay Heat Removal System Operability.” The interlock was originally intended to provide high pressure protection when RHR was aligned to the RCS for shutdown cooling. On September 11, 1997, the licensee identified that a discrepancy existed between TS, the UFSAR, and the operating procedure for RHR for loop suction valve power availability during shutdown cooling operations. Specifically, operating procedure 12 OHP 4021.017.002 permitted RHR motor-operated suction valves IMO-128 and IMC-129 to be open and de-energized while in Mode 4. Surveillance Requirement 4.5.3.1 for Mode 4 incorporated by reference the surveillances required by 4.5.2 (Modes 1 thru 3 surveillances). One of these surveillances, 4.5.2.d.1, required testing of the auto-closure interlock once every 18 months; therefore, by reference, the interlock needed to be available in Mode 4. UFSAR Section 9.3.2 also stated that the high RCS pressure interlocks would be available to provide automatic suction valve closure during shutdown cooling modes of operation. A TS change to allow operation in Mode 4 with the RHR suction valves open and power removed was required to be approved prior to restart (CAL RIII-97-011). The TS amendment was approved in December 1997 which satisfied CAL Item No. 6. In January 1998, the NRC performed a CAL Validation inspection. In the associated IR, the NRC concluded that based on review of actions taken, CAL Item No. 6 was closed. In March 1999, the licensee committed to conduct an additional review of the CAL items

to ensure that the previous response remained valid in light of subsequent ESRR findings. The licensee's review confirmed the validity of the earlier response to CAL Item No. 6.

c. Conclusions

The team reviewed the corrective action measures taken and found that they were acceptable. Based upon the licensee's completion of the corrective actions identified in CRs 99-04280 and 99-07144, CAL Item No. 6 is closed.

E8.1.6 CAL Item No. 7 - Fibrous Material in Containment

a. Inspection Scope

Inspectors reviewed the CAL Item No. 7 closure package, EHI-5201, "Containment Recirculation Sump Protection Program," CNT-99-269 "Engineering Action Plan," and a sample of the associated CRs.

b. Observations and Findings

The NRC had previously identified issues related to fibrous material inside containment (NRC IR No. 50-315/97017(DRP); 50-316/97017(DRP)). The licensee also reported this condition to the NRC in LER 50-315/97024-04. These issues have been included in the NRC Restart Action Matrix (RAM).

The team noted that licensee actions since 1997 have been fragmented and narrowly focused on specific findings rather than the overall issue of protection of the containment recirculation sump. Consequently, initial corrective actions were ineffective. Just prior to the inspection, the effort was turned over to a solutions team for resolution. During the inspection, the licensee developed EHI-5201 and CNT-99-269 to establish a coordinated effort to address all aspects of containment sump protection. Because these documents were issued during the inspection, revisions are expected as the work progresses.

The program described in EHI-5201 and implemented in CNT-99-269 required review and revision of supporting specifications and procedures. In addition, the licensee identified all CRs generated since 1997 that addressed containment sump protection issues and committed to review them as part of CNT-99-269. Thus, the licensee considers items which were previously closed, as open until addressed as part of the new program.

Licensing commitment change request CC-0020 stated, "No fibrous material will be installed within the LOCA [loss of coolant accident] destruction zone (defined as below elevation 614 feet and inside the crane wall), either jacketed or unjacketed. All known fibrous material in the LOCA destruction zone has been removed. A certain amount of fibrous material may be left outside of the LOCA destruction zone if supporting analyses allow." This commitment was addressed in ES-PIPE-1007-QCS (for example, Step 4.4.8). EHI-5201 did not address this commitment and the cognizant engineers were not aware of this licensing commitment. The licensee subsequently added a step to

CNT-99-269 to research NRC commitments to ensure standards in EHI-5201 were consistent with the commitments, and to revise the standards and commitments as necessary to ensure consistency.

The Inspectors made the following observations about EHI-5201:

- 800000-DIR-5000-6, "Material Condition and Housekeeping Assessment," was listed in Attachment 2 as a supporting document but was not identified in Section 4. This was a minor documentation error.

- 12CHP5021.ECD.005, "Installation, Replacement, and Repair of Silicone Fire Barrier Penetration Seals," had been omitted from the program. This was a significant omission because fire barrier modifications introduced fibrous material in the containment.

- Phase 1, "Actions to Support Closure of CAL Item No. 7," committed two items to be completed December 6, 1999. Only CAL Item No. 1, issue EHI-5201, was completed on this date. CAL Item No. 2, to develop a plan to address remaining fibrous material prior to affirmation of Mode 4 readiness, was not completed (Initial Action Plan dated December 14, 1999).

- In phase 3, "Actions to Establish 'full qualification'," it was not clear whether the "final closure of outstanding documents… associated with physical work performed to demonstrate operability," referred only to final paper handling and filing, or to substantive technical work. All technical work required to demonstrate operability must be finished prior to restart.

- In phase 4, "Actions to Implement a continuing program," the target milestone was set as 30 days before the next refueling outage (i.e., after restart). One of the actions was "ensure that design and configuration control procedures adequately address the need to evaluate the potential impact of changes on containment sump operation." It was not clear why this was not required prior to restart to control changes that could be made during the operating cycle.

- Item, "remain abreast of industry initiatives and operating experience in the area of sump debris concerns," was established as a post-restart action tied to the next scheduled refueling outage. The team considered this a weakness in that there was no mechanism to ensure that the containment protection program was kept current in the event that the plant was to shut down and the containment was opened before the scheduled refueling outage.

- §4.1 stated, "other containment material concerns were identified and entered into the corrective action system for resolution." The team reviewed these CRs to see if they dealt with fibrous material or other aspects of containment sump protection. The following CRs were of interest within the narrow statement of CAL Item No. 7:

- CR P-99-09933- "Marinite® Board (fire protection) installed in Containment may become debris in the Recirculation Sump… A commitment was made to remove

all fibrous materials, however, it appears that the Marinite® Board (or any similar replacements) was overlooked." The suspected cause or source of the condition stated, "the board not being identified during corrective actions for the fibrous material issues is due to an ineffective corrective action program at the time." A technical evaluation demonstrating acceptability of Marinite® Board was presented in the CR evaluation with the intent of closing the CR; however, no actions were identified to address this design change within the design control process (e.g., perform formal evaluation and change design specifications as appropriate).

- CR P-99-15201- "ESRR OE9997 identified that the effect of Cal-Sil insulation was not addressed in design of ECCS strainer (recirculation sump). Cook Plant has not considered Cal-Sil as a threat to the recirculation sump." The action item due date was September 9, 1999, and was assigned to the solutions team on November 24, 1999. Completion of the action item was overdue at the close of this inspection.

The team made the following observations about CNT-99-269 which was initially issued on December 14, 1999:

- Items 1.3 and 1.4 were not completed as scheduled (December 15 and 14, respectively). Licensee staff stated that Phase 1 was "Closure of CAL Item No. 7." Thus, CAL Item No. 7 did not meet the licensee's criteria for closure.

- The plan did not identify Unit 1 and Unit 2 steps where applicable although this was done with the corrective actions added to CR 97-2457.

- Twenty of the twenty-three specifications and procedures that were to be developed, revised, or verified were scheduled for completion on January 22, 2000; however, the licensee staff indicated that work planning and resource requirements to meet this date had not been determined.

- EHI-2291 stated that the department and individual's name responsible for completing each action be provided. This was not done.

- EHI-2291 (3.3.3b) required Action Plan steps and schedules to consider all specific activities required to close the Action Plan. Omissions included:

    - 12CHP5021.ECD.005, "Installation, Replacement, and Repair of Silicone Fire Barrier Penetration Seals," was not included.

The licensee revised the action plan addressing the following items discussed above:

- Phase 1 was revised to reflect completion; some steps were moved to phase 2

- Unit-specific steps were identified and provided a separate schedule

- A step was added to research NRC commitments

- Completion of phase 1 and 2 of the action plan was required for containment readiness. The licensee established a tie between CNT-99-269 and containment system readiness by the addition of action items to CR 97-2457. Restart Action Plan (RAP) 13B addressed containment system readiness. The statement of CAL Item No. 7 was, "Removal of fibrous material from containment that could clog the recirculation sump will be completed." RAP Item No. 13B, with the incorporation of the action plan effectively addressed CAL Item No. 7.

c. Conclusions

Based on the completed corrective actions and on actions committed to be completed before startup, the team determined that CAL Item No. 7 had been adequately addressed by the licensee and was considered closed by transfer of oversight of containment sump protection to RAP Item No. 13B.

E8.1.7 CAL Item No. 8 - Refueling Water Storage Tank (RWST) Mini-flow Recirculation Lines

a. Inspection Scope

The team reviewed various licensee documents related to CAL Item No. 8 which concerned monitoring valve leakage to the RWST during the emergency core cooling system (ECCS) recirculation mode. Most of the documents reviewed were in the CAL Item No. 8 closure package dated December 1, 1999. Additionally, team members reviewed related flow diagrams and interviewed licensee staff personnel involved with resolving the issue.

b. Observations and Findings

The NRC AE inspection in 1997 noted that not all of the six previously identified ECCS recirculation leakage paths to the RWST were monitored for leakage. Consequently, the licensing basis control room and offsite dose calculation assumption of 10 gallon per minute of ECCS leakage to the RWST was not verified by the licensee.

The six valves addressed by the CAL were:

(1) IMO-910 and IMO-911, which isolated the 8-inch coolant charging (CHG) pump suction line from the RWST.
(2) IMO-261, which isolated the 8-inch safety injection (SI) pump suction line from the RWST.
(3) IMO-262 and IMO-263, which isolated the 2-inch SI pump minimum flow line that returns to the RWST.
(4) RH-130, which isolated the 8-inch RHR return line to the RWST.

Subsequent to the AE inspection the licensee increased the number of affected valves from six to eight with the addition of check valves SI-101 and SI-185. The measured leakage was essentially 0 for Unit 1 and 0.482 gallon per minute for Unit 2. The leakage was significantly less than the 10 gallon per minute limit believed to be required for the

10 CFR Part 100 and General Design Criteria (GDC) 19 dose limits, and CAL Item 8 was closed in NRC IR 50-315/980004; 50-316/98004.

The licensee conducted the ESRR after that IR was issued. The ECCS system engineer reported there were several issues uncovered during the ESRR including:

- The basis for the 10 gallon per minute limit was not fully traceable to correct calculations but did note the GDC 19 calculation for a control room operator dose assumed a leakage of less than .2 gallon per minute.
- The GDC 19 dose calculation was a bounding condition for the 10 CFR Part 100 dose calculation.
- It was not necessary to leak check SI-101 and SI-185 if the single failure during an accident was the failure of one of the RWST to ECCS or containment spray (CTS) valves; however, it would be necessary to leak test additional valves to ensure the dose limits were not exceeded.

The team concluded the ESRR findings related to CAL Item No. 8 demonstrated an acceptable level of review. Based on a review of ECCS and CTS flow diagrams OP-2-5129 Revision 38, OP-2-5142 Revision 39, OP-2-5143 Revision 45, and OP-2-5144 Revision 44, the team concurred the valves listed in the next paragraph gave reasonable assurance that potential leakage paths from the containment sump to the RWST during recirculation phase had been identified. The team identified other valves such as IMO-215, -225, and -390, and CTS-138E and -138W, which could have been included in the list but were not. The licensee rationale for this was the only driving head would be containment pressure because the static head of water in containment and the RWST were essentially the same. Postulating significant leakage through the valves, given the tortuous path from containment to the RWST, did not seem credible.

The ECCS system engineer reported that a new design change, 2-DCP-4344, would be required to permit monitoring leakage through double disc gate valves:

- 2-RH-130, East RHR to reactor coolant loops #2 and #3 cold leg shutoff valve
- 2-RH-128E, West RHR to reactor coolant Loops #2 and #3 cold leg shutoff valve
- 2-RH-128W, East CTS pump mini-flow to RWST shutoff valves
- 2-CTS-105E, East CTS pump mini-flow to RWST shutoff valve
- 2-CTS-105W, West CTS pump mini-flow to RWST shutoff valve
- 2-CTS-106, CTS pump mini-flow to RWST shutoff valve .

The engineer stated the modification would have to be implemented prior to Unit 2 restart, the total leakage would have to be measured and be verified to be less than the value assumed in the new dose calculations, and a similar modification and leakage test would have to be performed on Unit 1 before it restarts.

The licensee reported there were several corrective actions which were required to bring the plant into compliance with the design and licensing basis prior to Unit 2 restart.

These included:

- A new GDC 19 dose calculation using new revised source terms, assuming a total unfiltered leakage of 0.2 gallon per minute, would be issued and submitted for NRC review. The licensee reported the calculation was in the final stages of owner review comment incorporation, should be completed by December 31, 1999, and then submitted for NRC staff review and approval.
- DCP 2-DCP-4344 would be issued and implemented.
- Actual total unfiltered leakage will be measured with acceptance criteria of less than a total of 0.2 gallon per minute.
- A Generic Letter (GL) 91-18 evaluation for the licensing basis would be completed to demonstrate operability. This would permit operation with additional administrative controls in place while the NRC staff reviewed the new dose calculation.

Verification of the actual leakage rates was one of the unverified assumptions provided to Westinghouse for their use in developing the new dose calculation. The information was provided in Design Information Transmittal (DIT) B-00069-00. CR P-99-19039 dated July 20, 1999, was initiated to track the unverified DIT, and was listed as a Unit 2 restart constraint.

The team determined the outstanding issues related to control room habitability were outside the scope of CAL Item No. 8. The team also concluded these operability, evaluation, and actual leakage rate results warranted further review. This was considered an inspection follow up item (IFI 50-315/99029-01(DRS); 50-316/99029-01(DRS)).

c. Conclusions

The team concluded CAL Item No. 8 could be closed based on measured leakage past the CAL-specified six valves being less than the specified 10 gallon per minute rate. Verification of the actual total leakage rates, and a review of the associated operability determination will be required prior to Unit 2 startup. Review and approval of the new dose calculation is a post Unit 2 restart issue if the NRC staff determines the associated GL 91-18 operability determination was adequate to support startup.

E8.2 Case Specific Checklist (CSC) Items

E8.2.1 CSC Item No. 2B - Inadequate Corrective Actions for Previously Identified Conditions Adverse to Quality

a. Inspection Scope

The team examined RAP Item No. 002, the RAP Item No. 002 notebook, corrective action program procedures and guidelines, associated completion documentation, the Corrective Action Program (CAP) Leadership Plan, several monthly CAP status reports, and CRs directly associated with the programmatic breakdown of the D. C. Cook CAP.

The team interviewed members of station management, the licensee's corrective action staff, and other members of the Cook plant staff to understand the program and assess the effectiveness of its implementation. The team also attended a meeting of the

Corrective Action Review Board (CARB) to evaluate the quality of corrective action effectiveness reviews.

The team also conducted a special review of 60 recently issued CRs. These CRs were randomly selected by the licensee's regulatory affairs department based on criteria set by the team. These CRs were examined for completeness of implementation and effectiveness of corrective actions. This review is discussed in detail in Section E8.5.

b. Observations and Findings

Following identification of the programmatic breakdown of the D. C. Cook CAP, the licensee, in early 1998, undertook a series of corrective actions designed to rebuild the CAP. Subsequent periodic progress evaluations revealed additional areas for improvement; consequently, the licensee's program has been continuously evolving. At the time of this inspection, remedial activities for the CAP were controlled by a Corrective Action Program Leadership Plan (Revision 2B, dated August 31, 1999) and RAP Item No. 002 (Revision 0B). These two documents jointly defined and detailed the specific actions to be completed by the D. C. Cook staff to restore the viability of the CAP. The RAP identified those corrective actions necessary to put the CAP in a condition capable of supporting plant restart. The leadership plan included these actions plus others intended to drive continued improvement. The leadership plan also included action item responsibility and completion status. The RAP notebook contained the RAP and closure documentation for each specific corrective action.

The NRC assessment of the D. C. Cook CAP breakdown characterized the condition as two fundamental concerns: a failure to properly identify issues and problems and failure to properly resolve previously identified conditions adverse to quality. The fundamental corrective action was the retirement of the existing CAP (along with its infrastructure) and the implementation of an entirely new program based on programs installed at other recent restart plants such as Salem and Crystal River. NRC IR 50-315/99024(DRS); 50-316/99024(DRS) addressed the licensee's capability, under the new program, to identify issues and problems. This inspection evaluated the licensee's capability to properly address previously identified problems.

Root cause assessment resulted in eight problem statements which were listed in both the leadership plan and the RAP. Of these eight problem statements, four were exclusively focused on problem identification. Of the remaining four, only one was exclusively focused on corrective actions with some tangential attention to corrective actions in the remaining three. The four problem statements containing actions relevant to corrective actions were:

- (3) condition report resolutions and root cause analyses are not timely and fail to identify and correct true root causes;

- (4) condition report corrective actions do not prevent event recurrence;

- (7) CAP infrastructure is weak, and corrective action program tools do not support condition report resolution; and

- (8) self-assessment efforts fail to proactively identify problems or generate effective remedial actions.

Accordingly, the team's inspection focused on actions taken by the licensee to address the problem resolution aspects of these four statements. The team examined the closure documentation contained in the RAP notebook for those actions that the licensee staff indicated as completed. By the close of the inspection, approximately 90 percent of specified actions had been completed. The team evaluated the identified corrective actions and noted that the most significant of these, i.e., those necessary to implement a system that ensured acceptable resolution of significant identified issues, had been completed. Remaining corrective actions were intended to address issues of lessor significance or drive program enhancements; incomplete actions were identified, personal responsibility assigned, and completion dates established. Through a process of document review and personnel interviews, the team validated the completion of actions so indicated by the licensee staff.

The team was particularly concerned with the potential for problem recurrence and took careful note of those actions intended to address this issue. The team viewed accurate root cause assessment, appropriate corrective action definition, and follow-up evaluation as vital aspects in preventing problem recurrence. Establishing the CARB was a key licensee action in addressing the issue of recurrence. The CARB functions, as defined in the charter, were to examine the root cause evaluations and proposed corrective actions for all category 1 and 2 CRs, and to conduct corrective action effectiveness reviews after allowing a suitable amount of time for the actions to take hold. To assess CARB's performance, the team attended a meeting which included a root cause/corrective actions review and a corrective actions effectiveness review. The meeting was characterized by intense, probing questioning of the presenters by all members of the board. On both matters, the board provided considerable comment on the actions; the corrective actions effectiveness review was accepted with comments for improvement and the root cause/corrective actions review was rejected with directions to examine additional aspects of the problem and make another presentation. The team found that the CARB was fulfilling its charter in an acceptable manner. Noting that the CARB only addressed category 1 and 2 CRs, the team inquired about examination of category 3 and 4 CRs and learned that the corrective actions department was reviewing closure of these CRs. This was not a permanent process; after a sustained demonstration of acceptable closures was observed, these reviews would be conducted on a sample basis. The team considered this acceptable. The team also noted that monitoring the closure of CRs had identified some undesirable trends that resulted in adjustments to the program. Of particular note were the restrictions placed on closure of CRs to other documents in August 1999 and the subsequent restriction on closure of CRs to other CRs in October 1999. The team found that these changes, in concert with other adjustments, were evidence of management's intent to strengthen the program.

The team interviewed both management and staff to learn management expectations for the program and to assess the effectiveness of program implementation. The results of the special CR review were also factored into the team's assessment of implementation. Management's expectations with regard to the CAP were clear: CRs were to be prepared promptly, evaluations were to be completed promptly and accurately, and corrective actions were to be completed expediently. Interviews with the

staff revealed a general acceptance of these expectations; however, some staff members did not appear to be fully involved. This was borne out by some of the problems with CRs identified by the team during the special CR review (discussed in detail in Section E8.5). Station management and the corrective action department were aware of the situation and were making concerted efforts to address it. One particular method was the frequent recognition and commendation of individuals who identified problems. The team considered this a good initiative.

The team noted that the licensee was struggling with a significant backlog of both condition evaluations and corrective actions. The team was concerned that, based on the licensee's performance indicators, generation of corrective actions was out-pacing completion and that the system would be overwhelmed. Completion of scheduled corrective actions had been historically low with the most recent result showing only a 13 percent rate. Meetings with the station management and the corrective action department revealed that the backlog had been evaluated, prioritized, and scheduled. A workdown curve was prepared to allow tracking completion of corrective actions to support the scheduled plant restart date. The team considered this satisfactory.

This inspection was focused on corrective actions for engineering issues which were core to the shutdown of the plant. Consequently, the majority of the condition reports and the corrective actions examined were developed and implemented in 1997 and 1998 under the retired program. While some actions were still in progress or had been completed under the new program, the team did not consider this population a sufficient sample size to draw conclusions on the new program's capability to resolve previously identified problems. To provide an adequate sample size, the team did a special closure review of 60 randomly selected, safety-related CRs. This effort is discussed in detail in Section E8.5. With regard to the overall capability of the program to effectively resolve previously identified problems, the team found that some instances of ineffective or incomplete reporting and inappropriate closure had occurred in category 3 and 4 CRs. However, no cases were identified where failure to properly identify and resolve a significant issue led to compromise of operability or function of a safety-related system or component.

c. Conclusions

The team concluded that the D. C. Cook CAP was capable of acceptably resolving identified conditions adverse to quality in a manner sufficient to support the plant's return to operation and recommends that this case specific checklist item be closed. This was based on the following observations:

- validation of satisfactory completion of the corrective actions, specified by the RAP and the leadership plan, that were identified as completed;

- a determination that the most significant corrective actions were among those that were completed;

- a formal requirement for CARB follow-up review of the effectiveness of corrective actions for level 1 and 2 CRs;

- the record of adjustments to the program in response to identified deficiency trends;

- a plan for workdown of corrective action backlog; and

- a 60-CR review that did not identify any flawed CRs that would have called into question the operability or functionality of a safety-related system.

E8.2.2 CSC Item No. 3A - Inadequate Design Control Pertaining to Uncontrolled and/or Unintended Changes in the Plant Design

a. Inspection Scope

The NRC designated inadequate design control pertaining to uncontrolled and/or unintended changes in the plant design basis as CSC Item No. 3A. Inspectors reviewed licensee root causes and corrective actions taken for this item as documented in RAP Item No. 3A, Revision 1, "Uncontrolled/Unintended Plant Design Changes," and the licensee response of March 19, 1999, to the NRC Notice of Violation dated October 13, 1998. In addition, the team interviewed members of the engineering staff and attended several sessions of the newly created Design Review Board (DRB) to understand and assess the effectiveness of the corrective actions for this issue.

b. Observations and Findings

The licensee's corrective actions for this problem included actions to resolve the extent of condition and actions to address the root causes in order to prevent recurrence. The RAP identified five management and organizational causes that were directly applicable to the problem of uncontrolled and unintended plant changes. The actions to prevent recurrence for these root causes included 13 management and organizational corrective actions. In addition, the RAP identified inadequate quality of key procedures as the programmatic cause of this problem. The actions to prevent recurrence for this root cause included 13 programmatic corrective actions. The RAP also identified five corrective actions, described as non-programmatic improvements, that must be completed to demonstrate restart readiness.

The team determined that the criteria in Enclosure 2 of the D. C. Cook RAM for Item No. C.1.2, "Corrective Action Development," C.1.2.a through C.1.2.j had been met. Attachment 2 to RAP Item No. 3A clearly correlated the identified root causes and the corrective actions to prevent recurrence. The RAP listed the corrective actions in sufficient detail to ensure that all activities were identified and also listed the documentation required to demonstrate that the corrective actions had been completed. The RAP also listed expected results and effectiveness measures as a means to verify that the corrective actions were adequate to prevent recurrence. The licensee expanded the scope of corrective actions based on programmatic and functional area assessments.

The RAP met the criteria in Enclosure 2 of the D. C. Cook RAM for Item No. C.1.3, "Corrective Action Plan Implementation and Effectiveness." Each action was assigned to a lead individual with completion dates commensurate with the safety significance of

the action. Training was developed and completed for the technical and administrative changes made as part of the RAP, and requirements for self-assessments of the implementation and effectiveness of the plan were included. The team noted that although the completion dates for several of the action items were not met, progress toward completion appeared to support the revised restart schedule.

The licensee's early assessments identified multiple processes that procedurally bypassed the design control process. The corrective actions to prevent recurrence included an extensive reorganization within engineering and established a new design control program. New procedures were issued for DCPs, Limited DCPs, Temporary Modifications, Calculations, Control of Design Input, Design Drawings and Interim Drawings, and others.

In determining the effectiveness of the licensee's corrective action to prevent recurrence, the team reviewed engineering products developed under the new design control program. Due to the predefined scope of the inspection, most of the engineering products were developed under the old design control program and therefore were not pertinent to evaluating the corrective action effectiveness. The predefined scope of the inspection only included a total of seven calculations or DCPs that were produced under the new program. All other engineering products that the team reviewed had been developed under the old program. As such, the team had a very limited population from which to assess the effectiveness of the changes to the design control program. Of the seven products reviewed by the team, a potentially significant problem was identified in the DCP, 2-DCP-729, associated with increasing the RWST water level.

The isometric drawing, INT-2-SI-255, to be used for installing the revised routing of the tank overflow piping was unclear relative to the slope of the new piping. The lack of clarity was demonstrated by the slope being misinterpreted by the pipe stress analyst. This resulted in the stress analysis modeling the 10-inch pipe nine inches shorter than intended. While the team considered this as not being a significant technical issue, it was disconcerting that the analyst appeared to miss the intent of the modification. If the pipe had been installed the way it was modeled, then the modification would not have worked. However, the team concluded that although the analysis was incorrect, and the isometric drawing was unclear, the pipe probably would have been installed correctly based on the correct dimensions being given in the demolition drawing, 2-SI-55-DEMO and the tank area piping arrangement drawing INT-2-5353.

A less quantifiable, but potentially more significant problem with the DCP was an apparent lack of consideration of the design function of the modification in the tank evaluation. Calculation SD-990914-002, "Structural Evaluation of RWST Tank Water Level Increase," Revision 0, evaluated the tank's nozzle loads due to the new overflow pipe routing and support configuration. The calculation was very detailed and even noted that the reaction force at the overflow pipe penetration due to the air flow through the pipe would be small and did not need to be addressed. However, the calculation did not discuss that the design function of the overflow piping was to allow water flow if the tank was overfilled and did not evaluate the magnitude of the reaction force at the overflow pipe penetration due to an overflow event. The magnitude of this reaction force was not insignificant and should have been evaluated. During initial discussions with the licensee, the team was informed that the load would be very small since the fill

line was only a three inch pipe. Subsequent investigation by the licensee determined that the tank could be filled with an eight inch pipe. The licensee initiated CR 99-29206 to document the problems identified in the DCP.

In addition to the problems with the above calculation, the team identified a concern with calculation 1-2-UNC-339-CALC1 regarding RWST vortexing level uncertainties. The team noted that the calculation did not address elevation uncertainties of the RWST tanks, discharge pipes, or level transmitters. The tolerances between the various floor and platform elevations used in the calculation were not specified on any documents. Licensee instrument engineers assumed the elevations on "as built" drawings were exact with no error. Licensee structural engineers noted the concrete elevations are nominal and actual elevations from point to point vary particularly on a floor or foundation slab because of drainage slopes. This was potentially significant with instrument loops 1(2)-ILS-950 and 1(2)-ILS-951 because the critical value in question to ensure that vortexing was not a problem was the level of water above the discharge pipe. The inability to determine the precision and accuracy of critical loop component and process elevations appeared to be inconsistent with the intent of 12-EHP 5040 DES.003 “Calculations.” The licensee initiated CR 99-29235 because there was no guidance for addressing the accuracy of elevations and dimensions used by those performing design changes and calculations. See Section 8.3.18 for additional details.

The team attended several sessions of the recently created DRB. As detailed in Procedure 12 EHP 5040.001, “Design Review Board Expectations, Policies, and Practice,” all DCPs, temporary modifications, and calculations were subject to DRB review unless exempted by the Director, Design Engineering. During the sessions attended by the team, the DRB provided critical oversight for the technical adequacy of several design calculations. The DRB extensively questioned technical aspects of the calculations and provided an additional level of management oversight. While the team considered this as very manpower intensive, it was viewed as a very positive effort.

With respect to resolving the extent of condition for uncontrolled/unintended plant design changes, the licensee implemented extensive multi-faceted corrective actions. ESRRs were performed on all high risk systems in the plant. These reviews identified a variety of problems requiring varying degrees of resolution. (See NRC IR No. 50-315/99007; 50-316/99007 for additional insights into this program.) In addition, assessments were performed for specific engineering programs, such as equipment qualification, Appendix R, motor- operated-valves, HELB, fire protection, and others. These assessments identified other problems requiring various degrees of corrective actions. The licensee will provide functional area affirmations prior to restart.

From a broader calculational perspective, the extent of condition for uncontrolled/unintended design changes was evaluated through the Calculation Reconstitution Program. This effort identified critical calculations by using the critical parameters list developed during the ESRRs and input parameters to safety analyses. If a calculation could not be located to support a parameter, a new calculation was to be created. Otherwise, the calculations supporting the parameters were graded from a technical and administrative perspective. Any calculation with discrepancies that resulted in the design or licensing basis not being met (T4) or that significantly affected the results or was resolved by detailed analysis (T3) was to be revised prior to restart.

Of the 338 calculations evaluated in this program, 60 calculations could not be located, 45 calculations were graded as T4, and 65 calculations were graded as T3. It was the judgement of the calculation evaluators that none of the discrepancies would result in system inoperability. As of the end of the inspection, only eight of the final calculations being revised or created had been received by the licensee from the outside engineering organizations. Of these eight calculations, six pertained to radiation protection and two pertained to the spent fuel pool. The team judged that none of the completed calculations would provide risk significant insights into the adequacy of the calculation reconstitution program or new design control process. Therefore, this major effort associated with the extent of condition and corrective actions to prevent recurrence for this case specific checklist item could not be assessed during this inspection.

c. Conclusions

The team was unable to conclude that there was reasonable assurance that case specific checklist item 3A was adequately resolved. Although significant changes in the design control program were noted through the extensive new procedures, the team recommends that this item not be closed yet. This was based on the following:

- very few engineering products generated under the new design control program were included in the scope of this inspection;
- of the few engineering products reviewed by the team that were generated under the new design control program, one calculation did not consider a fundamental requirement of a modification, and a modification drawing was drawn with conflicting dimension lines resulting in another calculation incorrectly analyzing the modified piping configuration; and
- licensee efforts associated with the calculation reconstitution program had not been completed and the program could not be evaluated.

E8.2.3 CSC Item No. 3B - Failure to Update the Updated Final Safety Analysis Report

a. Inspection Scope

The NRC identified the failure to update the UFSAR as CSC Item No. 3B. The team reviewed licensee root causes and corrective actions taken for this item as documented in RAP Item No. 3B, Revision 0, “Failure to Update the UFSAR,” and the licensee response of March 19, 1999, to the NRC Notice of Violation dated October 13, 1998.

b. Observations and Findings

The licensee’s corrective actions for this problem included actions to resolve the extent of condition and actions to address the root causes in order to prevent recurrence. The RAP identified two root causes for this problem. The actions to prevent recurrence for these root causes included five corrective actions. The RAP identified two additional corrective actions, one performed a follow-up assessment to validate the effectiveness

of the other corrective actions, and the other was a remedial action to improve the accuracy of the UFSAR.

The team determined that the criteria in Enclosure 2 of the D. C. Cook RAM for Item No. C.1.2, "Corrective Action Development," C.1.2.a through C.1.2.d, and C.1.2.g through C.1.2.i had been met. The licensee's RAP Item No. 3B clearly correlated the identified root causes and the corrective actions to prevent recurrence. The RAP listed the corrective actions in sufficient detail to ensure that all activities were identified, and also listed the documentation required to demonstrate that the corrective actions had been completed. The RAP also listed objectives of the corrective actions and effectiveness reviews as a means to verify that the corrective actions were adequate to prevent recurrence.

The RAP met the criteria in Enclosure 2 of the D. C. Cook RAM for Item No. C.1.3, "Corrective Action Plan Implementation and Effectiveness." Each action was assigned to a lead individual with completion dates commensurate with the safety significance of the action. Appropriate training was developed and completed, and requirements for self-assessments of the implementation and effectiveness of the plan's corrective actions were included.

The team noted that the development of a controlled, electronically available UFSAR appeared to significantly improve the licensee's ability to identify needed revisions to the UFSAR and to internally provide prompt updates to reflect pending changes. In addition, the action to develop a list of Accident Analysis Input Assumptions for Chapter 14 analyses appeared to provide a valuable reference for integrating 10 CFR Part 50.59 safety evaluations with the UFSAR. Also, the Licensing Basis Review effort, in conjunction with the ESRRs, had identified potentially significant licensing basis discrepancies that were being addressed through the corrective action program.

c. Conclusions

Based on the completed corrective actions and on actions committed to be completed before startup, the team concluded that CSC Item No. 3B had been adequately addressed by the licensee and recommends that this item be closed.

E8.2.4 CSC Item No. 3D - Inadequate Consideration for System/Component Failure Modes

a. Inspection Scope

The team reviewed the upgraded guidance and training documents as well as several system and component modifications intended to correct apparent design or operational weaknesses in the failure mode area, particularly with regard to the single failure criterion.

A number of functional or failure mode issues were reviewed involving the containment recirculation sump. The team evaluated modifications made to the recirculation sump, primarily as part of the CAL Item No. 2 sump vent hole issue. The team assessed the licensee's several sump modifications to determine whether additional failure modes were created without adequate design review. The team was particularly interested in

whether or not the net result was an overall improvement in sump functionality and reliability and whether or not any related degradation (if found) might be significant.

The team also reviewed three other issues. These were: (1) the control air system overpressure protection modifications; (2) emergency operating procedures that were modified to require shifting of RHR pumps from the RWST to the recirculation sump in a manner that would minimize the potential for single failure problems; and (3) development of single failure analysis guidelines.

b. Observations and Findings

During the 1997 AE inspection it was determined that the licensee's ability to ensure proper consideration of system and component failure modes in design and operational documentation had failed to keep pace with industry, and regulatory expectations and requirements. The issue of properly incorporating single failure considerations during LOCA procedures and the failure to protect the control air systems from overpressurization were the principal issues raised during that inspection. The licensee took steps to improve its guidance and training in these areas and completed some related modifications.

b.1 Recirculation Sump Failure Modes

In 1978 and 1979, the licensee made several modifications to the containment recirculation sump without adequate consideration of the resulting system paths for debris to bypass the one fourth inch retention screen. The licensee eventually identified and corrected these bypass paths, but only after many years and in reaction to findings of outside inspectors. At the time of the team's inspection, the recirculation sump configuration incorporated the corrective actions needed to prevent bypassing the particle retention screens. The team determined that the licensee's analysis of recirculation sump operability as part of the several post-modification one fourth inch particle retention bypass issues was generally acceptable. The team did not specifically review the one fourth inch retention screen criterion in detail, although the criterion was considered to be reasonable.

b.2 Control Air System Failure Modes

The licensee addressed control air system pressure regulator failure vulnerabilities in 12-DCP-854. The modifications were in response to issues raised during the 1997 AE inspection, which included concerns about overpressure protection of the downstream piping in the event one of the pressure reducers (regulators) failed open. The team reviewed these concerns and the associated corrective actions and determined that the modifications were appropriate, although the basis for them was not well developed. For example, the initiating failure mode suggested for these concerns was that an air regulator might "fail open" and overpressurize the downstream piping and components beyond design limits. The team considered this particular failure mode to be conservative since pressure reducing regulators are almost always designed to fail closed and, within the range of the team's knowledge, there have not been any fail-open events.

The team's experience did include instances of regulated air system relief valve actuations, but these were the result of the downstream system having no leaks or loads sufficient to accommodate the slight leak-by that was possible in even well-designed and maintained regulators. Nevertheless, the licensee's installation or relocation of system relief valves was appropriate.

Although installing relief valves was an appropriate undertaking, the team was concerned about the licensee's selection of the values to use for relief valve setpoints. For example, the 85 psig system relief was set at 90 psig and the 50 psig system relief was set at 55 psig. The team was concerned that these settings did not reflect consideration of regulator control, indication setpoint accuracies, or their relation to the relief valve setpoint ranges for lifting (accumulation) and reseating (blowdown). Not only could these settings result in relief valve chattering under normal operating conditions, a relief valve that failed to reseat following a minor pressure transient could result in a continuing high load on the air regulator to satisfy the relief path as well as the other system loads. Also, the licensee installed some relief valves that were oversized relative to system flow requirements, a condition that could result in an increase in the potential for relief valve chattering, leakage, and other valve-specific issues relative to design reseat pressures. Moreover, the team had concerns regarding the implications of having two relief valves in the same header that had the same setpoint.

Based on these considerations and the preferential location of the relief valves close to the discharge of regulating valves, additional analysis would be needed to determine whether the system demands could be met if a relief valve opened and failed to reseat. The team was concerned that this was a far more likely failure than the regulator valve failing open and that the small allowance for regulator and relief valve setpoint accuracies could contribute to the probability of this failure mode.

However, the licensee had incorporated a design feature intended to at least limit the consequences of a relief valve failing open. The licensee's control air system modifications included installing flow limiting orifices upstream of the regulating valves, an enhancement that limited the flow into the theoretical failed-open regulator and, thus, through any relief valve that might stick open. The team considered the installation of these orifices a positive design feature for the system, reflecting favorably on the licensee's failure mode analysis capabilities.

Finally, for relief valves designed to relieve into containment, there were additional issues regarding containment pressure, particularly during those accident scenarios where containment was isolated and pressurized as a result of a LOCA. The team noted that the licensee was already evaluating containment overpressure issues (CR-97-2413 and CR-98-0913), including conditions under which containment pressure could exceed the 12 psig containment design pressure.

b.3 Single Failure during ECCS Realignment to the Recirculation Sump

As part of its failure mode upgrade program in response to outside inspector findings, the licensee reviewed and upgraded its understanding of procedure induced single failure modes or vulnerabilities. For example, as part of this upgrade the licensee modified the procedures for RHR pump operational realignments to the containment

sump (swap-over) to avoid an unnecessary vulnerability of having all SI flow dependent on one pump, even temporarily. They also resolved the related single failure application issues and misunderstandings regarding "failure to start" and "failure to run." The licensee identified the root causes of these misunderstandings and took corrective actions, issuing policy and application guidance on single failure criteria as applied within the plant design bases. The licensee also committed to issuing more detailed guidance on these issues.

b.4 Single Failure Analysis Guidelines

In reviewing CR 98-07575, "Containment Spray System May Allow Acid Spray During Injection Phase of Any CTS Actuation" (December 3, 1998), the team noted several comments in this condition report on the licensee's weaknesses on single failure, including training, and the several cross references to other CRs intended to address these weaknesses. The team had been given copies of the licensee's single failure policy and directive as well as information on training, which consisted of lesson plans and attendance lists. Since all of these documents appeared to relate only to actions taken in 1997, the team requested any updated guidance and training materials that the licensee had that would provide a more positive status. The team also requested copies of the cross referenced CRs since they were not included in the documents provided to the team.

CR 99-13758 described the condition that design engineering had no process in place for performing single failure and redundancy evaluations and included action items to improve training, citing single failure application weaknesses. CR 99-04152 described the 1997 guidance on single failures as inconsistent with the plant's current licensing basis and noted a new document, PMI-7033, had been developed to address single failure. The team considered PMI-7033 acceptable for single failure analysis. CR P-99-13621, which was still under review, noted that the DCP procedures 12 EHP 5040.MOD.006 and .009 did not provide adequate guidance or discuss the need for performing failure mode and effects analyses.

c. Conclusions

Based on the team's review of these documents and the actions prescribed, the team determined that the licensee had made significant progress in the failure modes analysis area such that this restart item could be closed from a technical guidance perspective. The licensee's overall program for failure mode analysis was adequate to support plant restart. The team closed CSC Item No. 3D.

E8.2.5 CSC Item No. 8 - Resolution of Hydrogen Recombiner Operability Issues

a. Inspection Scope

Inspectors reviewed the RAP Item No. 008 "Resolution of Hydrogen Recombiner Operability Issues," which addressed six issues identified in IR 50-315/98007; 50-316/98007 and LER 98-009-00. In addition the team reviewed LER 98-019-02 which addressed a seventh issue relating to hydrogen recombiner operability.

b. Observations and Findings

Inspectors confirmed that RAP Item No. 008 met the procedure requirements of PMP 7200.RST.001 and addressed all seven issues identified.

Corrective actions developed as a result of the issues fell into three areas: TS surveillance testing; TS surveillance calibration, and operation of hydrogen recombiners in post-accident conditions. A total of 30 actions were developed with specific actions assigned to appropriate individuals and completion tied to specific dates prior to restart. The team reviewed 18 of 30 completed actions and found that corrective actions were generally in accordance with C.1.2 and C.1.3 of Enclosure 2 of the D. C. Cook RAM.

c. Conclusions

The team determined that CSC Item No. 8 had been properly addressed by the licensee and was closed.

E8.2.6 CSC Item No. 9 - Resolution of Distributed Ignition Technical Specification Issues

a. Inspection Scope

Inspectors reviewed RAP Item No. 009, "Resolution of Distributed Ignition Technical Specification Issues," which contained the corrective actions addressing the five issues identified in NRC IR No. 50-315/98007; 50-316/98007.

b. Observations and Findings

The NRC inspection of June 3, 1998, identified problems and concerns with the Distributed Ignition System (DIS). The problems included poor configuration control, inadequate surveillance testing requirements, questions regarding both the licensing and design basis, an outstanding NRC issue on system initiation, and concerns for equipment location in close proximity to CTS nozzles. The licensee subsequently performed a walkdown of the DIS and discovered additional technical and material deficiencies. Collectively, these problems rendered the operability of the system indeterminate. As a result of the ESRR review, additional issues were found. Several CR's were generated as a result.

Five specific issues were identified in IR No. 50-315/98007; 50-316/98007; two addressed the design basis and three addressed the licensing basis of the DIS. CR's were written for each issue with corrective actions identified. CR 99-18048 was written to summarize the issues, but no new corrective actions were identified in it.

Seven corrective actions were identified in the RAP, each of which had several aspects:

- perform a walkdown and document design configuration;
- document the exact location of the ignitors and their proximity to containment spray nozzles;

- develop modification 2 DCP-715 to resolve design configuration issues;
- correct the material conditions discovered in the walkdown;
- revise EOP's to initiate DIS when an SI signal was developed;
- develop and perform surveillance test procedures in accordance with proposed TS surveillance requirements;
- initiate revisions to the UFSAR and design basis documents; and
- revise 2 DCP-713 to incorporate Unit 1 issues.

The team noted that each of the corrective actions in the action plan had an owner assigned and each was scheduled for completion before Unit 2 restart. There were six corrective actions developed in the restart plan relating to Unit 2 and one relating to Unit 1 (revise DCP-715 to address Unit 1 issues). The team reviewed documentation provided in the closure package for four of the six corrective actions for Unit 2, including DCP-715, which among other things provided all new ignitor boxes. Significant items that were not complete at the time of the inspection were; revision of EOP's relating to initiation of DIS and development of revised surveillance test procedures to include visual observation of ignitors during testing. Both of these items were scheduled for completion in December 1999.

c. Conclusions

On the basis of the documentation reviewed and the scheduled completion of the significant corrective actions, the team concluded that CSC Item No. 9 was closed.

E8.2.7 CSC Item No. 10 - Resolution of Containment Spray System Operability Issues

a. Inspection Scope

Inspectors reviewed RAP Item No. 010 which addressed the issues noted in LER 98-022-02, "Postulated Failure of Spray Additive Tank Nitrogen Regulator potentially results in unanalyzed condition." In addition to the LER, the team reviewed CR 98-01226 which addressed the single failure of a spray additive tank (SAT) discharge valve IMO-202 or 204, which could prevent them from accomplishing their safety function. The team also reviewed CR 98-7575 which was written during the extent of condition review of RAP Item No. 010. This CR identified that a failure of eductor shutoff valves IMO 212 or 222, when called upon to deliver Sodium Hydroxide, would result in an "acid spray" through one of the CTS headers which would be contrary to the equipment qualification aspects of equipment inside containment.

b. Observations and Findings

The team determined that CR 98-01226 did address the postulated single failure of SAT discharge valves IMO 202 or 204 to close on low level in the tank. The team reviewed the hydraulic analysis performed as a part of`the investigation which concluded that

under certain conditions, failure of one of these valves to close when required could result in hydrogen or air being admitted to the suction of both CTS pumps.

An analysis of the effects of this condition indicated that entrapped gas up to three percent would affect performance slightly but the pumps would continue to run. Higher amounts of gas could induce large fluctuations of discharge pressure and flow. In these instances the pumps would be shutdown per EOPs and would require venting prior to restarting.

Other corrective actions taken by the licensee included an evaluation of all UFSAR figures against valve lineup procedures. This action was completed by the Design Basis Restart Project. The principal corrective action was to change the normal position of the nitrogen system supply valves 1-N-104 and 2-N-104 from normally open back to normally closed per the original plant design.

The principal cause of this condition was seen as an inadequate safety evaluation on the procedure when the change was made in 1981.

The extent of condition reported in CR 98-7575 determined that failure of an eductor supply valve IMO-212 or 222 to open would result in one train of CTS supplying water with a pH that was out of the range that was included in the equipment qualification program for equipment inside containment. Subsequent analysis by a licensee contractor determined that the containment equipment was satisfactory for a pH of 4.3 and would perform its safety function.

There were eight corrective actions developed as a result of CR 98-01222 and described in the plan. The team reviewed closure documentation for five of the eight items, the most significant being completion of Configuration Control Determination 34040 which revised the normal position of the SAT nitrogen supply valve. Corrective action documents not available at the time of the inspection included revision of operating procedures that required that the normal position of SAT nitrogen supply valves be closed and a test of the Units 1 and 2 SATs to ensure that nitrogen cover gas pressure was maintained with the nitrogen supply valve closed. Based upon the Westinghouse position that most plants operate with the nitrogen supply valves closed, the licensee planned to operate in that position prior to restart.

c. Conclusions

On the basis of the documentation reviewed and the scheduled completion of the significant corrective actions, the team concluded that CSC Item No. 10 was closed.

E8.2.8 CSC Item No. 11 - Resolution of Hydrogen Mitigation System Operability and Material Condition Issues

a. Inspection Scope

Inspectors reviewed RAP Item No. 011 which addressed hydrogen mitigation system operability and material condition Issues. Included was a review of LER 98-001-02

"Containment Air Recirculation System Flow Testing Results indicate a condition outside the Design Basis."

b. Observations and Findings

During an FME inspection conducted on November 26, 1997, it was found that one of two train B inlet lines for hydrogen removal and air recirculation from the steam generator No. 2 and 3 enclosure was blocked by concrete. This apparently occurred during reconstruction of the steam generator enclosure in 1988. LER 97-009-00 was prepared. CR 97-03429 was written in response to the LER. Corrective action taken was to prepare 12EHP 6040per.089 to provide air flow testing of the hydrogen skimmer and air recirculation (CEQ) system, to test the system after every refueling outage, and then to review test results after four consecutive tests for possible reduced frequency.

During January 1998, airflow testing of the CEQ system for Units 1 and 2 was performed per 12EHP 6040per.089. As-found air flows in certain rooms and compartments were less than the flows stated in UFSAR Section 5.5.3. Interim LER 98-001-00 was prepared identifying the condition. In general, the low flow results were attributed to the system not being balanced, as well as the conditions under which the system was tested. It was not possible to test the system in its operating condition due to the fact that the pressure drop through the ice condenser could not be exactly simulated. Both systems were walked down and on Unit 1 it was noted that fan inlet damper 1-VMO-101 was out of position. CRs 98-0033 and 98-0034 were written to investigate and correct the condition. It was determined that the damper was not positioned to line up with the operator due to a misunderstanding by maintenance personnel.

The main airflow concern related to the pressurizer enclosure. After additional tests, 12DCP-876 was prepared to increase the size of the outlet pipe from six inches to eight inches to allow increased airflow. The walkdowns also uncovered unacceptable material conditions with components in both Units 1 and 2 CEQ systems. CRs 98-1071 and 98-1127 were written to document the conditions. Action requests were written for both CR's to correct the material conditions identified.

LER 98-001-02 reported that post-modification testing and analysis determined that both CEQ systems met system performance criteria as defined in chapter 5 of the FSAR. Calculation FAI/99-55, "Hydrogen Distribution in D. C. Cook Containment under degraded Containment Recirculation and Hydrogen skimmer flow for justification for past operation," concluded that for one percent Zirconium clad oxidation, the containment hydrogen concentration remained below the four percent lower flammability limit.

The determination of air flows was done by using test data taken in accordance with 12 EHP 6040per.089 which was then input into calculations DC-D-HV-12-CON-001-N and –002-N, both of which were prepared and approved in February 1998. The calculations used pressure balance equations to establish a system model. The model was then used to determine the system pressure drops required to provide air flows consistent with the FSAR. Addendum 1 to DC-D-HV-12-CON-001-N concluded that testing of the modified hydrogen skimmer system indicated that UFSAR Chapter 5

requirements for the containment dome hydrogen skimmer flow and containment air recirculation flow would be met during all postulated conditions following a design basis LOCA.

CRs 99-12872 and 99-12875 were written on May 21, 1999, to discuss discrepancies with calculations DC-D-HV-12-CON-001-N and -002-N. The CR identified that design inputs were not acceptable or reasonable, and major assumptions were not justified. According to procedure 12 EHP1000CAL.001, calculations rated T3/A3 such as these must be put on restricted status and revised immediately. Corrective action for both CR's indicated that the calculations would be superceded by new calculations being developed by a consultant. Note: Both calculations were provided to the team for review as part of the closure package for RAP Item No. 011 even though it was known earlier by the licensee that these calculations were to be superceded.

CR 99-25414 was written by Performance Assurance on October 14, 1999, and it asserted that hydrogen system performance had not been demonstrated. Corrective actions specified for this CR were:

- perform owner's acceptance review of the new calculation and supercede the original calculations;
- verify that the new analysis validated acceptance of test data taken in January/February 1998;
- evaluate motor horsepower to be acceptable under accident conditions of higher density;
- revise CEQ flow balance procedure;
- review new Westinghouse analysis and assure that the new calculation was in compliance;
- adjust inlet fan dampers as specified by the new analysis;
- retest the CEQ fans and record suction and discharge pressures. The static pressure was to be compared to the new model; the model was to be updated if significant differences were found between the model and measured field conditions; and
- generate change requests to modify Design Basis DB-12-CNTS to incorporate a discussion of the new calculation and analysis.

Based upon CR 99-25414, some of the closure documentation provided to the team was not acceptable. The team found that RAP 011 was deficient in not addressing the issues relating to calculation problems identified in CRs 99-12872 and 12875 which were written on May 21, 1999, several months before RAP 011 was approved. Further, RAP 011 did not address the corrective actions of CR 99-25414 which were approved at about the time that the RAP was approved.

c. Conclusions

The team concluded that RAP 011 should have been revised to include the calculation concerns raised in CRs 99-12872 and 12875, and the corrective actions of CR 99-25414 before presenting it to the team for review. The team recommended that CSC Item No. 11 remain open until RAP 011 is revised, the corrective actions of CR 99-25414 implemented, and system performance assured.

E8.2.9 CSC Item No. 14E - Electrical Protection Coordination Including Fuse/Breaker Control Program Readiness for Restart

a. Inspection Scope

The team reviewed the licensee's engineering action plan for this issue, assessment SA-1999-008-NED, "Electrical Protection Program," Revision 2, and associated preliminary Unit 2 Electrical Calculations. The team also interviewed members of the engineering department involved with CSC Item No. 14E and attended DRB meetings.

b. Observations and Findings

CSC Item No. 14E required preparation of six major calculations and a design change. These calculations were intended to either replace or supplement existing calculations. Each of these used a number of supporting calculations as input assumptions or data. The calculations were actually performed by Sargent and Lundy with the licensee providing an owner acceptance review as part of the formal approval process. At the start of the inspection none of the calculations or the design change had completed the formal review and approval process. The licensee identified the following calculations, estimated issue dates, and provided the team with preliminary copies:

New Calculation No./Revision	Estimated Issue Date
2-E-N-PROT-RLY-002/0 (Unit 2-4KV Safety-Related Motors Phase Instantaneous (PJC) Settings)	December 24, 1999
2-E-N-PROT-TOL-001/0 (Unit 2-600V continuous duty motors, Thermal Overload Htr Selection Guidelines/Verification)	December 17, 1999
2-E-N-PROT-RLY-006/0 (Unit 2-EDG Overload and Over-current Relay Settings)	December 30, 1999
2-E-N-PROT-PEN-001/0 (Unit 2-Electrical Containment Penetration Protection)	January 7, 2000

2-E-N-PROT-BKR-007/0 (Unit 2-600V Switchgear Settings, Breakers 21A6, 21C9, 21D9 & 21D14)	To be determined
2-E-N-ELCP-250-001/0 (Unit 2-250VDC System Coordination Study)	December 14, 1999
2-DCP-4392 (Fuse Replacement)	December 20, 1999

In an effort to demonstrate that CSC Item No.14E, "Electrical protection coordination including fuse/breaker control program readiness for restart," was adequately addressed, the licensee provided the team with a copy of its self-assessment (Assessment No. SA-1999-008-NED dated December 1, 1999). The team had no comments on this self-assessment.

The team reviewed two of the "preliminary" calculations and had the following observations:

- 2-E-N-PROT-RLY-002/0: The team noted that the calculation did not adequately recognize the protection requirements of 4kV safety-related motor circuits. Specifically, the calculation failed to address the following: (1) the magnitude of available short-circuit fault currents; and (2) the short-circuit withstand capability of the motor circuit conductors. The licensee agreed to incorporate the team's observations into the final calculation.

- 2-E-N-PROT-RLY-006: (1) Page A1 of Attachment A provided the wrong instantaneous relay type and trip setting; and (2) the calculation incorrectly assumed that 4kV motor inrush currents (if any) with the diesel generator running in parallel with the offsite system were supplied by the diesel generator. The licensee was examining this calculation at the end of the inspection.

The team was concerned by the omission of fundamental assumptions in 2-E-N-PROT-RLY-002/0 and by the fundamental error involving direction of potential inrush currents in 2-E-N-PROT-RLY-006. The team was also concerned by the fragmentation of the 4kV motor circuit protection scheme of which 2-E-N-PROT-RLY-002/0 was a part. This calculation only addressed the instantaneous overcurrent (50) relay portion of the scheme. Other portions such as time overcurrent (51) were not addressed. The team pointed out that an industry standard calculation for a 4kV motor circuit protection scheme would be an integrated representation of all of the protective features along with component current capabilities and fault currents. The licensee said that the other settings were addressed by existing calculations and that preparation of a standard protection package was a post-restart action.

c. Conclusions

The team was concerned by the errors noted in the two "preliminary" calculations and by the fragmented approach to the 4kV motor circuit protection scheme. Because these calculations were under review, the errors identified by the team could have also been

identified by the licensee's review. Consequently, the team could draw no conclusions about the quality of activities associated with CSC Item No. 14E. The team recommended that this item remain open, subject to reinspection at a point in time when calculations and/or the design change are formally approved.

E8.3 High Priority Restart Issues (RI)

E8.3.1 R1.3 - LER 50-316/97005-01 "Condition Outside Design Basis Results in Technical Specification Required Shutdown"

a. Inspection Scope

This was the Unit 2 LER on the containment recirculation sump issue of CAL Item No. 1.

b. Observations and Findings

CR 97-2409 was initiated to document the condition, and included the correct scope. Action items within that CR were being tracked to the appropriate milestone. A detailed review of this issue was accomplished as part of review of CAL Item No. 1.

c. Conclusions

Based on the evaluation conducted for CAL Item No. 1, RAM Item No. R1.3 is considered closed.

E8.3.2 R1.4 - LER 50-315/97017-01, "Condition Outside Design Basis Results in Technical Specification Required Shutdown"

a. Inspection Scope

This was the Unit 1 LER on the containment recirculation sump issue of CAL Item No. 1. The scope of the inspection included how this issue was addressed in the CAP.

b. Observations and Findings

CR 97-2409 was initiated to document the condition, and included the correct scope. Action items within that CR were being tracked to the appropriate milestone. A detailed review of this issue was accomplished as part of review of CAL Item No. 1.

c. Conclusions

Based on the evaluation conducted for CAL Item No. 1, RAM Item No. R1.4 is considered closed. Completion of actions for Unit 1, similar to those for Unit 2, were planned and tracked through the CAP.

E8.3.3 R1.5 - LER 50-315/97018-01, "Failure to Maintain One Fourth Inch Particulate Retention Requirement for the Containment Recirculation Sump Results in a Condition Outside the Design Basis"

a. Inspection Scope

The team reviewed the issues addressed in this LER and the preventive measures taken to avoid recurrence. The team reviewed a number of related documents, including the licensee's condition reports for these issues.

b. Observations and Findings

Specifically, this LER described deficiencies related to recirculation sump FME design features, discovered primarily over the previous two years. Basically, these FME issues were not identified and corrected in 1978 when several modifications were made to the recirculation sump design. The LER lists a 1990 modification that was to have installed a screen over the eight inch line from the lower containment sump to the recirculation sump (see RI 2.3.47, below); the 1994 improvements to the lower containment sump cover; the 1990 correction of gaps around the recirculation sump, and the 1996 and 1997 plugging of the sump roof vent holes, later redrilled and screened off.

The team inspected the Unit 2 containment and observed those components that were accessible from the lower level of containment, including the sump and vent hole screens and their attachments. No additional issues were identified during this physical plant inspection. Nevertheless, upon reviewing additional sump modification documentation, the team became interested in the licensee's periodic inspection procedure and whether it adequately provided for the formal verification of the material condition of the equipment associated with the recirculation sump. Except for the possible need to periodically inspect the sump roof plate nuts and bolts and certain abandoned components that remained in the sumps, the team considered the inspection procedure to be adequate.

The industry had addressed generic FME issues in August 1995 (Institute for Nuclear Power Operations Significant Operating Event Report [SOER] 95-1), and the licensee addressed this specific SOER in CR 95-1151. The licensee instituted FME training upgrades, but neither the industry experience nor generic FME training would be expected to address or anticipate the subject LER issue for these rather unique sump roof vent holes. CR-95-1662 (October 1995) was issued to report sump inspection results (primarily regarding what was found in the recirculation sump), but did not discover or address the subject LER issue. Similarly, CR 96-0402 (March 1996) reported recirculation sump mesh screen edge gaps that were found to exceed the one fourth inch retention limit, but failed to identify the almost identical subject LER sump FME issue, although the reportability evaluation of April 15, 1996, did include the subject LER issue for Unit 2. CR 97-0668 (March 1997) reported the similar condition in Unit 1. The vent holes were subsequently filled in as part of the associated corrective actions. CR 97-2344 (August 1997) identified the fact that the vent holes were closed up erroneously, explaining that the 1978 recirculation sump modifications had not been incorporated properly into design documentation. The licensee justified operability due

to the original report from a consultant stating that the holes were an enhancement for an already operable sump.

The team reviewed the various technical reports regarding all such recommended enhancements to the recirculation sump made in 1978 and 1979 and verified that they were either implemented or otherwise properly dispositioned by the licensee with the exception of a vent pipe addition recommendation. Specific to the subject LER issues such as FME for the sump roof holes, the team verified that corrective actions have been completed. For example, the holes were redrilled and were then properly modified to include particle retention mesh screening. The related CRs reflected a gradual licensee recovery from design control and failure mode analysis issues. The team reviewed these and other CRs and modifications related to the recirculation sump and determined that the licensee still may not have adequately addressed FME issues related to the recirculation sumps. In particular, the team questioned whether the licensee had adequately considered the potential sources of foreign material installed directly in the sumps, such as some abandoned equipment as well as the relatively large number of nuts used to attach the metal roof installed in the downstream recirculation sump area, which was directly over the pump suction lines. Moreover, based on conditions reported in these CRs, the team questioned the licensee's disposition of issues related to paint chips found in the sumps, specifically whether the sump surfaces paint systems were adequate or consistent with the licensee's formal coating guidance. Subsequent to the team's questions, the licensee decided to perform a sump inspection to clarify potential issues raised by the team.

c. Conclusions

The physical plant issues identified in LER 50-315 97-018-01 have been addressed. The team closed RAM Item No. R1.5.

E8.3.4 R1.7 - LER 50-315/97020-01, "Failure to Maintain Sump Vent Configuration Results in Condition Outside the Design Basis"

a. Inspection Scope

This LER was issued in response to the AE team finding that in plugging the sump vent holes the licensee demonstrated a lack of understanding of the recirculation sump vent hole design basis. The team reviewed the LER, the AE IR, IR No. 50-315/98009(DRS); 50-316/98009(DRS), and closure documentation related to the issue.

b. Observations and Findings

The AE team finding was characterized as an Unresolved Item (URI) and was subsequently reclassified as an Escalated Enforcement Item (EEI) in NRC IR No. 50-315/98009(DRS); 50-316/98009(DRS) dated May 7, 1998. Corrective actions for the technical aspect of this issue were part of the actions taken in response to CAL Item No. 2. Corrective actions for the design basis understanding aspects of this issue were part of RAP Item No. 03A, which addressed design control issues in CSC Item No. 3A. These were discussed in Sections E8.1.2 and E8.2.2, respectively.

c. Conclusions

RAM Item No. R1.7 is closed. The technical issue was adequately addressed by the licensee's response to CAL Item No. 2. Although the team did not close CSC Item No. 3A, it was determined that actions taken in addressing that issue adequately addressed the programmatic aspects of this issue.

E8.3.5 R1.8 - LER 50-315/97021-01, "Potential Loss of All Medium and High Head Injection Due to Single Failure Could Result in a Condition that Would Prevent the Fulfillment of the Safety Function of a System"

a. Inspection Scope

The team reviewed the subject LER and the corrective actions taken by the licensee to resolve the identified problem.

b. Observations and Findings

This single failure issue, in an emergency operating procedure, was identified by the AE design inspection team in 1997, and was one of the aspects included in CAL Item No. 4, "ES-1.3 (Switchover to Recirculation Sump) Procedure." This CAL Item and the related CSC Item No. 14D, "Emergency Operating Procedures Program," were reviewed by the NRC in IR No. 50-315/99033; 50-316/99033. The adequacy of the licensee's corrective actions regarding EOPs in general, and specifically ES-1.3, was discussed in that IR. The team reviewed an interim revision to procedure ES-1.3 which had corrected the specific deficiency identified in the LER. However, the final version of the procedure was pending completion of the licensee's broader corrective actions for emergency operating procedures under CSC Item No. 14D.

In addition, CSC Item No. 3D, "Inadequate Consideration for System/Component Failure Modes," addressed the generic aspect of the problem and specifically addressed single failure criteria. See paragraph E8.2.4, above, for resolution of the root cause for this issue. Relative to the extent of condition, the ESRRs performed by the licensee provided reasonable assurance that comparable problems with single failure vulnerabilities did not affect operation of other systems or components.

c. Conclusions

Based on the extent of the licensee's corrective actions associated with CSC Item Nos. 3D and 14D, reasonable assurance was provided to resolve this issue. RAM Item No. R1.8 is considered closed.

E8.3.6 R1.14 - LER 50-316/98005-00 Interim LER – Potential for High Energy Line Break to Degrade Component Cooling Water System

a. Inspection Scope

The team examined the subject LER and CRs generated as a result of this issue. The inspection also included evaluation of the corrective actions taken by the licensee to resolve the identified problem including review of calculations, DCPs, and implementation of actions identified in the CRs.

b. Observations and Findings

Interim LER 50-316/98005-00 identified the potential for a critical crack in the Unit 2 main steam line to degrade the ability of adjacent CCW pumps to perform their design function. This LER was also referenced in LER 50-315/99-026, dated November 19, 1999, "High Energy Line Break Programmatic Inadequacies Results in Unanalyzed Conditions." The licensee identified that the steam pipes were located in a pipe chase that was adjacent to the CCW pumps and could be accessed through three adjacent doors. The licensee stated that, "Although the pipe chase walls provide a qualified HELB barrier, no calculation could be found which shows that the doors withstand the energy released from a postulated critical crack. As the adjacent CCW pump motors and other equipment were not qualified for a high temperature/high humidity environment, this was determined to constitute an unanalyzed condition."

CR P-98-02383 was prepared to evaluate and take corrective action for the identified issue. The corrective action discussed in the CR consisted of changing the UFSAR to adopt GL 87-11 as part of the licensing basis. A 10 CFR Part 50.59 review of this change was identified in the CR but had not yet been performed.

A second action that was being pursued was reinforcement of the three doors in question to ensure that they were capable of withstanding the HELB load. This action was identified in the HELB program, "Assessment and Action Plan, HELB Program at D. C. Cook, Engineering Leadership Plan," Assessment No. RST-1999-011-NED, approved December 7, 1999. The program stated, "Note: These modifications had been proposed but were still under evaluation. They may be changed or deleted based on the results of the supporting analysis." The design package (2-DCP-4258) and calculation (SD-991129-001) were in draft form and could not be adequately reviewed at the time of inspection. This action, including the preparation of the design package was not included in the action statements of CR P-98-02383.

Interim LER 50-316/98005-00 was prepared August 14, 1998, and the expected submission date for update was October 20, 1998. The LER had not been updated at the time of inspection. LER 50-315/99-026 was submitted on November 19, 1999, for the HELB program and included a summary of the interim LER; however, it did not provide an update. The lack of timeliness of corrective action or updating of the interim LER was of concern.

The 10 CFR Part 50.59 review of the UFSAR change to GL 87-11 had not been prepared and could not be evaluated. The DCP and the calculation to support the design package were in draft state at the time of the inspection and could not be reviewed. Finally, of note were the lack of timeliness of update to LER 50-316/98005-00 and the lack of consistency between action statements for CR P-98-02383 and the HELB program.

c. Conclusions

Reasonable assurance could not be provided that LER 50-316/98005-00 would be successfully resolved due to the uncertainty of the 10 CFR Part 50.59 evaluation and lack of commitment in the HELB program to implement the identified design change. Consequently, the team concluded that RAM Item No. 1.14 should remain open.

E8.3.7 R1.28 - LER 50-315/99011-00 Air System for Emergency Diesel Generators (EDG) May Not Support Long Term Operability Due to Original Design Error

a. Inspection Scope

The team examined the subject LER and CRs generated as a result of this issue. The inspection also included evaluation of the corrective actions taken by the licensee to resolve the identified problem including review of calculations, DCPs and implementation of actions in the CRs.

b. Observations and Findings

The air system of the EDG provided the function of EDG starting, instrument air supply for selected instruments and EDG shutdown via the throttle control cylinder. The system included two safety grade receivers capable of two EDG starts from each air receiver and air for the instrument air system. Make-up air to the receivers was supplied by two non-safety/non-seismic systems. The air supply pressurized the receivers and provided make-up air following the EDG start.

CR P-99-03087 and LER 315/99011-00 were prepared by the licensee to address long-term (seven day) operation of the EDG. The concern was the potential failure of the non-seismic equipment (air compressors, compressor drive motors, piping between each compressor and discharge check valves) to provide make-up air to the EDG receivers. Depletion of air during system operation due to system leakage and consumption with the instrument air system, would result in low system pressure. Low system pressure at the throttle control cylinder would cut off fuel supply and terminate operation of the EDG prior to seven days of expected operation.

The licensee provided a back-up operability assessment (91-18-ODE-268) to assure safe operation during Modes 5 and 6 and was proceeding with an action plan to upgrade the compressors, piping, and valves to safety/seismic grade equipment to assure availability of the compressors. The back-up operability assessment concluded that the EDG would remain operable for Modes 5 and 6.

DCP 2-DCP-487, for the piping and valve modification, was being prepared for Plant Operations Review Committee review and approval during the inspection. The package was to be amended at a later date to include the replacement of the compressors once a vendor was selected and installation information was available. The DCP was presented to the team late in the inspection and could not be reviewed in depth. If the compressors were not available, or could not be installed in time for start-up, the licensee action plan included either qualifying the existing compressors as the first back-up, or performing an operability assessment justifying continuing use of the existing compressor on an interim basis as the second back-up.

The LER and the CR committed to providing a temporary modification to supply control air to the EDG without reliance on the starting air compressors. The licensee discontinued this process due to unresolved safety issues, performed an operability assessment to support Modes 5 and 6 operation, and declared the systems to be operable in May-July 1999. The CR had not been updated nor had the LER been resubmitted to reflect this change in a timely manner.

The back-up operability assessment was reviewed by the team, without comment.

c. Conclusions

The actions identified in the CR and the licensee action plan were sufficient to resolve the issue. The back-up operability assessment for operation in Modes 5 and 6 was reviewed and was acceptable. Closure of this issue should be delayed until completion and review of the final design package, including the installation of the replacement compressor, and verification that plant modifications were made consistent with the DCP.

E8.3.8 R2.1.1- EEI 50-315/97017-03; 50-316/97017-03, "A Procedure That Defines How to Perform Containment Inspections and Makes No Reference to Looking for Fibrous Material or Insulation That Could Clog the Recirculation Sump Is Not Appropriate to the Circumstances"

a. Inspection Scope

Inspectors reviewed the closure package consisting of CR 98-0934, 98-1836, and procedure 01-OHP-4030.001.002, Revision 16.

b. Observations and Findings

The NRC had previously identified issues related to fibrous material inside containment (NRC IR No. 50-315/97017 (DRP); 50-316/97017 (DRP)). EEI 50-315/97017-03; 50-316/97017-03 dealt specifically with the procedure used to conduct containment tours.

Inspectors found the following cited as examples of loose debris in procedure 01-OHP-4030.001.002, Revision 16:

- Temp Mat type insulation
- Un-encapsulated fibrous material and/or insulation that could clog the recirculation sump

The term "un-encapsulated" was not defined in the procedure. The licensee stated that the absence of a definition for encapsulation had been the cause of unacceptable encapsulation in the past (e.g., use of stainless steel wire mesh in place of 0.010" stainless steel jacketing). The phrase "that could clog the Recirculation Sump" was not defined in the procedure; interpretation was left to the discretion of personnel performing the inspection. EHI-5201 stated, "The use of fibrous material inside containment … will be prohibited within the credible destruction zone of a high energy line break. Fibrous insulation left in service in non-break areas will be covered with metal lagging. The only exception might be an isolated location where other considerations are overriding." The inspection procedure did not delineate where fibrous material was specifically prohibited and where it was allowed.

The licensee developed the Containment Recirculation Sump Protection Program, EHI-5201, and Engineering Action Plan CNT-99-269 to establish a coordinated effort to address all aspects of containment sump protection. The program included review of 01-OHP-4030.001.002 and revision, as required, for implementation of EHI-5201.

c. Conclusions

Based on closure of CAL Item No. 7 and procedure improvements initiated by the licensee, the team determined that RAM Item No. 2.1.1 has been adequately addressed by the licensee and was closed.

E8.3.9 R2.1.9 - URI 50-315/316/98009-09, "ECCS Pump Suction Valves Not Leak-Rate Tested to Confirm Accident Analysis Assumption"

a. Inspection Scope

This AE inspection team concern was that, during a postulated LOCA in which fission products were released to the reactor coolant system, the ECCS recirculation mode provided an unmonitored and unfiltered valve leakage path for highly radioactive fission products to atmosphere through the RWST, which was vented to atmosphere. Specifically, the unresolved issue was that four out of six valves in this leakage path were not routinely checked for leakage as part of the inservice inspection program. The matter remained unresolved pending NRC verification that the total leakage was less than 10 gallons per minute. The team reviewed Condition Report 97-2450, which provided leakage data.

b. Observations and Findings

The licensee performed leak tests on the valves in question and demonstrated that leakage was zero except for RH-130 in Unit 2, which was about one-half gallon per minute. This valve was located in the normal cool down lineup return line back to the RWST and was normally locked closed when at power. Since the leak rate was found

to be less than the 10 gallon per minute, the licensee determined that the plant was still within its design basis and that the issue was not reportable, but that adjustments were needed to the inservice inspection program to better monitor and control such leak paths.

c. Conclusions

The team concluded that the licensee had taken appropriate action regarding this unresolved issue and closed RAM Item No. R2.1.9. Remaining concerns and actions associated with this issue are addressed under CAL Item No. 8.

E83.10R 2.2.4 - URI 50-316/97017-05, "The As-Found Condition of the Containment RecirculationSump Relative to Technical Specification Operability During Modes 1, 2, and 3"

a. Inspection Scope

This URI entitled, "The As-Found Condition of the Containment Recirculation Sump Relative to Technical Specification Operability During Modes 1, 2 and 3," was associated with the issue of fibrous material, described in CAL Item No. 7. Specifically, it addressed the issue of operability of the sump when the fibrous material issue was first identified.

b. Observations and Findings

As stated in LER 50-315/97024-03 on this subject, "Given the variety of locations and quantity of materials in combination with the lack of a model for debris generation and transport, blockage of the recirculation sump could not be discounted, and the sumps were therefore considered inoperable in the as-found condition."

The licensee later commissioned independent assessments of the safety significance of the "as found" condition of the ECCS and containment systems (including the sump).

In the licensee's response letter of March 19, 1999, to the NRC Notice of Violation, dated October 13, 1999, the licensee stated, "… although there was a degradation in margin due to the degraded and non-conforming conditions identified in the cited violations, the ECCS and Ice Condenser containment systems would have functioned and did not pose an undue risk …" These conditions were identified as preliminary, in that they were under review by the licensee. The licensee later determined that rather than attempting to prove in detail that the sumps were operable in the as-found condition, resources would be more appropriately directed at correcting the condition.

c. Conclusions

Based on the corrective actions which have or are being taken on fibrous and other non-conforming material as part of CAL Item No. 7, the technical issue associated with the as-found condition of the sump was considered to have been adequately addressed, and RAM Item No. R2.2.4 was closed.

E8.3.11R 2.2.13 - URI 50-315/98009-04, “Apparent Failure to Take Prompt Corrective Action After the 1993 Systems-based Instrument and Control Inspection Finding Regarding the Potential for Vortexing and Air Entrainment in the RWST, and After Documented by the Licensee in 1995 in CR 95-1015"

a. Inspection Scope

This was based on an unresolved item (50-315/97201-04; 50-316/97201-04) from the AE inspection where the AE team raised a concern that overall vortexing effects on RWST level biases could have been identified in 1995. The team examined the original 1995 CR and subsequent CRs on this issue as part of the review for CSC Item No. 2B.

b. Observations and Findings

The licensee wrote a CR to address the AE concerns of untimely corrective action. Subsequently, the investigation of this unique issue was subsumed by the broader issue of the site-wide breakdown of the corrective action program.

As part of the examination of CSC Item No. 2B, the team examined actions prescribed by the licensee to ensure prompt corrective action of identified discrepancies in the future. These actions were considered effective at addressing the site-wide issue and by extension, consequently, the corrective action questions of this specific issue. The technical aspects of this issue were addressed in corrective actions for other findings.

c. Conclusions

Acceptable corrective actions taken for the site-wide breakdown of the corrective action program were sufficient to address the prompt corrective action concerns of this specific issue. RAM Item No. 2.2.13 is closed.

E8.3.12R 2.2.16 - EEI 50-315/98016-01; 50-316/98016-01, “Programmatic Breakdown in the Area of Corrective Action”

a. Inspection Scope

Resident inspectors observed that corrective actions for problems associated with caution tags had been ineffective. A December 1997, licensee self-assessment concluded corrective actions had failed to resolve program deficiences. The report indicated that actions to address this were being tracked under CSC Item No. 2B. The IR concluded that modifications to the licensee’s corrective actions were necessary. The team examined the original IRs and subsequent CRs on this issue as part of the review for CSC Item No. 2B.

b. Observations and Findings

As part of the examination of CSC Item No. 2B, the team examined actions prescribed by the licensee to ensure prompt corrective action of identified discrepancies in the

future. These actions were considered effective at addressing the site-wide issue and by extension, consequently, the corrective action questions of this specific issue.

c. Conclusions

Acceptable corrective actions taken for the site-wide breakdown of the corrective action program were sufficient to address the prompt corrective action concerns of this specific issue. RAM Item No. 2.2.16 is closed.

E8.3.13R 2.3.2 - LER 50-315/97011-02, “Operation Outside the Design Basis for ECCS and Containment Spray Pumps for Switchover to Recirculation Sump Suction”

a. Inspection Scope

The team reviewed LER 50-315/97011-02, its associated closure package, dated December 1, 1999, EOPs ES 1.3, Revision 5 and draft Revision 6, dated December 3, 1999, RWST drawings, CRs 98-025 and 98-2927, DCPs 12-(DCP) 853 “Modification to ILS-950 and 951," Revision 0, 2-DCP-729 "RWST Overflow Line Modification," Revision 0, and interviewed several staff members.

b. Observations and Findings

LER 50-315/97201, Revisions 0 and 1, addressed the implications of RWST level instrument uncertainties associated with flow, and how the errors could result in premature swapover from injection to recirculation mode. This problem was addressed in several reports such as the IR No. 50-315/97201; 50-316/97201, and IR No. 50-315/99032; 50-316/99032 under RAM Item No. 2.3.22.

CR 98-0025 dated December 24, 1997, addressed a condition where drip catches were installed on the RWST 10-inch overflow lines. The installers were unaware of the UFSAR Section 6.2 statement which credited these 10-inch lines as a backup for the RWST normal eight inch vent line. Corrective actions for CR 98-0025 focused on inadequate plant procedures which permitted the installation of drip catches without an adequate 10 CFR Part 50.59 review.

CR 98-2927, dated June 23, 1998, was written because the potential adverse impact of the drip catches on RWST level instrumentation was not evaluated in CR 98-0025. Specifically, inadequate venting during ECCS injection phase could result in drawing a vacuum in the RWST which would result in indicated level being less than actual level. Revision 2 to LER 50-315/97011 addressed the additional uncertainties related to the potential obstruction of the 10-inch overflow/vent pipe. This LER was later classified as high priority RAM Item No. 2.3.2.

The licensee issued DCP 2-DCP-729 "RWST Overflow Modification," Revision 0, which will modify the overflow pipe with a riser section to increase the available water stored in the RWST. The DCP was issued on December 11, 1999, but one of the critical design inputs, calculation MD-2-RWST-001-N, "Determination of RWST Vacuum for the 10-inch Vent Configuration," Revision 0, was not issued. DCP Section 5.0, "Open

Items/Constraints List," indicated the calculation approval was required for Mode 4. Without this calculation the licensee could not verify the design change would not result in an RWST vacuum adversely affecting the indicated level. Additionally the physical modifications to the overflow pipe were not started by the conclusion of the onsite inspection period.

The team noted neither calculation 1-2-UNC-339 CALC1, "Refueling Water Storage Tank Level Loop Accuracy Calculation," Revision 1, nor 1-2-UNC-339 CALC2, "Setpoint Calculation for RWST Level Alarms and RHR Pump Trip Interlock," draft Revision 0, dated September 29, 1999, included the effect of potential RWST vacuum during the injection phase. If calculation MD-2-RWST-001-N determined there would be a vacuum drawn in the RWST during the post accident injection phase this vacuum would have to be incorporated as a bias in one, if not both of these calculations.

Criteria for closure of high priority RAM items include all corrective actions required for restart have been completed. As the required calculation was not approved, the RAM item cannot be closed. When the calculation is approved, the RAM item and LER can be closed.

c. Conclusions

The team concluded there was reasonable assurance that the technical issues in LER 315/97-011-02 were understood, were being properly addressed, and the extent-of-condition had been identified. However, all engineering activities required for restart were not complete. Therefore, RAM Item No. 2.3.2 remains open.

E8.3.14 R 2.3.5 - EEI 50-315/97017-01; 50-316/97017-01, “The Lack of Sufficient Measures to Assure That the Design Basis Was Correctly Translated into Specifications to Control the Installation of Material That Could Be Essential to the Safety-Related Functions of the Containment System”

a. Inspection Scope

The team reviewed the closure package consisting of CR 97-2457 and associated condition reports, and the specifications and procedures revised or developed as preventive actions.

b. Observations and Findings

The NRC had previously identified issues related to fibrous material inside containment (NRC IR No. 50-315/97017(DRP); 50-316/97017 (DRP)). EEI 50-315/97017-01; 50-316/97017-01 dealt specifically with the presence of fibrous material in electrical cable trays in containment.

The licensee initially generated CR P-97-2457 to address fibrous material found in electrical cable trays and generated additional condition reports to address other aspects of containment sump protection. This condition report was open pending completion of a corrective action to issue specification ES-CIVIL-430-QCN,

"Requirements for Material Inside Containment." During the inspection, the licensee created additional action items for this condition report to establish a tie between the containment sump protection program action plan CNT-99-269 and containment readiness tracking.

The inspectors observed that little work had been accomplished regarding fibrous material inside containment in 1999 prior to developing EHI-5201 and CNT-99-269. The licensee had prepared a draft of ES-CIVIL-430-QCN prior to March 1999, and noted it in the licensee's reply to Notice of Violation dated October 13, 1998, AEP:NRC:1260GH. The commitment date in CR P-97-2457 is April 4, 1999. The specification was not issued prior to the end of the inspection; thus, this action was overdue.

Preventive actions identified in CR P-97-2457 included revisions to DCC-FP101-QCN, Revision 14, and to 12CHP5021.ECD.005, Revision 9. The revisions were not acceptable, because they did not exclude fibrous material from areas such as HELB zone of destruction areas where encapsulation was not adequate. The observations by the Inspector are presented in detail in Section E8.3.16 (RAM Item No. 2.3.7), of this IR. The licensee developed the Containment Recirculation Sump Protection Program, EHI-5201, and Engineering Action Plan CNT-99-269 to establish a coordinated effort to address all aspects of containment sump protection. The program included review of DCC-FP101-QCN and revision, as required, for implementation of EHI-5210. 12CHP5021.ECD.005 had been omitted from the program.

c. Conclusions

Based on the inadequate revision of 12CHP5021.ECD.005 and the omission of 12CHP5021.ECD.005 from EHI5021 and CNT-99-269, the inspectors determined that RAM Item No. 2.3.5 had not been adequately addressed by the licensee and was considered open.

E8.3.15 R 2.3.6 - EEI 50-315/97017-02; 50-316/97017-02, "The Lack of Sufficient Measures to Assure That the Design Basis Was Correctly Translated Into Instructions Which Would Be Changed in a Controlled Manner"

a. Inspection Scope

Inspectors reviewed the closure package consisting of CR 97-2656, CR 98-1837, specification ES-PIPE-1007-QCS, and installation procedure 12CHP5021.CCD.023. Inspectors also reviewed CR P-99-24477.

b. Observations and Findings

The NRC had previously identified issues related to fibrous material inside containment (NRC IR No. 50-315/97017(DRP); 50-316/97017(DRP)). EEI 50-315/316/97017-02 dealt specifically with the presence of unjacketed fibrous pipe insulation in containment. The licensee generated CRs 97-2656 and 98-1837 to address this item.

The licensee issued ES-PIPE-1007-QCS, Thermal Insulation, as a replacement to the previous specification for thermal insulation and a new implementing procedure, 12CHP5021.CCD.023, Thermal Insulation in Containment. The licensee identified an apparent 10 CFR Part 50.59 bypass in the procedure, which allowed the cognizant engineer to approve exceptions to the procedure, as a follow-up to CR P-99-24050 (see discussion below) in which an unapproved material was installed in the ice condensers per an action request evaluation dated August 1998. Although the licensee generated CR P-99-24185 on September 29, 1999, "immediate" corrective action was delayed until December 4, 1999, when the licensee placed an administrative hold on the section containing the bypass.

The inspectors also observed that 12CHP5021.CCD.023 stated, "The procedure has been identified as an "Information Use" procedure per Revision 3 of PMI-2011." Revision 4 of PMI-2011 was issued six months prior to issue of the thermal insulation procedure. All personnel involved in the writing, review, and approval of this procedure failed to prevent use of a superseded revision. The licensee generated a condition report in response to this finding.

The licensee generated CR P-99-24050 when it discovered Armaflex insulation with reinforced cloth and mastic installed inside the ice condensers in lieu of a stainless steel jacket as required by ES-PIPE-1007-QCS. AR A159570 Evaluation 05 approved an exception to ES-PIPE-1007-QCS, thereby bypassing the 10 CFR Part 50.59 process. The licensee installed lagging over the Armaflex insulation in Unit 2 (2-DCP-629). Work was not completed in Unit 1.

c. Conclusions

Based on closure of CAL Item No. 7 and procedure improvements initiated by the licensee, the team determined that RAM Item No. 2.3.6 had been adequately addressed by the licensee and was considered closed.

E8.3.16R 2.3.7 - EEI 50-315/97017-04; 50-316/97017-04, "A Procedure for Installation, Replacement, and Repair of Silicone Fire Barrier Penetration Seals That Did Not Require That Fibrous Damming Material Be Removed or Encapsulated Following Sealing Operations Is Not Appropriate to the Circumstances"

a. Inspection Scope

Inspectors reviewed the closure package consisting of CR 97-1837, design specification DCCFP101QCN, and installation procedure 12CHP5021.ECD.005. Inspectors also reviewed CR P-99-24477.

b. Observations and Findings

The NRC had previously identified issues related to fibrous material inside containment (NRC IR No. 50-315/97017(DRP); 50-316/97017(DRP)). EEI 50-315/97017-04;

50-316/97017-04 dealt specifically with the procedure for installation, replacement and repair of silicone fire barriers.

The licensee generated CR 97-1837 to address this restart item. The discussion presented in CR 97-1837 was generally weak and confusing with respect to its scope and related CRs. For example, this CR stated, "CRs 97-2457 and 97-2656 go into great detail… The physical work performed as corrective action is detailed in those CRs. The root causes and preventive actions are presented herein."

The corrective actions specifically related to this RAM item were to revise the design specification and implementing procedure. The licensee added a note to several locations in DCC-FP101-QCN, Revision 14, and to 12CHP5021.ECD.005, Revision 9. The note was not acceptable, because it did not exclude fibrous material from areas such as HELB zone of destruction areas where encapsulation was not adequate.

The inspectors observed that CR 97-1837 incorrectly represented corrective action 3 which states, "The DCC specification … was revised … to disallow fibrous damming materials to be left in place in the containments." The note actually added to the specification states, "All damming and forming materials which are not encapsulated, shall be removed …" The note allowed encapsulated fibrous material to remain. The Inspectors also observed that this note was not consistent with ES-PIPE-1007-QCS which excluded all fibrous material below elevation 614 feet.

The inspectors observed that the implementing procedure was revised prior to revision of the specification and did not reflect the requirements of the specification. Although the action of the note affected Section 4.5 of the procedure, its placement and level of indentation implied it was part of Section 4.4.7.1; the location was better presented in DCC-FP101-QCN. This note had not been added to Section 7.2, Forming, of the procedure which states, "These materials can be left in place following curing of the sealant." The note was included in the corresponding step in DCC-FP101-QCN (Step 6.3). The note was added to DCC-FP101-QCN Step 6.5.6.1 but not to the corresponding step in 12CHP5021.ECD.005 (7.3.8.1). The note was added to Appendix A in §A.3.2. It is not clear whether it should be included in A.1 and A.2 also. The lead engineer working on CAL Item No. 7 could not clarify this point.

The licensee developed the Containment Recirculation Sump Protection Program, EHI-5201, and Engineering Action Plan CNT-99-269 to establish a coordinated effort to address all aspects of containment sump protection. The program included review of DCC-FP101-QCN and revision, as required, for implementation of EHI-5210. 12CHP5021.ECD.005 had been omitted from the program.

c. Conclusions

Based on the inadequate revision of DCC-FP101-QCN and 12CHP5021.ECD.005 and the omission of 12CHP5021.ECD.005 from EHI5021 and CNT-99-269, the inspectors determined that RAM Item No. 2.3.7 had not been adequately addressed by the licensee and was considered open.

E8.3.17R 2.3.8 - LER 50-315/97024-04, “Material Discovered in Containment Degrades Containment Recirculation Sump and Results in Condition Outside Design Basis”

a. Inspection Scope

This LER is associated with CAL Item No. 7, fibrous material inside containment, and the associated RAM items (R.2.1.1, R.2.3.5, R.2.3.6, R.2.3.7). CAL Item No. 7 and the RAM items were reviewed separately in this IR.

b. Observations and Findings

The LER addressed the same issue as CAL Item No. 7. The LER stated that corrective actions included preparation of a specification which the licensee has previously identified as ES-CIVIL-0430-QCN. The licensee changed its plans to address this issue by preparing the Containment Recirculation Sump Protection Program, EHI-5201, and Engineering Action Plan CNT-99-269 to establish a coordinated effort to address all aspects of containment sump protection. This program and plan were issued during the inspection. Observations and findings regarding the program and plan are presented in Section E8.1.6 of this IR.

c. Conclusions

Based on the completed corrective actions and on actions committed to be completed before startup, the inspectors determined that RAM Item No. R8.3.17 had been adequately addressed by the licensee and is considered closed by transfer of oversight of containment sump protection to RAP Item No. 13B.

8.3.18R 2.3.24 - EEI 50-315/98009-03; 50-316/98009-03, “Apparent Failure to Consider Potential for Vortexing and Air Entrainment When Establishing the RWST Low-Low Level Setpoint”

a. Inspection Scope

The team reviewed the closure package for EEI 50-315/98009-03; 316/98009-03, dated November 21, 1999, the associated condition report, completed and planned corrective actions, calculations associated with RWST level, and emergency response procedures for changing from the injection to recirculation mode. Specific items reviewed included CR 97-2312, CR 97-2350, LER 97-011-01, Calculation ENSM 970606JJR, "RWST Vortexing," Revision 2, 1-2-UNC-339 CALC1, "Refueling Water Storage Tank Level Loop Accuracy Calculation," Revision 1, 1-2-UNC-339 CALC2, "Setpoint Calculation for RWST Level Alarms and RHR Pump Trip Interlock," draft Revision 0, dated September 29, 1999, and 1-2-I9-03 CALC6, "RWST Level Scaling Calculation.”

b. Observations and Findings

CR 97-2312 addressed, in part, problems with the RWST level instruments 1(2)-ILS-950 and 1(2)-ILS-951 not including all flow induced bias errors. CR 97-2350 addressed, in part, engineering control procedures associated with RWST level that did not address

vortexing for the RHR pump trip on low-low level. The team reviewed these CRs and determined the evaluation, including extent of condition, and corrective actions required were adequate with regards to RWST vortexing.

RWST level instrument calculations were in various stages of review and approval during the inspection. The key calculation associated with this issue, 1-2-UNC-339 CALC2, was still in a draft status and therefore the team could not conclude the RAM item was adequately addressed for restart. The draft version of 1-2-UNC-339 CALC2, dated September 29, 1999, Section 2.5.6 used an elevation for vortex initiation of approximately 612.5 feet and based this on calculation ENSM 970606JJR, Revision 2. The team noted Section 6.1.7 of -2-UNC-339 CALC2 clearly noted that ENSM 970606JJR was in a restricted use status, and use of this as input was properly classified as an unverified assumption.

Calculation ENSM 970606JJR evaluated potential vortexing in the RWST with various combinations of ECCS and CTS pumps. As noted above, it was in a restricted status, but Design Information Transmittal (DIT) B-00174-00, "RWST Vortexing Values," dated September 3, 1999, validated the results of the calculation as technically correct although there were some administrative problems. The team determined the calculations used appropriate techniques to estimate when vortexing could be expected to occur, but noted some technical and administrative errors in the calculation including failure to calculate the worst case pump combination which would have been both trains of RHR, SI, CHG, and CTS pumps and incorrect identification of the 24-inch schedule 10 discharge pipe as a 24-inch schedule 20 pipe.

The largest flow evaluated, identified as case 1, was for a maximum outflow after termination of the West RHR and CTS pumps with the East pumps running. Procedure 01(02)-OHP 4023.ES-1.3, Revision 5, and the draft Revision 6 both stopped the East RHR pumps first.

The next largest flow evaluated was after termination of one SI, both CHG, and the West RHR and CTS pumps. The supervisor of the EOP upgrade project could not identify how this pump combination would arise, and suspected it was used to evaluate a proposed configuration before 01(02)-OHP 4023.ES-1.3, Revision 5, was approved.

The team concluded the calculation had more problems than just the administrative errors noted in the DIT. However, the magnitude of the errors for case 3 (both SI and CHG pumps running), which was the case associated with this issue, was small.

The supervisor of the EOP upgrade project stated a calculation was being performed to determine if it would be possible to operate the RHR and CTS pumps at a lower RWST level, to permit operators more time to manually stop the SI and CHG pumps. Licensee engineering personnel later stated this was only a vortexing study, not a calculation, and the current design basis was still ENSM 970606JJR. However, until the study was complete and evaluated, the licensee could not confirm the safety limit for the RWST low-low level alarm setpoint and RHR pump trip. The inability to specify the final analytical limit prevented the licensee from applying the various instrument loop

uncertainties and determining the RWST low-low level nominal setpoint. As a result, calculation 1-2-UNC-339 CALC2 , Revision 0, could not be finalized.

The team concluded the closure package for EEI 50-315/98009-03; 50-316/98009-03 should have included DIT-B-00174-00, in addition to the restricted associated calculation, and the technical review of ENSM970606JJR performed for the DIT was less than fully adequate.

The team noted neither calculation 1-2-UNC-339 CALC1, nor draft 1-2-UNC-339 CALC2 addressed elevation uncertainties of the RWST tanks, discharge pipes, or level transmitters. Additionally, the licensee process to calculate instrument uncertainties detailed in Engineering Guide (EG) IC-004, "I&C Engineering Guide for Instrument Setpoint/Uncertainty," Revision 3, Change Sheet 3, dated July 14, 1998, did not address the uncertainties associated with installed elevations. The level transmitters' elevations referenced the 593' 0" auxiliary building pipe tunnel floor while the RWST elevations referenced the external pipe tunnel platform at 608' 6"; the tolerances between the floor and platform elevations were not specified on any documents the licensee could provide to the team. This was potentially significant with instrument loops 1(2)-ILS-950 and 1(2)-ILS-951 because the critical value in question to ensure vortexing was not a problem was the level of water above the discharge pipe.

Licensee instrument engineers assumed the elevations of tanks, pipes, and floors on approved "as built" drawings were always correct and exact with no error. Licensee structural engineers noted the concrete elevations are nominal and actual elevation from point to point varied, particularly on a floor or foundation slab, because of drainage slopes. Additionally, the structural engineers could not identify any document such as a construction specification which defined elevation tolerances for building floors or slab foundations. The structural engineer noted that there were several measurements taken on the RWST tank over time to ensure it was not settling at an unacceptable rate, and concluded with confidence that variation in the concrete elevations for the RWST and its associated transmitter from drawing to actual was less than an inch. 12-EHP 5040 DES.003, "Calculations," Section 3.1.2, "Numerical Accuracy," requires in part that calculations "should be performed with the degree of precision consistent with the design assumption and input data." The inability to determine the precision and accuracy of critical loop component and process elevations appeared to be inconsistent with the intent of 12-EHP 5040 DES.003.

In the response to CAL Item No. 9 the licensee committed to use Branch Technical Position (BTP) HICB-12, "Guidance on Establishing and Maintaining Instrument Setpoints," as a reference in developing the guidance for performing instrument uncertainty calculations. Section B.3 of the BTP notes the description of the instrument channel should include instrument and installation details relative to a reference datum. Using multiple reference points for elevations without knowing the installation tolerance of the reference points does not meet the BTP intent. The licensee initiated CR 99-29235 because there was no guidance for addressing the accuracy of elevations and dimensions used by those performing design changes and calculations.

c. Conclusions

The team concluded there was reasonable assurance that the technical issues in EEI 50-315/98009-03; 50-316/98009-03 were understood, the extent-of-condition has been identified, and problems were being addressed. The team concluded the item should remain open until the licensee provided evidence that:

- vortexing effects, taking into account as-built configurations (i.e., elevation) and operating procedures, are included in the instrument loop uncertainties associated with RHR and CTS pump manual and automatic trips; and

- EOPs which can be impacted by RWST vortexing are consistent with the approved uncertainty calculations.

E8.3.19 R 2.3.26 - EEI 50-315/98009-06; 316/98009-06, "Apparent Failure to Demonstrate, Using Design Basis Documentation, That There Was Adequate Containment Recirculation Sump Water Volume Following a LOCA"

a. Inspection Scope

This was an escalated enforcement item associated with the sump inventory issue of CAL Item No. 1.

b. Observations and Findings

A detailed examination of the sump inventory issue was conducted as part of the CAL Item No. 1 review discussed earlier in this IR.

c. Conclusions

As there are no additional issues contained in this escalated enforcement item over and above those identified as part of CAL Item No. 1, RAM Item No. R2.3.26 is closed.

E8.3.20 R 2.3.28 - EEI 50-315/316/98009-08, "Apparent Failure to Maintain the One Fourth Inch Containment Recirculation Sump Particulate Retention Requirement, Which Could Allow the ECCS Throttle Valves and Containment Spray Nozzles to Become Inoperable"

a. Inspection Scope

The closure package for this issue, provided by the licensee, was titled "Sump Screen Edge Gaps Exceeding One Fourth Inch Particle Retention Limit (EA #01292)." Additional bypass paths were also addressed in this documentation. The specific issue was the, "failure to correctly translate recirculating sump particulate retention design basis into specifications, drawings, procedures, and instructions." The team inspected the Unit 2 recirculation screen to determine whether the retention screen bypass paths identified had been corrected, including the sump roof vent holes that had to be redrilled and protected with a permanent mesh screen. These particle bypass paths (up to one

half inch) resulted from the improper design and installation of the vertical one fourth inch mesh screen in 1978 and 1979 (DC-12-2361).

b. Observations and Findings

Based on visual inspection of the Unit 2 recirculation sump retention screen, the team determined that the previously identified bypass paths around the edges of the screen had been corrected. The licensee's records showed this being done during 1997. This inspection provided reasonable assurance that the problem had been corrected in both units. The periodic recirculation sump inspections performed by the licensee provided additional assurance that the installation problems associated with these screens would not be a problem in the future. For example, even though the sump internal screen installed between the lower containment sump and the recirculation sump was not directly inspected by the team, the inspection procedure lists these screens for periodic inspection.

c. Conclusions

The team determined that the previously identified recirculation sump particle bypass paths have been closed and closed RAM Item No. R2.3.28.

E8.3.21 R 2.3.47 - LER 50-315/98012-00, "One Fourth Inch Particulate Requirement Not Maintained in Containment Recirculation Sump"

a. Inspection Scope

This LER was very similar to the LER discussed above for RAM Item No. R1.5 discussed in Section E8.3.3 above. On March 5, 1998, with both units in Mode 5, it was determined that the one fourth inch particulate retention requirement for the containment recirculation sumps was not properly established in 1979 following sump modifications. This LER and CR 98-0837 focused specifically on the ice condenser drain paths to the lower containment sumps in both units. The concern was the ability of the recirculation sump pumping systems to operate if foreign material from the ice condenser systems had been passed from the lower sumps to the recirculation sumps through the eight inch cross-connect lines. The sump interconnection path in each unit was determined to have been open to material greater than one fourth inch since 1979, prior to the installation of a retention screen on the cross-connect lines in 1999 (12-DCP-886).

b. Observations and Findings

Due to the location of the sump cross-connect line in a radioactive confined space, the team did not directly inspect the retention screen that the licensee added to the eight inch cross-connect line that connects the lower sump to the recirculation sump. The licensee stated in this LER that the materials that might have transited during an accident from the ice condensers to the lower sump would have been, "only the heaviest of the debris." Further, the licensee argued that such heavy debris would sink to the bottom of the lower sump and not be subject to transport to the recirculation sump. Finally, the licensee argued that any buoyant material susceptible to transport to the

recirculation sump would be light and would have been “broken down” by the RHR and CTS pumps, rendering such materials harmless to system components.

From a design perspective, the team noted that the closure documentation materials provided by the licensee on this issue did not state the purpose of the cross-connection line or under what circumstances flow would occur in what direction. Nevertheless, the team determined that the licensee’s corrective actions were adequate to provide reasonable assurance that, with the installation of the one fourth inch retention screen on the eight inch cross-connection line, foreign materials greater than one fourth inch in cross section would be prevented from entering the recirculation sump by this path. To further assess the licensee’s corrective actions, the team reviewed the periodic sump inspection procedure and the proposed revisions and noted that there was reasonable assurance that the cross-connect line retention screen would be periodically inspected for material condition and blockage.

c. Conclusions

The team determined that the actions related to the LER and its closure had been adequately identified and would be accomplished by the licensee prior to startup, allowing RAM Item No. R2.3.47 to be closed.

E8.4 Low Priority Restart Issues

a. Inspection Scope

The team examined relevant IRs, LERs, CRs, action requests, and status reports to ensure that the issue was captured in the licensee’s corrective action system, that the issue was correctly characterized and classified, that appropriate corrective actions were specified, and that the corrective actions were either completed, or scheduled and tracked for completion.

b. Observations and Findings

For each of the issues listed below the team confirmed that the four attributes listed in the scope above were satisfied.

- R1.1 URI 50-315/96013-06, “Normal Charging Capability”
- R1.2 LER 50-316/97003-03, “Performance of Dual Train Component Cooling Water Outage during Unit 2 1996 Refueling Outage Resulted in Condition Outside Plant Design Basis”
- R1.6 LER 50-315/97019-01, “Operation Contrary to the Design Bases with Residual Heat Removal Suction Valves Automatic Closure Interlock Defeated in Modes 4 and 5"
- R1.9 LER 50-315/97022-01, “Failure to Comply with USAS B31.1 Power Piping Code Due to Oversight in Valve Control Requirements Results in a Condition That Could Have Prevented Fulfillment of a Safety Function of a System”

- R1.11 LER 50-315/97026-01, “Potential for Overpressurization of the Control Air Headers Determined to Be Unanalyzed Condition”
- R1.16 URI 50-316/98007-13, “Pending the Licensee’s Assessment of the As Found Operability of the Open Electrical Junction Box, and Additional Inspector Review”
- R1.17 URI 50-315/316/98009-13, “Apparent Failure to Analyze All Potential Failure Modes of the Instrument Air System That Could Render Redundant Trains of Safety-Related Equipment Inoperable”
- R1.18 EEI 50-315/316/98009-34, “Operation of the Plant Without Overpressure Protection for the RHR System, Contrary to the UFSAR”
- R1.19 LER 50-315/98031-01, “Potential Common Mode Failure of Residual Heat Removal Pumps Due to Use of Inaccurate Values”
- R1.22 LER 50-315/98046-00, “Auxiliary Feedwater System Unable to Meet Design Flow Requirements During Special Test”
- R1.25 LER 50-315/99001-00, “General Electric HFA Relays Installed in Emergency Diesel Generators May Not Meet Seismic Qualification”
- R1.26 LER 50-315/99008-00, “Residual Heat Removal (RHR) Piping Vibrations Could Potentially Cause RHR Piping Failures”
- R1.27 LER 50-315/99010-00, “Reactor Coolant System Leak Detection System Sensitivity Not in Accordance with Design Requirements”
- R1.29 LER 50-315/99012-00, “Auxiliary Building ESF Ventilation System may not be Capable of Maintaining ESF Room Temperatures Post-Accident ”
- R1.30 LER 50-315/99013-00, “Safety Injection and Centrifugal Charging Throttle Valve Cavitation During LOCA Could Lead to ECCS Pump Failure”
- R2.1.2 LER 50-315/98001-02, “Containment Air Recirculation System Flow Testing Results Indicate Condition Outside the Design Basis”
- R2.1.4 IFI 50-315/316/98004-03, “Verification of Sump Screen As-Left Configuration”
- R2.1.10 URI 50-315/316/98009-15, “Apparent Failure to Establish Controls to Prevent Potential Operation of the CCW System with the CCW Heat Exchangers Above the Maximum Fouling Factor Value Established by the GL 89-13 Testing Program”
- R2.2.1 IFI 50-315/316/96006-07, “Responses to NRC Generic Communications Was Narrowly Focused and Did Not Fully Address the Issues”
- R2.2.3 LER 50-315/97010-02, ”Unit Operation with Lake Temperature in Excess of Design Basis Value Results in Condition Outside the Design Basis”
- R2.2.5 EEI 50-315/316/98004-16, “Failure to Implement Corrective Actions for a Previous Condition Adverse to Quality”

- R2.2.14 EEI 50-315/316/98009-12, “Apparent Lack of Documentation to Demonstrate That the Control Room Equipment Was Qualified at Worst Case Operating Temperatures in the Control Room”
- R2.3.3 LER 50-315/97012-01, “Potential Operation of CCW System Above Design Basis Value for Heat Exchanger Outlet Constitutes Condition Outside Design Basis”
- R2.3.4 LER 50-315/97014-02, “ Potential for Operation in Unanalyzed Condition Due to Postulated Elevated Room Temperatures”
- R2.3.9 EEI 315/316/98004-09, “Failure to Verify or Adequately Check the Design Inputs in Calculation DCCHV12AE06-N”
- R2.3.23 URI 50-315/316/98009-02, “Incorrect RWST Level Acceptance Criterion Specified in TS Surveillance Procedure Could Have Allowed RWST Level to be Less than the TS Requirement”
- R2.3.27 URI 50-315/316/98009-07, “Apparent Failure to Preclude a Single Active Failure When Performing Changes to the Plant, Which Is Contrary to the Assumptions in the UFSAR and the Design Basis”
- R2.3.29 URI 50-315/316/98009-10, “Apparent Failure to Demonstrate, Using Design Basis Documentation, That the Plant Could Perform a TS 3.0.3 Shutdown in 36-hours to 200°F Using One CCW Train and Design Basis Assumptions”
- R2.3.30 URI 50-315/316/98009-11, “Apparent Failure to Correctly Translate the As-Built Design of the CCW Heat Exchanger into Safety-Related Calculations and Analyses”
- R2.3.31 EEI 50-315/316/98009-14, “Operation of the Plant with CCW Supplied Flows to Safety-Related and Important to Safety Components Contrary to the Values Stated in the UFSAR”
- R2.3.33 EEI 50-315/316/98009-18, “Apparent Failure to Maintain Adequate Design and Procedural Controls That Allowed the Plant to Operate in Modes 5 and 6 without an Adequate Volume of Borated Water in the Other Unit's RWST in Order to Meet Appendix R Requirements”
- R2.3.40 URI 50-315/316/98009-25, “Apparent Failure to Maintain Adequate Design Control and Follow Established Procedures for Equipment Abandoned in Place”
- R2.3.41 URI 50-315/316/98009-26, “Apparent Failure to Maintain Adequate Drawing Control That Has the Potential to Impact Plant Operating Procedures, and Maintenance Activities That Use Drawings”
- R2.3.42 URI 50-315/316/98009-27, “Apparent Failure to Adequately Translate Design Basis Assumptions into Plant Procedure OHP4021.001.004, Plant Cooldown from Hot Standby to Cold Shutdown”
- R2.3.44 IFI 50-315/316/98009-35, “UFSAR and TS Inconsistencies with RWST Volume”
- R2.3.51 LER 50-315/98020-01, “Interim LER - Containment Recirculation Sump pH Upper Limit Potentially Exceeded Due to Analysis Input Omission”

- R2.3.52 LER 50-315/98022-02, “Potential Failure of Spray Additive Tank Nitrogen Regulator Results in Unanalyzed Condition”
- R2.3.53 LER 50-315/98038-00, “Potential for Single Failure to Isolate Emergency Core Cooling System Suction Paths”
- R2.3.54 LER 50-315/98045-01, “Interim LER - Insufficient Deliverable Volume in Containment Spray System Chemical Additive Tank”
- R2.3.56 LER 50-315/98049-00, “Interim - Emergency Boron Injection Flow Path Inoperable Due to Original Design Deficiency”
- R2.3.57 LER 50-315/98052-01, “Potential Failure Mode for Air Operated Components Not Considered in Original Design”
- R2.3.58 LER 50-315/98055-00, “Interim - Potential Condition Outside Design Basis for Rod Control System”
- R2.3.59 LER 50-315/98056-00, “Interim LER - Hot Leg Nozzle Gaps”
- R2.3.60 LER 50-315/98059-00, “Interim LER - Single Failure in Containment Spray System Could Result in Containment Spray pH Outside Design”
- R2.4.1 VIO 50-315/96011-01, “Failure to Implement Temporary Modification Procedure”
- R2.4.2 VIO 50-315/316/96015-04, “Failure of Design Control Measures to Adequately Review for Suitability Non-Safety Related Piping on the AFW Pumps”
- R2.4.5 IFI 50-315/316/97009-08, “NRR to Determine If Seasonal Modification Is Really a Permanent Change”
- R2.4.6 VIO 50-315/316/97009-09, “Modification Package Missed Discrepancies”
- R2.4.7 URI 50-316/97018-03, “Adequacy of Operations Procedure Safety Evaluations”
- R2.4.8 VIO 50-315/316/97024-01, “Failure to Maintain Written Safety Evaluation”
- R2.4.10 EEI 50-315/316/98004-01, “Failure to Perform a Safety Evaluation for Re-Drilling the Sump Roof Vent Holes”
- R2.4.11 EEI 50-315/316/98004-02, “Failure to Perform a Safety Evaluation for the Change to Delete the Containment Recirculation Sump Support Nut”
- R2.4.12 EEI 50-315/316/98004-04, “Failure to Perform a Safety Evaluation Screening for Changing the Containment Recirculation Sump Screen Materials”
- R2.4.13 EEI 50-315/316/98004-05, “Failure to Perform a Safety Evaluation for the Welding and Reduction in Sump Screen Size”
- R2.4.15 EEI 50-315/316/98004-11, “Failure to Perform an Adequate Safety Evaluation Prior to the CVCS Filter Change”
- R2.4.16 EEI 50-315/316/98004-12, “Failure to Perform a Safety Evaluation for Procedure Changes Required by Design Change RFC-DC-12-2665"
- R2.4.18 EEI 50-315/316/98004-14, “Failure to Perform an Adequate Safety Evaluation to Support Changes to CCW Flows that Could Exceed the UFSAR CCW Heat Exchanger Design Flow Values”

- R2.4.19 EEI 50-315/316/98004-15, “Failure to Perform an Adequate Safety Evaluation for the RWST Low Level Alarm Setpoint Change”
- R2.4.20 VIO 50-315/316/98007-01, “Failure to Perform a Full Safety Evaluation on the Change to the Operating Procedure for the Hydrogen Recombiners”
- R2.4.21 EEI 50-315/316/98007-06, “An Apparent Violation for Failure to Comply with 10 CFR 50.59"
- R2.4.23 EEI 50-315/316/98009-28, “Operation of the Plant Above the Maximum UHS Temperature Limit without Performing a 10 CFR 50.59 Evaluation”
- R2.4.25 EEI 50-315/316/98009-31, “Refilling the Containment Recirculation Sump Ventilation Holes without Performing a 10 CFR 50.59 Safety Evaluation”
- R2.4.27 EEI 50-315/316/98009-33, “Operation with Less Than UFSAR Specified CCW Flow Through the RCP Thermal Barrier without Performing a 10 CFR 50.59 Safety Evaluation”
- R2.4.28 EEI 50-315/316/98018-01, “Improperly Closed Request for Change”
- R2.6.14 LER 50-315/99007-00, “Calculations Show that the Divider Barrier Between Upper and Lower Containment Volumes May Be Overstressed”
- R2.8.1 LER 50-315/98009-01, “Hydrogen Recombiner Surveillance Requirement Not Being Met Results in a Condition Prohibited by Technical Specifications”
- R2.8.2 LER 50-315/98019-02, “Hydrogen Recombiner Temperature Circuit Technical Specification Surveillance Requirement Not Met”
- R2.8.3 LER 50-315/98033-00, “Hydrogen Recombiner Wattmeter Circuit Technical Specification Surveillance Requirement Not Met”
- R2.9.2 IFI 50-315/98007-09, “Review of the Design Basis for the DIS and How the Spray Impingement May Have Affected the Design Basis.”
- R2.10.2 LER 50-315/98030-01, “Incorrect Installation of Containment Spray Heat Exchanger Could Result in Unanalyzed Condition”
- R2.10.3 LER 50-315/98034-00, “Interim LER - Flow Rates to Containment Spray Headers Are Potentially Lower than Design Basis Values”
- R4.1 IFI 50-315/316/96013-08, “Consequences of Single Failure of CCP [Centrifugal Charging Pump] Emergency Leakoff Valves”
- R4.2 IFI 50-315/316/98004-08, “Peak Containment Pressure and Long-Term Post-LOCA Core Subcriticality Evaluations”
- R4.3 LER 50-315/98029, “Spent Fuel Pool Ventilation Inoperable Due to Original Design Deficiency”

c. Conclusions

Based on verification that the issues were entered in the corrective action system, that the issues were properly characterized and classified, that appropriate corrective actions

had been specified, and that the corrective actions were scheduled and tracked, the issues listed in paragraph b. above are closed.

E8.5 Assessment of Corrective Actions

E8.5.1 Detailed Review and Assessment of a Random Sample of CRs

a. Inspection Scope

The team reviewed the licensee's effectiveness of corrective actions by performing a detailed review of a random sample of CRs. The review included assessment of root and apparent causes, assessment of whether the corrective action addressed the problem, determination of the extent of completed corrective actions, and assessment of the effectiveness of corrective actions to prevent recurrence.

b. Observations and Findings

The team evaluated a sample of 60 randomly selected CRs to determine the effectiveness of corrective actions for engineering issues. The sample included mostly CRs written in 1999 but included a few CRs written in 1998 to gain a historical perspective about the changes that the licensee had implemented in the corrective action process. The percentage of categories 1 through 4 of the sample was consistent with the percentage of categories 1 through 4 of the overall population of CRs. Generally, the earlier CRs had a corrective action that solved the particular problem without much probing into underlying causes or applicability to similar situations in other areas or systems within the plant. The review of the CR sample showed that licensee staff underwent a learning curve on both administrative and technical aspects of the CR process before a recent trend of more consistent resolution of CRs emerged. Although apparent or root cause investigations in earlier CRs were weakly documented, recent apparent and root cause evaluations addressed the appropriate questions and generally identified the main cause within a narrow focus. However, Cook staff generally did not examine contributing causes in detail. The impression that emerged from the sample review was that D. C. Cook completed the easier corrective actions for CRs in a timely manner, but the more difficult or those that had programmatic or complex issues such as written guidance, procedures, standards, engineering calculations, evaluations, or equipment issues were slow to reach resolution. The team noted that reducing the CR backlog to a manageable level presented challenges because the backlog of open CRs was large.

The team discovered several CRs that were closed without completing all the corrective actions required to resolve the identified problem.

- CR 99-21010 had improperly closed item c without addressing an important aspect of the identified issue. The instrument had one percent accuracy (that corresponded to 2.4 psi); however, the CR listed the calibration of the instrument as 0.24 psi. To resolve this discrepancy the licensee initiated a new CR 99-29104 to investigate whether they should account for the one percent accuracy

of the instrument by analysis or if they must change to another instrument to meet the required accuracy.

- After issuing CR 99-15163, the licensee addressed the uncertainty accuracy of an instrument in use, by issuing a second CR (99-17931). The second CR was closed without any indication that the uncertainty accuracy issue had been resolved. Because the second CR was now closed, the licensee assumed they resolved the problem. They assigned "No Action" required and closed the first CR. After the team questioned these documents, the licensee wrote a new CR (99-28769) to address the original uncertainty accuracy issue adequately.

- CR 99-15350 questioned not getting a diesel generator control and instrumentation alarm when the associated control room knife switches were closed. The supervisor stated that this was not a valid issue and no alarm was the correct response for closing a knife switch. However, the alarm did come in after using the correct method of ganging closed two knife switches in series. The CR had been closed with no action and had missed an opportunity to resolve the lack of clear instructions and address inadequate staff knowledge about plant equipment.

The team observed evidence of less thorough approaches associated with CR corrective actions and investigations to resolve the identified problems.

- One category 3 CR had a flawed apparent cause evaluation. The stated apparent cause was personal error because of lack of training on significant figures. The real issue was that the technician recorded data that was clearly out of the specification acceptance range and did not stop the calibration. The technician's subsequent efforts to rationalize his mistake by misguided application of significant figures was a minor factor. After the team raised questions, the licensee reopened the CR investigation.

- One old CR had addressed a question whether there should be testing requirements on the non-essential service water (NESW) pumps auto-start features. The CR resolution stated the NESW pumps were not required for safety; therefore, testing of the auto-start function of NESW was not necessary. In retrospect this answer was weak and narrowly focused. During review for the ESRR, the licensee revisited this issue and began developing procedures to test the NESW pumps every 18 months.

- One old CR had addressed adverse effects after the licensee changed a ventilation configuration to run two fans at the same time; however, they had not designed or sized the ducts for both fans running in parallel. The evaluation was not thorough because it did not address how the plant made the change without discussion with and concurrence from engineering staff familiar with the duct's design.

- One category 3 CR had only Action 1, but listed seven separately numbered distinct sub-steps. Action 1 was flagged for completion before only one time-56

sequenced event; however, not all the individual sub-steps were required to be completed before the same event. This practice created a potential for incorrect control of CRs as well as incorrect resolution because of difficulty eventually closing the Action 1 if the individual sub steps were poorly documented on the actions taken to close.

- Category 4 CRs corrective actions were generally satisfactory; however, a number of category 4 CRs had "no actions required" as the resolution. The team found examples where vaguely written documentation made it difficult to determine precisely what was done when an immediate corrective action was completed, coincident with writing the CR. However, recent CRs showed improvement in documenting actions accomplished to resolve the condition.

One CR identified an adverse trend in the clearance program and was combined into a category 1 CR that addressed the root causes of 43 other CRs that had identified clearance problems. The team judged the joint and comprehensive root cause review of all 44 CRs as a step forward to improve the clearance program.

While the team identified deficiencies in the resolution of some of the CRs in the sample, these were generally limited to category 3 and 4 CRs issued in 1998 or early 1999. No resolution discrepancies were found in category 1 or 2 CRs issued in 1999. None of the deficiencies identified on any of the CRs was significant enough to call into question the operability or function of any safety-related system or component.

c. Conclusions

The team did identify cases where the licensee's staff had closed low significance issues without finding effective and complete resolutions. While the team noted that there was some lack of consistency and thoroughness in resolving CRs, no significant issues developed from the inspection of the random sample of 60 CRs. The team concluded that the CAP was adequate to support plant restart but management attention was still needed to improve consistency in reporting and resolution of problems.

X. Management Meetings

X1 Exit Meeting Summary

The team discussed the progress of the inspection with licensee representatives on a daily basis and presented inspection results to members of licensee management at the conclusion of the inspection on January 5, 2000. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Bakken, Site Vice President
J. Bass AEP/Westinghouse
B. Bradley, Nuclear Engineering
G. Brassart – Westinghouse
G. Corpora – Westinghouse
R. Crane, Regulatory Affairs
M. Finissi, Plant Engineering
K. Garner – Westinghouse
S. Greenlee, Nuclear Engineering
R. Godley, Regulatory Affairs
D. Hafer , Nuclear Engineering
R. Huey, Performance Assurance
W. Kropp, Performance Assurance
S. Lacey, Engineering Restart
M. Marano, Business Services
R. Powers, Senior Vice President
M. Rencheck, Vice President, Nuclear Engineering
J. Sholonski – Westinghouse
T. Taylor, Licensing
K. VanDyne, Regulatory Affairs
L. Weber, Operations

NRC

B. Bartlett, Senior Resident Inspector
K. Coyne, Resident Inspector
J. Gavula, Reactor Engineer
J. Grobe, Division Director
J. Maynen, Resident Inspector
D. Passehl, Project Engineer
G. Shear, Branch Chief
R. Winter, Reactor Engineer

INSPECTION PROCEDURES USED

IP 37551:	Engineering
IP 37700:	Design Changes and Modifications
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 92903:	Follow-up - Engineering

ITEMS OPENED, CLOSED, OR DISCUSSED

Opened

50-315/316/99029-01	IFI	Review and Approval of Dose Calculation for GDC 19 Control Room Habitability Issue

Closed

Escalated Enforcement Issues (EEI)

50-315/316/98004-15	Failure to Perform an Adequate Safety Evaluation for the RWST Low Level Alarm Setpoint Change
50-315/316/98004-16	Failure to Implement Corrective Actions for a Previous Condition Adverse to Quality
50-315/316/98007-06	An Apparent Violation for Failure to Comply with 10 CFR 50.59
50-315/316/98009-06	Apparent Failure to Demonstrate, Using Design Basis Documentation, That There Was Adequate Containment Recirculation Sump Water Volume Following a LOCA
50-315/316/98009-08	Apparent Failure to Maintain the One-Fourth Inch Containment Recirculation Sump Particulate Retention Requirement Which Could Allow the ECCS Throttle Valves and Containment Spray Nozzles to Become Inoperable
50-315/316/98009-12	Apparent Lack of Documentation to Demonstrate That the Control Room Equipment Was Qualified at Worst Case Operating Temperatures in the Control Room
50-315/316/98009-14	Operation of the Plant with CCW Supplied Flows to Safety-Related and Important to Safety Components Contrary to the Values Stated in the UFSAR
50-315/316/98009-18	Apparent Failure to Maintain Adequate Design and Procedural Controls That Allowed the Plant to Operate in Modes 5 and 6 without an Adequate Volume of Borated Water in the Other Unit's RWST in Order to Meet Appendix R Requirements
50-315/316/98009-28	Operation of the Plant Above the Maximum UHS Temperature Limit without Performing a 10 CFR 50.59 Evaluation
50-315/316/98009-31	Refilling the Containment Recirculation Sump Ventilation Holes without Performing a 10 CFR 50.59 Safety Evaluation

50-315/316/98009-33	Operation with Less Than UFSAR Specified CCW Flow Through the RCP Thermal Barrier without Performing a 10 CFR 50.59 Safety Evaluation
50-315/316/98009-34	Operation of the Plant without Overpressure Protection for the RHR System, Contrary to the UFSAR
50-315/316/98016-01	Programmatic Breakdown in the Area of Corrective Action
50-315/316/98018-01	Improperly Closed Request for Change

Violations (VIO)

50-315/96011-01	Failure to Implement Temporary Modification Procedure
50-315/316/96015-04	Failure of Design Control Measures to Adequately Review for Suitability Non-Safety Related Piping on the AFW Pumps
50-315/316/97009-09	Modification Package Missed Discrepancies
50-315/316/97024-01	Failure to Maintain Written Safety Evaluation
50-315/316/98007-01	Failure to Perform a Full Safety Evaluation on the Change to the Operating Procedure for the Hydrogen Recombiners

Unresolved Items

50-315/96013-06	Normal Charging Capability
50-316/97018-03	Adequacy of Operations Procedure Safety Evaluations
50-316/98007-13	Pending the Licensee's Assessment of the As Found Operability of the Open Electrical Junction Box, and Additional Inspector Review
50-315/316/98009-02	Incorrect RWST Level Acceptance Criterion Specified in TS Surveillance Procedure Could Have Allowed RWST Level to be Less than the TS Requirement
50-315/98009-04	Apparent Failure to Take Prompt Corrective Action After the 1993 Systems Based Instrument and Control Inspection Finding Regarding the Potential for Vortexing and Air Entrainment in the RWST, and After Documented by the Licensee in 1995 in CR 95-1015
50-315/316/98009-07	Apparent Failure to Preclude a Single Active Failure When Performing Changes to the Plant, Which Is Contrary to the Assumptions in the UFSAR and the Design Basis

50-315/316/98009-09	ECCS Pump Suction Valves Not Leak-Rate Tested to Confirm Accident Analysis Assumption
50-315/316/98009-10	Apparent Failure to Demonstrate Using Design Basis Documentation, That the Plant Could Perform a TS 3.0.3 Shutdown in 36-hours to 200°F Using One CCW Train and Design Basis Assumptions
50-315/316/98009-11	Apparent Failure to Correctly Translate the As-Built Design of the CCW Heat Exchanger into Safety-Related Calculations and Analyses
50-315/316/98009-13	Apparent Failure to Analyze All Potential Failure Modes of the Instrument Air System That Could Render Redundant Trains of Safety-Related Equipment Inoperable
50-315/316/98009-15	Apparent Failure to Establish Controls to Prevent Potential Operation of the CCW System with the CCW Heat Exchangers Above the Maximum Fouling Factor Value Established by the GL 89-13 Testing Program
50-315/316/98009-25	Apparent Failure to Maintain Adequate Design Control and Follow Established Procedures for Equipment Abandoned in Place
50-315/316/98009-26	Apparent Failure to Maintain Adequate Drawing Control That Has the Potential to Impact Plant Operating Procedures and Maintenance Activities That Use Drawings
50-315/316/98009-27	Apparent Failure to Adequately Translate Design Basis Assumptions into Plant Procedure OHP4021.001.004 Plant Cooldown from Hot Standby to Cold Shutdown

Inspection Followup Items (IFI)

50-315/316/96006-07	Responses to NRC Generic Communications Was Narrowly Focused and Did Not Fully Address the Issues
50-315/316/96013-08	Consequences of Single Failure of CCP [Centrifugal Charging Pump] Emergency Leakoff Valves
50-315/316/97009-08	NRR to Determine If Seasonal Modification Is Really a Permanent Change
50-315/316/98004-03	Verification of Sump Screen As-Left Configuration
50-315/316/98004-08	Peak Containment Pressure and Long-Term Post-LOCA Core Subcriticality Evaluations

50-315/98007-09	Review of the Design Basis for the DIS and How the Spray Impingement May Have Affected the Design Basis.
50-315/316/98009-35	UFSAR and TS Inconsistencies with RWST Volume

Licensee Event Reports (LER)

50-316/97003-03	Performance of Dual Train Component Cooling Water Outage During Unit 2 1996 Refueling Outage Resulted in Condition Outside Plant Design Basis
50-316/97005-01	Condition Outside Design Basis Results in Technical Specification Required Shutdown
50-315/97010-02	Unit Operation with Lake Temperature in Excess of Design Basis Value Results in Condition Outside the Design Basis
50-315/97012-01	Potential Operation of CCW System Above Design Basis Value for Heat Exchanger Outlet Constitutes Condition Outside Design Basis
50-315/97014-02	Potential for Operation in Unanalyzed Condition Due to Postulated Elevated Room Temperatures
50-315/97017-01	Condition Outside Design Basis Results in Technical Specification Required Shutdown
50-315/97018-01	Failure to Maintain One Fourth Inch Particulate Retention Requirement for the Containment Recirculation Sump Results in a Condition Outside the Design Basis.
50-315/97019-01	Operation Contrary to the Design Bases with Residual Heat Removal Suction Valves Automatic Closure Interlock Defeated in Modes 4 and 5
50-315/97021-01	Potential Loss of All Medium and High Head Injection Due to Single Failure Could Result in a Condition that Would Prevent the Fulfillment of the Safety Function of a System
50-315/97022-01	Failure to Comply with USAS B31.1 Power Piping Code Due to Oversight in Valve Control Requirements Results in a Condition That Could Have Prevented Fulfillment of a Safety Function of a System
50-315/97024-04	Material Discovered in Containment Degrades Containment Recirculation Sump and Results in Condition Outside Design Basis
50-315/97026-01	Potential for Overpressurization of the Control Air Headers Determined to Be Unanalyzed Condition

50-315/98001-02	Containment Air Recirculation System Flow Testing Results Indicate Condition Outside the Design Basis
50-315/98009-01	Hydrogen Recombiner Surveillance Requirement Not Being Met Results in a Condition Prohibited by Technical Specifications
50-315/98012-00	One Fourth Inch Particulate Requirement Not Maintained in Containment Recirculation Sump
50-315/98019-02	Hydrogen Recombiner Temperature Circuit Technical Specification Surveillance Requirement Not Met
50-315/98020-01	Interim - Containment Recirculation Sump pH Upper Limit Potentially Exceeded Due to Analysis Input Omission
50-315/98022-02	Potential Failure of Spray Additive Tank Nitrogen Regulator Results in Unanalyzed Condition
50-315/98029-00	Spent Fuel Pool Ventilation Inoperable Due to Original Design Deficiency
50-315/98030-01	Incorrect Installation of Containment Spray Heat Exchanger Could Result in Unanalyzed Condition
50-315/98031-01	Potential Common Mode Failure of Residual Heat Removal Pumps Due to Use of Inaccurate Values
50-315/98033-00	Hydrogen Recombiner Wattmeter Circuit Technical Specification Surveillance Requirement Not Met
50-315/98034-00	Interim - Flow Rates to Containment Spray Headers Are Potentially Lower than Design Basis Values
50-315/98038-00	Potential for Single Failure to Isolate Emergency Core Cooling System Suction Paths
50-315/98045-01	Interim - Insufficient Deliverable Volume in Containment Spray System Chemical Additive Tank
50-315/98046-00	Auxiliary Feedwater System Unable to Meet Design Flow Requirements During Special Test
50-315/98049-00	Interim - Emergency Boron Injection Flow Path Inoperable Due to Original Design Deficiency
50-315/98052-01	Potential Failure Mode for Air Operated Components Not Considered in Original Design

50-315/98055-00	Interim - Potential Condition Outside Design Basis for Rod Control System
50-315/98056-00	Interim - Hot Leg Nozzle Gaps
50-315/98059-00	Interim - Single Failure in Containment Spray System Could Result in Containment Spray pH Outside Design
50-315/99001-00	General Electric HFA Relays Installed in Emergency Diesel Generators May Not Meet Seismic Qualification
50-315/99007-00	Calculations Show that the Divider Barrier Between Upper and Lower Containment Volumes May Be Overstressed
50-315/99008-00	Residual Heat Removal (RHR) Piping Vibrations Could Potentially Cause RHR Piping Failures
50-315/99010-00	Reactor Coolant System Leak Detection System Sensitivity Not in Accordance with Design Requirements
50-315/99012-00	Auxiliary Building ESF Ventilation System may not be Capable of Maintaining ESF Room Temperatures Post- Accident
50-315/99013-00	Safety Injection and Centrifugal Charging Throttle Valve Cavitation During LOCA Could Lead to ECCS Pump Failure

Discussed

50-315/316/97017-01	EEI	The Lack of Sufficient Measures to Assure That the Design Basis Was Correctly Translated into Specifications to Control the Installation of Material That Could Be Essential to the Safety-Related Functions of the Containment System
50-315/316/97017-04	EEI	A Procedure for Installation, Replacement, and Repair of Silicone Fire Barrier Penetration Seals That Did Not Require That Fibrous Damming Material Be Removed or Encapsulated Following Sealing Operations Is Not Appropriate to the Circumstances
50-315/316/98009-03	EEI	Apparent Failure to Consider Potential for Vortexing and Air Entrainment When Establishing the RWST Low-Low Level Setpoint
50-315/97011-02	LER	Operation Outside the Design Basis for ECCS and Containment Spray Pumps for Switchover to Recirculation Sump Suction

50-316/98005-00	LER	Interim – Potential for High Energy Line Break to Degrade Component Cooling Water System
50-315/99011-00	LER	Air System for Emergency Diesel Generators (EDG) May Not Support Long Term Operability Due to Original Design Error

LIST OF ACRONYMS USED

AE	Architect Engineer
BTP	Branch Technical Position
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CCW	Component Cooling Water
CEQ	Hydrogen Skimmer and Air Recirculation
CFR	Code of Federal Regulations
CR	Condition Report
CTS	Containment Spray
DIS	Distributed Ignition System
DIT	Design Information Transmittal
DRB	Design Review Board
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EHR	Hydrogen Recombiner
EOP	Emergency Operating Procedure
ESRR	Expanded System Readiness Review
ESW	Essential Service Water
FME	Foreign Material Exclusion
FO	Field Observations
GDC	General Design Criteria
GL	Generic Letter
HELB	High Energy Line Break
IR	Inspection Report
IST	Inservice Testing
NESW	Non-Essential Service Water
NRR	Office of Nuclear Reactor Regulation
PA	Performance Assurance
RAM	Restart Action Matrix
RAP	Restart Action Plan
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RWST	Refueling Water Storage Tank
SAT	Spray Additive Tank
SER	Safety Evaluation Report
SI	Safety Injection
SOER	Significant Operating Event Report
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report

LIST OF DOCUMENTS REVIEWED

Procedures

- PMP-7300.UFSAR.001, UFSAR Update Process, Revision 3
- PMP-7030.CAP.001, Corrective Action Program Process Flow, Revision 3, dated October 15, 1999
- PMP 7200.RST.001, Restart Action Plans, Revision 6
- 02-OHP 4023.ES-1.3, Revision 5, January 3, 1998
- PMI 5043, Configuration Management Program, Revision 0
- PMP 5043 CCD.001, Configuration Change Determination, Revision 0a
- 12 EHP 5040.DRB.001, Design Review Board Expectations, Policies, and Practice, Revision 0
- 12 EHP 5040.DES.001, Control of Design Input, Revision 0
- 12 EHP 5040.DES.003, Calculations, Revision 2a
- 12 EHP 5040.DES.004, Design Drawings and Interim Drawings, Revision 0
- 12 EHP 5040.MOD.006, Design Change Packages, Revision 1a
- 12 EHP 5040.MOD.009, Design Change and Temporary Modification Package Reference Guide, Revision 1
- 12 EHP 5043.OAR.001,Owners Acceptance Review, Revision 0
- 01-OHP 4021.017.003, Removing Residual Heat Removal From Service, Revision 9
- 12 MHP 4030.STP.008, Inspection of Lower Containment and Recirculation Sump procedure, Revision 5 (being modified as a result of CR 99-17279)

Drawings

- Drawing OP-1-5151B-51
- Drawing OP-1-5120Y-2
- Drawing 2-OP-5129, Flow Diagram CVCS-Reactor Letdown and Charging, Revision 38
- Drawing 2-OP-5142, Flow Diagram Emergency Core Cooling (SIS), Revision 39
- Drawing 2-OP-5143, Flow Diagram Emergency Core Cooling (RHR), Revision 45
- Drawing 2-OP-5144, Flow Diagram Containment Spray, Revision 42
- Drawing INT-2-SI-55
- Drawing INT-2-SI-55-DEMO
- Drawing INT-2-5353

Reports

- NRC IR 50-315/97201(DRS); 50-316/97201(DRS), Design Inspection, November 26, 1997
- NRC IR 50-315/97017(DRS); 50-316/97017(DRS), Fibrous material, April 9, 1998
- NRC IR 50-315/98004(DRS); 50-316/98004(DRS), Confirmatory Action Letter Validation
- NRC IR 50-315/98005(DRS); 50-316/98005(DRS), Ice condenser, April 10, 1998
- NRC IR 50-315/98007(DRS); 50-316/98007(DRS), Containment pressure suppression, June 3, 1998
- NRC IR 50-315/98009(DRS); 50-316/98009(DRS), Design control (A/E) follow-up, May 7, 1998

Letters

- Confirmatory Action Letter Supplemental Response, AEP:NRC 1260G4, December 24, 1997
- Response to CAL No. RIII-97-011, NRC Architect Engineer (A/E) Design Inspection August 1997, AEP:NRC 1260G3, December 2, 1997
- Withdrawal of Response to Issue 2 of the NRC CAL of September 19, 1997 (RIII-97-011), AEP:NRC 1260GQ, March 17, 1999
- Verification of CAL Resolution, C1099-14, October 25, 1999
- Case Specific Checklist Update, September 17, 1999
- D. C. Cook Restart Action Matrix, October 21, 1999
- D. C. Cook Enforcement (EA #s 98-150, 98-151, 98-152, & 98-156), October 13, 1998
- Reply to Notice of Violation, dated October 13, 1998, AEP:NRC 1260GH, March 19, 1999
- Summary of the July 12, 1999, Technical Meeting regarding Containment Sump Issues related to Restart of the Donald C. Cook Nuclear Plant, Units 1 and 2, October 1, 1999
- Letter from S. A. Richards (NRC) to E. E. Fitzpatrick (I&M) dated 11/26/97 “Donald C. Cook, Units 1 & 2 Design Inspection (NRC Report No 50-315/316/97201)”
- Letter from J. M. Yedidia and G. F. Zindler (Westinghouse) to P. Dragoumis (AEP) dated March 31, 1969, “Component Cooling System” AEW-640, RFS-AE-2502)
- Letter from J. M. Yedidia and G. F. Zindler (Westinghouse) to R. S. Hunter (AEP) dated November 11, 1970, “Design Descriptions” (AEW-2193, RFS-AE-5578)
- Westinghouse Letter from Joe Walecko to Mr. Mark Kelly, dated September 16, 1997, transmitting Cooldown Calculation to Support Plant Restart
- Westinghouse Letter from Joe Walecko to Mr. Shane Lies, dated October 2, 1997, transmitting RHR Cooldown Calculation with a CCW Heat Exchanger Outlet Temperature 110°F
- Westinghouse Letter from E. Dzenis, G. Corpora and K. Garner to Mr. D. Hafer, dated December 15, 1999, Clarification of AEW-640
- AEP Internal Letter from Mark Michaelson to R.C. Godley, September 16, 1999
- Letter from John F. Stang, Sr. (NRC) to Robert P. Powers (IMP), dated September 27, 1999, Review of preliminary sequence precursor analysis of operational condition at Donald C. Cook Nuclear Plant, Units 1 and 2
- Letter from M. W. Rencheck (IMP) to U.S. Nuclear Regulatory Commission, dated November 8, 1999, Review of preliminary accident sequence precursor analysis operational condition
- AEP internal letter from Scott Boeing to Mary Beth Depuy, dated June 21, 1999 regarding Safety Significance Input
- S&L letter SLC-99-632, Transmittal of procurement requirements for EDG Starting Air Compressor Package 2-DCP-487
- AEP:NRC: C1099-08, “Donald C. Cook Nuclear Plant Units 1 and 2, Technical Specification Change Request, Containment Recirculation Sump Water Inventory,” October 1, 1999

Restart Action Plans

- Corrective Action Restart Action Plan 002, Revision 0B
- Failure to Update the UFSAR, Restart Action Plan 03B, Revision 0

- Uncontrolled/Unintended Plant Design Changes, Restart Action Plan 03A, Revision 0 and Revision 1
- Inadequate Consideration for System/Component Failure Modes (0350 Item 3D) Restart Action Plan 3D, Revision 0
- Resolution of Distributed Ignition Technical Specification Issue Restart Action Plan 09, Revision 0C
- Resolution of Hydrogen Mitigation System Operability and Material Condition Issues Restart Action Plan 011, Revision 0

Calculations

- SD-991129-001 (Draft)
- SD-990913-006, Piping Stress Analysis and Support Load Determination for the 10" SI Overflow Line Off RWST per DCP#2-DCP-729, Revision 0, December 14, 1999
- SD-990914-002, “Structural Evaluation of RWST Tank Water Level Increase,” Revision 0, December 13, 1999
- 2-E-N-PROT-RLY-002/0, Unit 2-4KV Safety-Related Motors Phase Instantaneous (PJC) Settings
- 2-E-N-PROT-TOL-001/0, Unit 2-600V Continuous Duty Motors, Thermal Overload Heater Selection Guidelines/Verification
- 2-E-N-PROT-RLY-006/0, Unit 2-EDG Overload and Over-current Relay Settings
- 2-E-N-PROT-PEN-001/0, Unit 2-Electrical Containment Penetration Protection
- 2-E-N-PROT-BKR-007/0, Unit 2- 600V Switchgear Settings, Breakers 21A6, 21C9, 21D9 and 21D14
- 2-E-N-ELCP-250-001/0, Unit 2-250VDC System Coordination Study
- 2-RPA-4344 “Leak Testing of Unit 2 RWST Boundary Valves,” dated October 26, 1999
- ENSM970606JJR RWST Vortexing, Revision 2, dated 10/21/97
- 1-2-UNC-339 CALC1 "RWST Level Loop Accuracy Calculation," Revision 1, dated November 1, 1999
- 1-2-I9-03 CALC6 "RWST Level Scaling Calculation," Revision 0, dated October 29, 1999
- PA-97-06, Risk Analysis of Potential Events Associated with 12-DCP-854,” Revision 0, dated September 22, 1997 (Note: This calculation number is the same as the number for an unrelated report.)
- MD-12-CA-001-N, Rate of Containment Pressurization due to Failure of a Relief Valve on the Compressed Air System, Revision 1, dated November 11, 1997
- ENSB-12-CA-97-01, Control Air Header Overpressure Protection, Revision 0, dated September 23, 1997

Design Change Packages

- Request for Change RFC DC-12-2361, Work Package to Install Recirculation Sump Modifications Recommended by Alden Research Laboratory, February 1, 1979
- Design Change Package 12-DCP-852, Recirculation Sump Vent Hole Screens in Units 1 and 2 Containments, Revision 0, dated September 19, 1997
- Design Change Package 12-DCP-854, Relocate Safety Relief Valves on the Containment Control Air Headers, Revision 0 and 2
- Design Change Package 12-DCP-855, Revision 0
- Design Change Package 2-DCP-4258 (Draft)

- Design Change Package 2-DCP-487, EDG Starting Air Compressor
- Design Change Package 2-DCP-549
- Design Change Package 2-DCP-443 “Re-Route CEQ Stairwell Drains”
- Design Change Package 2-DCP-650 “CEQ Fan Timer/Logic Change”
- Design Change Package 2-DCP-679 “Crane Wall Openings”
- Design Change Package 2-DCP-729 “RWST Overflow Line Modification” Revision 0, dated December 11, 1999
- Design Change Package 2-DCP-4392, Fuse Replacement
- Design Change Package 12-DCP-0853, Modification to RWST Level Instruments ILS-950 and 951, Revision 0, dated September 24, 1997

Licensee Event Reports

- LER 50-315/97026-01, “Potential for Overpressurization of the Control Air Headers Determined to Be Unanalyzed Condition”
- LER 50-316/98005-00, “Interim LER - Potential for High Energy Line Break to Degrade Component Cooling Water System”
- LER 50-316/97005-01, “Condition Outside Design Basis Results in Technical Specification Required Shutdown”
- LER 50-315/97017-01, “Condition Outside Design Basis Results in Technical Specification Required Shutdown”
- LER 50-315/97018-01, “Failure to Maintain the One Fourth Inch Particulate Retention Requirement for the Containment Recirculation Sump Results in a Condition Outside the Design Basis”
- LER 50-315/97020-01, “Failure to Maintain Sump Vent Configuration Results in Condition Outside the Design Basis”
- LER 50-315/97011-02, “Operation Outside the Design Basis for ECCS and Containment Spray Pumps for Switchover to Recirculation Sump Suction”
- LER 50-315/97024-04, “Material Discovered in Containment Degrades Containment Recirculation Sump and Results in Condition Outside Design Basis”
- LER 50-315/98012-00, “One Fourth Inch Particulate Requirement Not Maintained in Containment Recirculation Sump”
- LER 50-315/97021-01, “Potential Loss of All Medium and High Head Injection Due to Single Failure Could Result in a Condition That Would Prevent the Fulfillment of the Safety Function of a System”
- LER 50-315/99011-00, “Air System for Emergency Diesel Generators (EDG) May Not Support Long Term Operability Due to Original Design Error ”
- LER 50-315/98034-00, “Interim LER - Flow Rates to Containment Spray Headers Are Potentially Lower than Design Basis Values”
- LER 50-316/97003-03, “Performance of Dual Train Component Cooling Water Outage During Unit 2 1996 Refueling Outage Resulted in Condition Outside Plant Design Basis”
- LER 50-315/97019-01, “Operation Contrary to the Design Bases with Residual Heat Removal Suction Valves Automatic Closure Interlock Defeated in Modes 4 and 5"
- LER 50-315/97022-01, “Failure to Comply with USAS B31.1 Power Piping Code Due to Oversight in Valve Control Requirements Results in a Condition That Could Have Prevented Fulfillment of a Safety Function of a System”

- LER 50-315/97022-01, “Failure to Comply with USAS B31.1 Power Piping Code Due to Oversight in Valve Control Requirements Results in a Condition That Could Have Prevented Fulfillment of a Safety Function of a System”
- LER 50-315/98031-01, “Potential Common Mode Failure of Residual Heat Removal Pumps Due to Use of Inaccurate Values”
- LER 50-315/98056-00, “Interim LER – Hot Leg Nozzle Gaps”
- LER 50-315/97014-02, Potential for Operation in Unanalyzed Condition Due to Postulated Elevated Room Temperatures”

Miscellaneous Documents

- NRC Branch Technical Position RSB 5-1, Revision 1, Design Requirements of the Residual Heat Removal System
- D. C. Cook UFSAR chapter 9, Revision 16.2
- Programmatic Assessment Report of Corrective Action and Self-Assessment, RST-1999-001-CAP (draft), dated August 12, 1999
- Corrective Action Program Monthly Performance Indicators, September 1999
- Slides from AEP:NRC public 0350 Meeting, October 28, 1999
- System Description, SD-AEP/AMP-200/C/1, American Electric Power Services Corp. Donald C. Cook Nuclear Plant Units 1 and 2. Shop Order AEP/AMP-200, Residual Heat Removal System, L. D. Parke, August 1970
- D. C. Cook Technical Specification 3.0.3
- Vendor Technical Manual VTD-CONS-0024, Consolidated (Dresser) Engineering Instructions EG394, Revision 0
- Vendor Technical Manual VTD-CONS-0025, Consolidated (Dresser) Publication SRV#1
- Vendor Technical Manual VTD-CONS-0008
- Assessment and Action Plan, HELB Program at D. C. Cook, Engineering Leadership Plan, Assessment Number RST-1999-011-NED, approved December 7, 1999
- Engineering Action Plan 99-282, EDG Starting Air, dated October 25 1999
- NRC Information Notice 98-41, dated November 20, 1998
- Calculation Assessment Report, No. SA-1999-011-NED, Revision 1, November 23, 1999
- Operations and Maintenance Functional Area Activities Assessment Report, No. SA-1999-012-NED, November 20, 1999
- Assessment of Engineering Bypass Mechanisms, Revision 0
- Assessment of UFSAR Verification Activities, December 15, 1998
- Licensing Basis Review Project Summary Report, Revision 0, August 27, 1999
- CAL Item No. 8 Closure Package, dated December 1, 1999
- Alden Research Laboratory Report “Hydraulic Model Investigation of Vortexing and Swirl within a Reactor Containment Recirculation Sump,” for Donald. C. Cook Nuclear Power Station, dated September 1978
- Alden Research Laboratory Report “Experimental Investigation of Air Entrainment at a Reactor Containment Sump due to Break and Drain Flow,” dated December 1979

Condition Reports

- CR 95-1015, RWST Vortexing, dated July 7, 1995
- CR 96-1605, Failure To Identify Plant Changes as Temporary Modification, dated October 9, 1996

- CR 97-0011, Failure to Adequately Review the Use of Non-Safety Related Pipe on Auxiliary Feedwater Pump Bearings, dated December 31, 1996
- CR 97-904, “During Performance of CCW Flow Balance Procedure 12EHP 4030 STP.248, The Flow to The Steam Generator Blowdown Sample Heat Exchanger Did Not Meet Acceptance Criteria”
- CR 97-2196, ”50.59 Review Has Not Been Completed to Support the Higher Lake Temperature and the Safety Related Calculations Have Not Been Reviewed to Determine If They Are Impacted by the Higher Lake Temperature”
- CR 97-2312, RWST Level reads higher than actual, dated August 22, 1997
- CR 97-2350, RWST Vortexing, dated August 27, 1997
- CR97-2378, “Operation of the Plant with CCW Supplied Flows to Components Contrary to the Values Stated in the UFSAR”
- CR 97-2390 “Past Operation With Lake Temperatures Greater than 76 Degrees Has Resulted in an Unanalyzed Control Room Instrumentation Concern”
- CR 97-2409, “Indications that Required Containment Conditions Will Not Be Met,” September 5, 1997
- 97-2447, “Lack of Over-Pressure Protection on the 20, 50, and 85 Psi Control Air Headers Needs to Be Investigated to Ensure That a Postulated Regulator Failure”
- CR 97-2450, Not all RWST Flow Paths are Leak Tested, dated September 11, 1997
- CR 97-2457, “Fibrous Material in Containment”
- CR97-2358, Failure to Meet RWST Appendix R Borated Water Supply Requirements, dated August 28, 1997
- CR 97-3523, “GL 89-13, Service Water System Problems Affecting Safety-Related Equipment Testing of the CCW/ESW Heat Exchangers ”
- CR P-98-0025, RWST Overflow line drip catch, dated December 29, 1997
- CR P-98-0346, Inadequate 10 CFR 50.59 Screening for OHP 4023.ECA-0.2 Change
- CR P-98-0347, Inadequate 10 CFR 50.59 Screening for OHP 4023.ECA-0.0 Change
- CR P-98-0913, “Discrepancies Between EOPs and Accident Analysis for Primary System Containment Spray System”
- CR P-98-2078, “NSAL 98-002, Potential Common-Mode Failure of RHR Pumps During Intermediate Break LOCA”
- CR P-98-2383
- CR P-98-02924, Changes in Containment Conditions That May Affect Analyzed Containment Pressure
- CR P-98-2927 RWST, Tank Pressure Uncertainty Did Not Include Tank Vacuum, dated June 23, 1998
- CR P-98-4080,“Potential for Single Failure To Isolate ECCS Suction Paths”
- CR P-98-5019, NESW and ESW Autostart Function Testing, dated September 18, 1999
- CR P-98-7848, “Westinghouse Owners Group Withdrew From Consideration ECAP 13386 ECCS Hot Leg Recirculation Elimination For Westinghouse 3 and 4 Loop Design NSSS”
- CR P-98-06001, “Diesel Fuel Oil incorrect calibration – 0 level input signal should be 0.125 feet not 0.0 feet”
- CR P-98-5356, “No Documentation to Show That the Suction Strainers in the ESW System Can Support the Design Basis of the AFW System”
- CR P-98-5456, Inadequate RFC 12-396 Cancellation, dated October 6, 1998
- CR P-98-5844, Rod Control System Failure Could Invalidate Maximum Rod Cluster Speed FSAR Statement, dated October 15, 1998

- CR P-98-6704, Conflicting Information on RWST Heat Trace Safety Related Status, dated November 11, 1998
- CR P-99-996, “Excessive Vibration in the RHR Systems When Flow Is Aligned to the Normal Cooldown Line”
- CR P-99-01467, Air Flowing Through Control Room Ventilation Equipment Room Floor Drains Crosstied Control Room Pressure Boundaries
- CR P-99-3087
- CR P-99-4180, Use of incorrect design inputs for calculation DCCHV12AE06-N, dated March 3, 1999
- CR P-99-4983, “Lower Containment Sump Does Not Conform to TS Bases 3.4.6.1 Leakage Detection System”
- CR P-99-5412, Containment Wide Range Level Instruments are not protected against foreign material blockage, dated December 4, 1999
- CR P-99-6940, “Degradation of ECCs Throttle Valves Due to Cavitation Induced Erosion during LOCA”
- CR P-99-8841, “Insufficient Assurance AES Is Capable of Meeting Safety and Accident Mitigation Functions”
- CR P-99-09388, Operability Determination Deficiencies, dated April 24, 1999
- CR P-99-07350, Operations Leadership Plan Problem Statement 3
- CR P-99-10357, Inappropriate Safety Related Fan Control Scheme Design Change, dated May 3, 1999
- CR P-99-10520, “Zebra Mussel Monitoring and Control Program,” May 4, 1999
- CR P-99-10970, Corrective Actions Leadership Plan Problem Statement 4, dated May 7, 1999
- CR P-99-12506, High Backlogs Continue to Challenge Department Resources and Contribute to Confusion of Department Priorities, dated May 19, 1999
- CR P-99-12642, The Number of Overdue CRs, Root Cause Determinations, and Corrective Actions within Design Engineering Should be Included in the Respective Performance Indicators, dated May 20, 1999
- CR P-99-13758, “Design Engineering Has No Process in Place for Performing Single-failure and Redundancy Evaluations”
- CR P-99-13651, Condition Reports in eCAP are Not Being Processed by Departments in a Timely Manner, dated May 26, 1999
- CR P-99-14624, A large backlog of Root Cause Evaluations is Delaying Targeting Corrective Actions and Closure for many CRs, dated May 28, 1999
- CR P-99-14944, “Design Engineering Should Assess AL/ZN Inventories Inside Containment to Ensure That They Are Consistent with the Plant Design Basis”
- CR P-99-15163, “Technical Specification inconsistencies related to SG Wide Range Level Indication,” June 10, 1999
- CR P-99-17931, “Discrepancy Found In Wide Range Level Indication Channel Uncertainty Value,” July 7, 1999
- CR P-99-19039, Track unverified release rate data in dose calcs, dated July 20, 1999
- CR P-99-27432, “PMP-2010.PRC.002 Should Be Enhanced”
- CR P-99-28491, RWST Tank Drawing Inconsistencies
- CR P-99-28571, Evaluated corrective action not carried over to a CA, dated November 11, 1999
- CR P-99-28795, CR 99-5412 Condition Evaluation for assessing debris of RG 1.97 wide range containment level indication appears inadequate, dated December 9, 1999

- CR P-99-28769, “Incomplete Condition Report Evaluation,” December 12, 1999
- CR P-99-28798, Chemistry Monitoring Equipment Instrument Uncertainty, dated December 9, 1999
- CR P-99-29023
- CR P-99-29017
- CR P-99-28798, Chemistry Monitoring Equipment Instrument Uncertainty, dated December 9, 1999
- CR-P-99-29159, “A Discrepancy in 2-DCP-650 Between Section 2.2 “Affected Design Document” and Section 5 “Open Items/Constraint List”
- CR P-99-29203, Containment Wide Range Level Sensing Instrument (NLI-320, -321) no provision for blockage of debris, dated December 16, 1999
- CR P-99-29206, “Questions from NRC ECATI on 2-DCP-729 and Associated Calculations,” December 15, 1999
- CR P-99-29325, Elevation Accuracy and Dimensions Not Addressed, dated December 16, 1999