U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Licensee:	Indiana Michigan Power Company
Facility:	Donald C. Cook Nuclear Generating Plant
Location:	1 Cook Place Bridgman, MI 49106
Dates:	September 14, 1999 - January 5, 2000
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EXECUTIVE SUMMARY

D. C. Cook, Units 1 and 2
NRC Inspection Report 50-315/99026(DRS); 50-316/99026(DRS)

By NRC 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 nonroutine inspection focused on the licensee corrective actions for resolution of CSC items 6 "Resolution of Ice Condenser Issues" and 12 "Resolution of Containment Liner Pitting" identified in Enclosure (1) of this letter. The standard applied to evaluate the acceptability for resolution of these CSC items was that described in paragraphs C.1.1 "Root Cause Determination", C.1.2 "Corrective Action Development", C.1.3 "Corrective Action Plan Implementation and Effectiveness" of Enclosure (2) of the NRC letter transmitting the CSC. Based on this inspection CSC items 6 and 12 are closed.

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 a higher inspection priority. All RAM items associated with the ice condenser were categorized as low inspection priority. A sample of these lower inspection priority 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 inspection priority 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 D. C. Cook and to ensure appropriate focus on the issues most important from a safety and probabilistic risk perspective.

Maintenance

- Overall, the licensee had implemented adequate corrective actions for previously identified issues related to surveillance testing of the ice condenser. Based on establishment of enhanced procedure controls and observations of contractor training, the inspectors concluded that adequate contractor controls existed to reduce the likelihood of ice basket damage (M1.1).

- Comprehensive corrective actions had been implemented for previously identified issues affecting the material condition of the ice condensers. Substantial improvements in the ice condenser material condition were observed by the inspectors. Further, the actions to replace the lower inlet door seals, to reduce the ice sublimation rate, represented a long-term solution to maintaining a stable ice bed inventory (M2.1).

Engineering

- The inspectors concluded that the licensee had established appropriate corrective actions to address the causes for poor design controls associated with the ice condenser. Based on a review of modifications, vendor audit and observations of the

Design Review Board, the inspectors concluded that adequate modification and design controls were implemented for ice condenser components (E7.1).

- For resolution of ice condenser issues, the scope of corrective actions documented in Restart Action Plan 6 was considered comprehensive. Fifty-eight corrective actions were specified in the licensee's Restart Action Plan 6, which included revisions to procedures, enhanced training, component modifications, and improvements to the overall material condition in the ice condenser to address deficiencies in surveillance testing, material condition and the design basis for the ice condenser. Based on review of a sample of these corrective actions, Case Specific Checklist item 6 is closed (E8.1).

- Comprehensive and thorough investigations of the containment liner pitting corrosion had been completed. Corrective actions for resolving the containment liner pitting included recoating of corroded areas and resealing of the containment liner floor interface and completion of an engineering evaluation to confirm liner integrity. The inspectors considered the corrective actions adequate to resolve this issue and Case Specific Checklist item 12 is closed (E8.2).

Report Details

II. Maintenance

M1 Conduct of Maintenance

M1.1 Ice Condenser Surveillance Testing

a. Inspection Scope (40500 and 61700)

The NRC had previously identified issues related to surveillance testing of the ice condenser as documented in inspection report 50-315/98005(DRS); 50-316/98005 (DRS). These issues were incorporated into the NRC Restart Action Matrix (RAM) and classified as low inspection priority items. The inspectors verified that these issues had been entered into the corrective action system and that the licensee had designated the completion of appropriate corrective actions prior to restart. One issue associated with the control of contractors during ice condenser surveillance testing was selected for a more in-depth evaluation of corrective actions.

b. Observations and Findings

For issues related to ice condenser surveillance testing, the licensee implemented corrective actions, which included revisions to procedures, enhanced training and revised Technical Specifications (TS). The condition reports which addressed the issues associated with ice condenser surveillance testing were identified in Table 1 of Restart Action Plan (RAP) 6 "Address Ice Condenser Issues", and were reviewed by the inspectors as discussed below.

b.1 Ice Condenser Flow Passage Surveillance Testing

The licensee had failed to provide appropriate instructions in 12 EHP 4030 STP.250, Revision 1, "Inspection of Ice Condenser Flow Passages", which was used to perform the Technical Specification (TS) required inspection of ice condenser flow passages (EEI 50-315/98005-01(DRS); EEI 50-316/98005-01(DRS), EEI 50-315/98005-02(DRS); EEI 50-316/98005-02(DRS), EEI 50-315/98005-03(DRS); EEI 50-316/98005-03(DRS)). This procedure had inadequate instruction for selection and inspection of ice condenser flow passages. Additionally, this procedure had insufficient margin between the acceptance criterion for degraded flow passages and analysis assumptions. These conditions were reported to the NRC in Licensee Event Report (LER) 50-315/98004-02 and LER 50-315/98025-00. The inspectors confirmed that these issues were adequately documented in condition reports (CRs) 98-1764, 98-1061, 98-0326, and 98-1062. Corrective actions included revising the TS requirements and surveillance procedures to correct these deficiencies. Incompleted corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.2 Ice Weight Surveillance Testing

The licensee had failed to provide appropriate instructions in 12 EHP 4030 STP.211, Revision 2, "Ice Condenser Surveillance", used to perform the TS required verification of ice basket inventory (EEI 50-315/98005-04(DRS); EEI 50-316/98005-04(DRS), EEI 50-315/98005-05(DRS); EEI 50-316/98005-05(DRS), EEI 50-315/98005-6a(DRS), EEI 50-316/98005-6b(DRS), EEI 50-315/98005-07(DRS); EEI 50-316/98005-07(DRS)). This procedure did not provide sufficient allowance between the maximum acceptable gross ice basket weight of 1877 pounds and the analysis limit to account for error associated with the measurement uncertainty in performing the basket weighing surveillance. This procedure allowed unpinning of up to 60 ice baskets in performing the surveillance without an analysis to bound this configuration and this condition was reported to the NRC in LER 50-315/98006-02. Use of this procedure, resulted in the selection of nonrepresentative samples of ice baskets, as reported to the NRC in LER 50-315/98007-00 and 50-315/98015-01. Additionally, the licensee had not followed the procedure change process. The inspectors verified that these issues were documented in CRs 98-0500, 98-725, 98-1059, 98-1060, 98-0673, 98-687, 98-1657 and 98-537. Corrective actions included revising the ice condenser TS requirements and surveillance procedures to correct these deficiencies. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.3 Ice Condenser Basket Inspection Surveillance Testing

The licensee had failed to include TS requirements to inspect accessible portions of the lower basket assembly in 12 EHP 4030 STP.212, Revision 0, "Ice Condenser Basket Inspection", (EEI 50-315/98005-09(DRS); EEI 50-316/98005-09(DRS)). The inspectors verified that these issues were documented in CRs 98-388 and 98-5014. Corrective actions included revising the ice condenser surveillance procedures to correct these deficiencies. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.4 Ice Condenser Door Surveillance Testing

The door operability acceptance criteria were at the maximum values allowed by TS 4.6.5.3 in procedures 12 EHP 4030 STP.207, Revision 0, "Ice Condenser Lower Inlet Doors", and 12 EHP 4030 STP.245, Revision 0, "Inspection of Ice Condenser Intermediate Deck Doors". A margin for error associated with the measurement uncertainty in performing the door surveillance testing had not been incorporated into the acceptance criteria used in these procedures (EEI 50-315/98005-10(DRS); EEI 50-316/98005-10(DRS); EEI 50-315/98005-11(DRS); EEI 50-316/98005-11(DRS)). The inspectors verified that these issues were documented in CRs 98-1057 and 98-687. Corrective actions included revising the ice condenser surveillance procedures to correct these deficiencies. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.5 Control of Contractors During Ice Condenser Surveillance Testing

As reported in LER 50-315/98008-00, the licensee had identified numerous damaged, ice baskets, including damaged upper rims, missing or torn ligaments, and dents and folds. Some of the baskets had sustained sufficient damage to place them outside the original design basis. Subsequent licensee testing confirmed that these baskets may have failed, with plastic deformation, under less than design loads. The damaged baskets were documented in CRs 98-0388, 98-0721, 98-1058, 98-1077 and 99-22974 and identified as an apparent violation (EEI 50-315/98005-08(DRS); EEI 50-316/98005-08(DRS)) by the NRC. Corrective actions assigned to this issue included; action items 3, 22, 37 and 48 of RAP 6. These actions included establishing a definition of detrimental damage, assigning responsibility for oversight of production work to the maintenance department, upgraded maintenance and surveillance procedures, and an upgraded training program. The inspectors reviewed closure documents for these action items and performed a review of the corrective actions as discussed below. Incomplete corrective actions identified for the associated CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

The licensee attributed ice basket damage to improper handling of the baskets by the contractors during associated maintenance and surveillance activities. For example, as documented in CR 98-1077, licensee staff observed a contract worker using an inappropriate tool to free a stuck basket resulting in damage to the upper rim. Specifically, the licensee determined that there had been poor oversight of contractor personnel by plant staff, poor understanding of management expectations regarding control and oversight of contractors, and plant staff had failed to verify that the contractors were properly qualified and trained. As a corrective action, the licensee developed a station procedure (PMI-5080, Revision 7, "Administration of Contractors") describing expectations for contractor control. Additionally, the maintenance department assumed the overall oversight for those contractors performing ice condenser work. Other corrective actions included revising specific maintenance and surveillance procedures to preclude, identify and correct detrimental basket damage. The inspectors reviewed a sample of the revised maintenance and surveillance procedures and confirmed incorporation of appropriate additional instructions for preventing damage to the ice baskets. For example, precaution 3.10 of 12MPH-4030.010.001 "Ice Condenser Basket Weight Surveillance" stated that the only approved method for freeing a stuck ice basket was using the weighing rig specified in the procedure. Additionally, the prerequisites to this procedure required that personnel performing the surveillance had been trained to the latest training modules discussed below.

The licensee provided training to contractors on the revised maintenance procedures and on the general operation and purpose of the ice condenser. The inspectors attended contractor training held on October 29 and 30, 1999, for ice condenser operation and ice basket loading and weighing. This training included the use of ice basket mockups and stressed maintenance practices that avoided inadvertent basket damage. The contractor training appeared sufficiently detailed to address the causes for previous ice basket damage related to inappropriate surveillance testing practices.

c. Conclusions

Overall, the licensee had implemented adequate corrective actions for previously identified issues related to surveillance testing of the ice condenser. Based on establishment of enhanced procedure controls and observations of contractor training, the inspectors concluded that adequate contractor controls existed to reduce the likelihood of ice basket damage.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Restoration of Ice Condenser Material Condition

a. Inspection Scope (62707, 61726, 40500 and 37700)

The NRC had previously identified issues affecting the material condition of ice condenser components as documented in inspection report 50-315/98005(DRS); 50-316/98005(DRS). These issues were incorporated in the RAM and classified as low inspection priority items. The inspectors verified that these issues had been entered into the corrective action system and that the licensee had designated the completion of appropriate corrective actions prior to restart. One issue associated with ice bed inventory, was selected for a more in-depth evaluation of corrective actions. Additionally, the inspectors performed walkdowns of the Unit 1 and 2 ice condensers throughout the inspection period.

b. Observations and Findings

The inspectors observed substantial improvements in the ice condenser material condition. Each ice condenser had been completely thawed, and all ice baskets had been removed and reinstalled to facilitate ice basket replacement or repair work. Specific material condition improvements included; new covers, belts, drain piping, flex hoses and wiring for the air handling units, ice basket segments with no observable dents or missing screws (new screws), ice basket bottom assemblies with new hold down bar welds, grid assemblies, and galvanizing, new intermediate deck doors and protective door covers, new metallic air box shock absorbers, new lower inlet door channels and seals, resealed floor joints, new top deck doors, new runs of heat trace wiring, new supports and new insulation for glycol piping. At the conclusion of this inspection the licensee was in the process of refilling the Unit 2 ice baskets and had scheduled refill of the Unit 1 ice condenser.

The condition reports which addressed the issues associated with ice condenser surveillance material condition were identified in Table 1 of RAP 6 "Address Ice Condenser Issues", and were reviewed by the inspectors as discussed below.

b.1 Ice Bed Inventory

The licensee had failed to identify and evaluate the significance of missing ice segments in the lower section of the ice baskets (EEI 50-315/98005-12(DRS); 50-316/98005-12 (DRS)). This condition was documented in CRs 98-500 and 98-537. The licensee also

reported a related issue associated with falsification of ice weight data to the NRC in LER 50-315/98024-00. Corrective actions assigned to these issues included action items 3, 24, and 26 as documented in RAP 6. The licensee determined that the missing ice segments resulted from the ineffective management of the ice condenser system. Specifically, a poor understanding of the associated design basis and surveillance bases by the licensee's staff, resulted in the failure of the licensee's ice basket weight surveillance program to verify that the appropriate ice mass was resident and correctly distributed in the condenser. The inspectors reviewed closure documents for these action items and performed a review of the corrective actions discussed below. Incomplete corrective actions identified for the associated CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

The licensee initiated comprehensive actions to address concerns for ice bed inventory which included removing all ice (thawed) from each Unit's ice condenser and had completed actions to minimize the loss of ice through sublimation. The original door seals had degraded over the life of the plant, and consequently the intrusion of warm air through these seals contributed to increased sublimation of ice baskets near the crane wall. To minimize this inflow of heat through the lower doors, new ice condenser door seals were installed for each of the 24 pairs of lower inlet doors on Unit 2. The inspectors observed portions of the installation and preliminary acceptance testing on the lower inlet door seals of Bay 6 in the Unit 2 ice condenser. This activity was performed correctly and in accordance with station procedures. Unit 1 door seals were also scheduled to be replaced prior to Unit 1 restart. The inspectors noted that replacement of the lower inlet door seals, to reduce the ice sublimation rate, represented a long-term solution to maintaining a stable ice bed inventory. At the conclusion of this inspection, approximately 50 percent of the Unit 2 ice baskets had been refilled with new ice and Unit 1 ice baskets were empty pending completion of repair work and ice bed cooldown.

b.2 Ice Condenser Floor Checks

Trapped water under the lower floor slab had caused floor heaving at McGuire Unit 2 (reference inspection report 50-369/97-16; 50-370/97-16), which had affected the operation of the lower inlet doors. Melting of the ice within the ice condenser for D. C. Cook introduced water onto the lower ice condenser concrete floor wear slab surface. The licensee used specialized ultrasonic examination techniques to identify water trapped within the concrete subfloor areas filled with foam concrete in Unit 1, which was subsequently drained (Inspection Report 50-315;316/98016). The licensee avoided this condition in Unit 2, by application of additional sealant to seams in the concrete floor of Unit 2. Additionally, the licensee performed measurements pre and post-cooldown documented in job order C004600, C005389, and C0053985 to verify that the floor had not moved significantly during Unit 2 ice condenser cooldown. The inspectors compared data taken after cooldown for eight locations in four bays (bay 17, 18, 19 and 20) and noted agreement within one third of an inch with pre-cooldown measurements. Therefore, the inspectors concluded that floor heaving from potential water intrusion had not occurred in Unit 2 and that floor measurements planned for Unit 1 would readily indicate if floor movement occurred.

b.3 Ice Basket Screws

The licensee had failed to take appropriate timely corrective actions for missing ice basket screws (EEI 50-315/98005-15(DRS); 50-316/98005-15(DRS)), including evaluating the effect of the missing screws on the structural integrity of the ice baskets. This issue was reported to the NRC in LER 50-315/98005-03. The inspectors verified that these issues were documented in CRs 98-0306, 98-0538, and 99-02292. Corrective actions included testing to confirm the structural adequacy of existing screws and replacement of missing screws in each basket. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.4 Ice Basket Webbing Damage

The licensee had failed to take appropriate timely corrective actions for potentially detrimental ice basket webbing damage (EEI 50-315/98005-13(DRS); 50-316/98005-13(DRS). On February 12, 1998, the licensee conducted a scoping test on a Unit 1 ice basket, which contained a dented/buckled section of webbing approximately 1 foot above the bottom of the basket. This test was intended to apply a compressive axial and lateral load equivalent to that used to qualify the design basis of an undamaged basket. This basket began to fail with plastic deformation (crumple) under a compressive load of less than half that used to qualify the design of an undamaged basket. This condition applied to several Unit 1 and 2 ice baskets and the licensee reported this issue to the NRC as a condition outside the plant design basis in LER 50-315/98008-02. The inspectors verified that these issues were documented in CRs 98-0388, 98-1055, 98-0721, 98-1058, and 98-1077. Licensee corrective actions included removal, inspection and repair of all ice baskets in both units to meet the detrimental damage criterion described in 12CHP5021.MCD.004 "Removal and Replacement of Ice Condenser Ice Baskets", Revision 4. The inspectors had previously observed this process (reference inspection report 50-315/98016; 50-316/98016). Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.5 Ice Basket Lower Assembly Welds

The licensee had failed to take prompt effective corrective action for ice baskets with failed fillet welds (EEI 50-315/98005-18(DRS); 50-316/98005-18(DRS)). The licensee's extent of condition investigations subsequently identified additional defective hold down bar welds and missing grid welds. The NRC had previously identified an unresolved item (URI 50-315/98005-19(DRS); URI 50-316/98005-19(DRS)) pertaining to the evaluation of 10 CFR 50.72 and 10 CFR 21 reporting requirements for the hold down bar welds. The inspectors attributed the licensee's failure to perform an adequate evaluation and reporting under 10 CFR 50.72 and 10 CFR 21 to the failure to perform adequate corrective actions for the failed fillet welds on the hold down bar which was identified and corrected in response to EEI 50-315/98005-18(DRS); 50-316/98005-18 (DRS). The licensee subsequently reported this condition in LER 50-315/98032-00. The inspectors verified that these issues were addressed in CRs 98-0688, 98-1055, 98-2896, 99-01612, and 98-6988. Corrective actions included inspection and repair of each ice basket's bottom rim welds. Incomplete corrective actions identified for these CRs

had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.6 Lower Assembly U-bolt Nuts

The licensee had failed to take effective corrective actions to prevent the recurrence of loose U-bolt nuts on the lower ice basket assemblies (EEI 50-315/98005-16(DRS); 50-316/98005-16(DRS)). The inspectors confirmed that these issues were documented in CRs 98-1055, 98-0388 and 99-11408. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.7 Separated Ice Baskets

The licensee had failed to take effective corrective actions to prevent the recurrence of separated Unit 1 ice baskets (EEI 50-315/98005-17(DRS)). These issues were documented in licensee CRs 98-1055 and 98-0388. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.8 Debris in the Ice Condenser

The inspectors had identified fibrous material and debris in the ice condenser (EEI 50-315/98005-14(DRS); 50-316/98005-14(DRS)). The licensee subsequently identified additional debris and reported this condition in LER 50-315/98017-00. These issues were documented in CRs 98-0634, 98-3372, 98-3437, and 98-5581. Corrective actions included detailed inspections of all ice condenser bays for cleanliness and establishing improved methods for control of foreign material. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

On December 1, 1999, the licensee halted the filling of the Unit 2 condenser ice baskets due, in part, to problems with foreign material exclusion (FME) controls. On several occasions, these controls were not effectively implemented. For example, workers were allowed to enter the condenser with unsecured or unnecessary materials. This problem was caused by assigning contractors loading ice, the additional responsiblility for overseeing FME controls. The licensee determined that these problems had not yet resulted in instances where foreign material was introduced into the ice baskets. To address these problems, the licensee assigned FME oversight to a different contractor work group, and provided additional contractor staff to oversee the FME controls. Further, supplemental FME training was held for contract ice condenser personnel. On December 28, 1999, the inspectors observed ice loading of ice baskets in Bay 2 of Unit 2. A licensee control point logged/tracked materials transported into and out of the ice condenser to confirm positive FME controls. The inspectors concluded that problems with control of FME appeared to be adequately resolved.

b.9 Lower Inlet Door Shock Absorbers

The licensee had identified that the lower inlet door shock absorbers were damaged and did not meet their design and reported this condition in LER 50-315/98035-01. This issue was documented in CR 98-03152. Corrective actions included replacement of the existing foam absorbers with new stainless steel air boxes and training of personnel. Incomplete corrective actions identified for this CR had been designated for "restart." This issue is considered closed.

b.10 Divider Deck Barrier Seals Procedure

The NRC had identified an Unresolved Item (URI 50-315/98007-17(DRP); 50- 316/ 98007-17(DRP)) with step 6.3 of station procedure 12MHP4030.STP.039, Revision 1, "Upper and Lower Containment Compartments Seal Material Inspection". Specifically, this step appeared to give a blanket approval for using an alternate seal material configuration solely based on engineering approval and without an associated safety evaluation.

In CR 98-0930, the licensee concluded that this procedure did potentially allow for a bypass of the safety evaluation process and deleted step 6.3 in a subsequent revision to this procedure. The broader concern regarding bypasses of the safety evaluation process was documented in CR 99-06584 and was evaluated by the NRC (inspection report 50-315/99023; 50-316/99023). This issue is considered closed.

b.11 Bypass of the Ice Condenser Divider Seal Barrier

The licensee identified that prior deficiencies in the divider seal between upper and lower containment potentially would have allowed a bypass, during a loss of coolant accident, greater than previously analyzed. The licensee reported this condition in LER 50-316/98004-02 and 50-315/98037-01. The associated issues were documented in CRs 98-1053, 98-0500 and 99-09064. Corrective actions included implementation of a design change DCP -713 "Perform Divider Barrier Seal Rework" to replace portions of the divider seal barrier at the ice condenser end wall. The inspectors observed portions of the divider seal barrier replacement and reviewed the engineering resolution for field changes made to resolve problems with divider seal fit-up. Specifically, the minimum gap (rattle space) could not initially be maintained due to the as-found configuration of the joint at the containment and ice condenser end wall. The engineering department resolved the divider seal fit-up problems and this modification was successfully installed. Incomplete corrective actions identified for these CRs had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.12 Ice Condenser Deck Door Structural Discrepancies

As documented in LER 50-315/98010-01, the licensee had identified several intermediate deck door structural deficiencies resulting from a failure to follow procedures. Specifically, in CR 98-0607 the licensee attributed these problems to incorrect assembly of doors during past ice condenser work activities. The doors were

currently disassembled as part of the ongoing ice condenser work and incomplete corrective actions identified for this CR had been designated for "restart". This issue is considered closed.

b.13 As-Found Ice Condenser Operability Evaluation

The original ice condenser was degraded to a poor state of material condition, such that the operability of the ice condenser was in question (URI 50-315/98005-31(DRS); URI 50-316/98005-31(DRS)). The licensee stated at the May 20, 1998 predecisional enforcement conference that the ice condensers were inoperable in the as found condition. To resolve this issue the licensee had contracted Westinghouse to perform a containment integrity analysis. By letter, "Containment Integrity Analysis - Justification for Past Operation, Revision 1", dated May 15, 1998, Westinghouse concluded that post loss of coolant accident containment pressure would have reached 11.91 psig and remained below the 12 psig design. However, as described in CR 98-2924, the licensee identified that other conditions impacted this evaluation such as increased reactor coolant system volume, debris in the spray header, and the containment spray heat exchanger installed backwards (reference inspection report 50-315/98025(DRS)).

In the licensee's response letter of March 19, 1999, to the NRC notice of violation dated October 13, 1998, the licensee stated "...although there was a degradation in margin due to the degraded and nonconforming conditions identified in the cited violations, the emergency core cooling systems and ice condenser containment systems would have functioned and did not pose an undue risk....." Because of the variety and number of issues, the sampling nature of data such as ice weights, and the ice bed material condition, the licensee concluded that a rigorous operability analysis would have been extremely complicated to formulate. Therefore, based on the conditions outside the TS requirements and the level of effort required to assemble rigorous arguments to demonstrate operability, the licensee elected to consider both ice condensers inoperable. The licensee stated that future resources were focused on restoration of the ice condenser, vice demonstrating operability of the ice condenser in the as found condition. Based on corrective actions implemented and completed for the full spectrum of NRC and licensee identified ice condenser issues, the inspectors considered this item closed.

c. Conclusions

Comprehensive corrective actions had been implemented for previously identified issues affecting the material condition of the ice condensers. Substantial improvements in the ice condenser material condition were observed by the inspectors. Further, the actions to replace the lower inlet door seals, to reduce the ice sublimation rate, represented a long-term solution to maintaining a stable ice bed inventory.

III. Engineering

E7 Quality Assurance in Engineering Activities

E7.1 Restoration of the Ice Condenser Design and Licensing Basis

a. Inspection Scope (40500 and 37700)

The NRC had previously identified issues within the ice condenser related to maintenance of the design basis as documented in inspection report 50-315/98005 (DRS); 50-316/98005(DRS). These issues were incorporated in the RAM and classified as low inspection priority items. The inspectors verified that these issues had been entered into the licensee's corrective action system and that the licensee had designated the completion of appropriate corrective actions prior to restart. Issues associated with modification and design control for ice condenser components were selected for a more in-depth evaluation of corrective actions. Additionally, the inspectors reviewed the vendor audit performed by the licensee related to control of the ice condenser design basis "Engineering Evaluation Review Report ER-ICE-99-001 Westinghouse Electric Company" dated March 24, 1999.

b. Observations and Findings

For issues related to control of the ice condenser design basis, the licensee implemented corrective actions, which included a vendor audit, component modifications, revisions to the Updated Final Safety Analysis Report (UFSAR) and the establishment of design information transmittals to support surveillance testing requirements. The condition reports which addressed the issues associated with maintenance of the ice condenser design and licensing basis were identified in Table 1 of RAP 6 "Address Ice Condenser Issues", and were reviewed by the inspectors as discussed below.

b.1 Effective Vendor Audit for the Ice Condenser Design Basis

To assess control of the ice condenser design basis, the licensee performed an engineering review (audit) to assess the adequacy of the Westinghouse design control, configuration control, and technical support for the D. C. Cook Plant ice condensers. The inspectors reviewed the licensee's findings documented in the "Engineering Evaluation Review Report ER-ICE-99-001 Westinghouse Electric Company" dated March 24, 1999 and corrective actions to resolve these findings.

For this review, a four person team of experienced engineers performed a four week inspection (two on-site weeks conducted at the Westinghouse facility in Monroeville, Pennsylvania). The review scope for this audit was extensive, as evidenced by the number and types of documents reviewed. The scope included a detailed vertical review of two ice condenser components (ice baskets and shock absorbers), a review of component design basis accident margins resulting from power uprating, and a review of the Westinghouse responses to "as-found" material conditions/technical issues identified by the licensee.

Based on the audit findings, the licensee concluded that the design basis of the ice condenser had been invalidated. Specifically, the licensee's report stated; "The engineering design analysis appears to be intact, although fragmented and difficult to follow. Unfortunately, Westinghouse has consistently utilized the ultimate strength in assessing design change impacts. Additionally, successive revisions of ice condenser design loads (e.g. loss of coolant accident blowdown loads and dead weight loads) have invalidated the original design basis defined in WCAP-8304/WCAP-8887 and FSAR Appendix M. The use of ultimate, rather than design strength in design impact assessments has compounded this error." The inspectors considered that the licensee conclusions were supported by the report observations and findings. Because of these findings, the licensee initiated a reanalysis of ice condenser components and containment during design basis accident loadings. The product of this reanalysis included calculation SD-990826-003, Revision 0 "D. C. Cook Ice Condenser Ice Basket Design", which established the new design basis for the ice baskets. Additionally, the licensee contracted Westinghouse to issue a new design basis document; WCAP-15323 "D. C. Ice Condenser Ice Basket Structural Qualification".

The methodology and personnel used for this engineering review were effective as evidenced by the types of issues identified. For example, in CR 99-6410 the licensee identified that the 1988 Westinghouse Cook Plant power uprate report failed to evaluate potential ice condenser impacts. As a consequence, the licensee's design basis documents and UFSAR were not updated to reflect new ice condenser design basis loads and load factors. Nine new condition reports were written to document issues related to ice condenser components or their design basis and calculations were initiated to reanalyze the blowdown loads on the ice condenser components. The inspectors confirmed that the licensee corrective actions implemented for these issues were designated to be complete prior to restart.

b.2 UFSAR Description of the Ice Condenser

The licensee had failed to update the ice condenser description in the UFSAR. Specifically, the NRC identified that the licensee had not incorporated; ice condenser flow passage blockage limits as established in WCAP-11902, as-built ice basket configuration, description of the ice form, modified ice baskets, the revised maximum analyzed gross ice basket weight, and the replacement ice basket design into the UFSAR (EEI 50-315/98005-20(DRS); EEI 50-316/98005-20(DRS), EEI 50-315/98005-21(DRS); EEI 50-316/98005-21(DRS), EEI 50-315/98005-22(DRS); EEI 50-316/98005-22(DRS), EEI 50-316/98005-23(DRS), EEI 50-315/98005-24(DRS), EEI 50-315/98005-25(DRS), EEI 50-316/98005-25(DRS), EEI 50-315/98005-26(DRS); EEI 50-316/98005-26(DRS)). The inspectors confirmed that these issues were documented in CR 98-1056. Incomplete corrective actions identified for this CR had been designated for "restart" or where appropriate, deferred to a post restart date. These issues are considered closed.

b.3 Modification and Design Control for Ice Condenser Components

The NRC had identified examples, in which the licensee had failed to follow established design control processes for modification to the ice baskets (EEI 50-315/98005-27 (DRS); EEI 50-316/98005-27(DRS), EEI 50-315/98005-28(DRS); EEI 50-316/98005-

28(DRS), EEI 50-315/98005-29(DRS); EEI 50-316/98005-29(DRS), EEI 50-315/98005-30(DRS); EEI 50-316/98005-30(DRS)). Corrective actions were assigned for this issue as action items 15 and 16 of the licensee's restart plan. These corrective actions addressed root cause CR-3 "Failure to update ice condenser component drawings to show the current authorized configurations", identified in the licensees RAP 6. Based on the corrective actions completed and implemented (as discussed below) these issues are considered closed.

The inspectors reviewed corrective actions for issues related to the ice basket design basis documented in CR 98-1054. Actions #2 and #5 of this CR involved the physical removal and reinspection of the Unit 2 ice baskets. The inspectors reviewed action request 156423 and actions 24, 51, 52, 59, 62, 64, and 65 completed or in progress under job order C004381 to confirm licensee corrective actions had been implemented for this issue. All actions under this job order were designated as required for the restart of Unit 2. The licensee had previously committed to the NRC that a design change would be issued to allow use of a bolt, instead of only a clevise pin in the ice basket lower assembly. Action #3 for this CR specified changing this commitment. The licensee intended to delete this action and meet the original NRC commitment. The inspectors confirmed that draft Revision 3 to DCP-887 incorporated the use of a bolt or clevise pin in the lower basket assembly consistent with the original NRC commitment. In action #6, the licensee committed to issue 2- LDCP-645 to document the as-left configuration of the ice baskets and this action had been completed. The licensee specified similar corrective actions to those discussed above for the restoration of the Unit 1 ice baskets, which were designated to be completed prior to Unit 1 restart. Additionally, the inspectors observed in-process ice basket inspection, repair and replacement activities during prior inspection activities documented in NRC reports 50-315/98016(DRP); 50-316/98016(DRP) and 50-315/98025(DRS).

The licensee determined that the loss of design controls in the ice condenser represented symptoms of a broader problem in the control of the plant design and licensing basis. Broader scope corrective actions were designated to correct the management, organizational, and programmatic root causes associated with the overall loss of design control as documented in corrective actions for CR 99-00594.

To improve the quality of modifications, an additional review was added to the modification planning and issue process. This review was conducted by the Design Review Board which was comprised of a nine member team primarily staffed by contractors. This team included designated members representing regulatory affairs, maintenance, electrical engineering, instrument and controls engineering, mechanical engineering, structural engineering, systems engineering, operations and nuclear fuel and safety analysis. The team members typically had extensive experience and education in the disciplines which they represented. The inspectors attended two meetings in which this board reviewed design change packages related to glycol flex hoses for the air handling units and lighting within the ice condenser. This board provided knowledgeable informed questions, that prompted additional engineering reviews and corrective actions. Based on these observations, the inspectors considered that the Design Review Board was improving the quality of the modification process.

b.4 Design Basis Established for Surveillance Requirements and Ancillary Equipment

The licensee issued eight design information transmittals (DITs) documenting the historical basis for procedure requirements and acceptance criterion in the ice condenser surveillance procedures. The inspectors reviewed DIT S-00084-00 "Ice Condenser Basket Weighing Surveillance" and DIT S-00076-00 "Ice Condenser Flow Passage and Channel Surveillance". These documents provided a detailed history of the design and licensing basis supporting the procedure requirements and acceptance criteria in the associated TS surveillance procedures. The inspectors considered that the intended purpose in providing a repository for information on design basis, methodology, assumptions, margins and limitations had been met, to complete corrective action 26 of RAP 6.

The licensee identified in CR 98-4099 that ancillary equipment installed in the ice condenser was not designed to withstand design basis earthquake and seismic loads and reported this condition to the NRC in LER 50-315/98050-00. The licensee designated actions 14 and 55 of RAP 6 to address this issue. Actions implemented included design changes to upgrade supports/restraints and proposed revision of the ancillary equipment design criteria for incorporation into the UFSAR. Incompleted corrective actions identified for this CR had been designated for "restart" or where appropriate, deferred to a post restart date. This issue is considered closed.

c. Conclusions

The inspectors concluded that the licensee had established appropriate corrective actions to address the causes for poor design controls associated with the ice condenser. Based on a review of modifications, vendor audit and observations of the Design Review Board, the inspectors concluded that adequate modification and design controls were implemented for ice condenser components.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) Resolution of Ice Condenser Issues (CSC Item 6)

a. Inspection Scope (40500 and 37700)

The NRC identified resolution of ice condenser issues as Case Specific Checklist (CSC) item 6. The inspectors reviewed licensee root causes and corrective actions taken for ice condenser issues documented in RAP 6 "Address Ice Condenser Issues" Revision 1 and the licensee response of March 19, 1999, to the NRC notice of violation dated October 13, 1998.

b. Observations and Findings

The regulatory issues associated with the ice condenser documented in inspection report 50-315/98005(DRS); 50-316/98005(DRS) were entered into the licensee's corrective action system and had been incorporated into RAP 6 "Ice Condenser Issues" Revision 1. Corrective actions reviewed by the inspectors in sections M1.1, M2.1 and

E7.1 of this report included: revisions to procedures, enhanced training, component modifications, and improvements to the overall material condition to address deficiencies in surveillance testing, material condition and design controls for the ice condenser. The root causes for these issues were evaluated as discussed below.

The inspectors attended the Senior Management Review Team meeting for review and approval of RAP 6 and concluded based on the plan presentation and ensuing discussions, that comprehensive actions had been implemented to address the ice condenser problems. In this plan, the licensee identified 20 root causes for ice condenser related issues. The root causes were grouped into three categories; management ineffectiveness, organization to program ineffectiveness and human errors. However, no documentation existed to provide a direct correlation between NRC and licensee identified problems in the ice condenser to the 20 individual root causes. The inspectors noted that these root causes appeared to bound the gambit of ice condenser deficiencies which had been identified and concluded that criterion c of C.1.1 "Root Cause Determination", of Enclosure 2 of the NRC letter transmitting the Specific Checklist had been met.

Actions referenced in RAP 6 included training of ice condenser personnel, revision of procedures, processes and programs to address the root causes which resulted in the degradation of the ice condensers. Open NRC issues had been correlated to actions planned or completed in Table 1 of this plan and each root cause had been correlated with corrective actions in Table 4. The inspectors considered that criteria a, b, c, d, e, f, g, h, i, and j, of C.1.2 "Corrective Action Development" of Enclosure 2 of the NRC letter transmitting the Specific Checklist had been met.

Each of the 58 corrective actions had a responsible owner with a completion date designated (prior to Unit 2 restart) for the deliverables/expected results (Table 5 of RAP 6). The licensee classified the ice condenser in Maintenance Rule A.2 and intended to use procedure PMI 5035 "Maintenance Rule Program" Revision 3 to do performance monitoring and trending for the ice condenser. Additionally, the Performance Assurance department audited seven of the 58 corrective actions and confirmed adequate corrective actions had been implemented. The inspectors considered the corrective actions comprehensive and appropriate to address the ice condenser issues (sections M1.1, M2.1 and E7.1). The inspectors considered that criteria a, b, c, f, h, and j of C.1.3 "Corrective Action Plan Implementation and Effectiveness" of Enclosure 2 of the NRC letter transmitting the Specific Checklist had been met.

c. Conclusions

Direct correlation between NRC and licensee identified problems in the ice condenser to specific root causes had not been documented. However, the root causes appeared to bound the gambit of ice condenser deficiencies which had been identified and were tied to specific corrective actions with owners, deliverables and appropriate due dates assigned to each action.

For resolution of ice condenser issues, the scope of corrective actions documented in RAP 6 was considered comprehensive. Fifty-eight corrective actions were specified in RAP 6, which included revisions to procedures, enhanced training, component

modifications, and improvements to the overall material condition in the ice condenser to address deficiencies in surveillance testing, material condition and the design basis for the ice condenser. Based on review of a sample of these corrective actions, CSC item 6 is closed.

E8.2 (Closed) Resolution of Containment Liner Pitting (CSC Item 12)

a. Inspection Scope (40500, 62707, 61726 and 37700)

The licensee identified areas of containment liner pitting in both Units. The NRC identified resolution of containment liner pitting issues as CSC item 12. The inspectors reviewed licensee root causes and corrective actions taken for containment pitting identified in both Units as documented in RAP 12 "Containment Liner Corrosion Pitting" Revision 0. Additionally, the inspectors performed a walkdown of the accessible portions of the Unit 1 and 2 containment liner where pitting had been identified.

b. Observations and Findings

In response to NRC Information Notice 97-10 "Liner Plate Corrosion in Concrete Containments", the licensee performed visual inspections of the containment liner on Unit 2. On February 6, 1998, the licensee identified corrosion (pitting) of the Unit 2 containment liner at the floor seal area which did not exceed the maximum allowable depth of 0.125 inches. On March 5, 1998, the licensee identified pitting of the Unit 1 containment liner plate in the floor seal area. This examination identified in excess of 40 areas in which the thickness of the liner plate had been reduced below a minimum design thickness value of 0.25 inches. The licensee reported this condition to the NRC in LER 50-315/98011-02. The licensee also identified minor areas (containment liner thickness was maintained above minimum design) of liner corrosion on the bottom side of the top deck ice condenser curtain support in each Unit. These issues and related issues were captured in RAP 12 and entered into the corrective action system as documented in CRs 98-1772, 98-4969, 98-5111, 98-5925, 98-5926, 98-6010, 98-5111, 98-0443, 98-00836, 99-12223, 99-16903, 99-17104, 99-17113, 99-18478 and 99-18480. The root causes and corrective actions identified for these issues were reviewed by the inspectors as discussed below.

In RAP 12 "Containment Liner Corrosion Pitting" Revision 0, the licensee identified two root causes; lack of (or inadequate) maintenance procedural requirements for containment liner seals that resulted in degradation of the seals and lack of a comprehensive containment liner inspection program that resulted in liner corrosion. Additionally, the licensee identified three "inappropriate actions"; maintenance procedures did not correlate the long-term corrosion potential with the construction practices used, during pressure washing of the liners probable damage to the seals was not considered by the plant, and seals were not routinely inspected or maintained by the plant. The inspectors attended the Corrective Action Review Board presentation for the root cause investigation of the containment corrosion issues. Based on the plan presentation and ensuing discussions the inspectors considered that the root causes had been thoroughly investigated as documented in CR 99-18478. The inspectors considered that criteria b, c, and f of C.1.1 "Root Cause Determination", of Enclosure 2 of the NRC letter transmitting the Specific Checklist had been met.

The licensee concluded that the liner plate pitting degradation had not affected containment operability. Actions were specified in RAP 12 which included, revision to procedures, processes and programs to address the root causes of the pitting which resulted in the degradation of the liner. Table 2 of RAP 12 cross-referenced the root causes to ten corrective actions. These corrective actions were assigned to an individual in Table 1 of RAP 12 with responsibility for completing the actions by an assigned date. These actions included liner seal replacement, investigation report for the potential corrosion on the bottom liner, evaluation of structural integrity, and procedure reviews. The Performance Assurance department reviewed four of these corrective actions and found them satisfactory with a minor comment related to reviews for the liner structural evaluation. The inspectors reviewed corrective actions as discussed below. Based on these reviews, the inspectors determined that the criteria a, b, c, d, g, h, and i of C.1.2 "Corrective Action Development", and criteria a, b, d, and j of C.1.3 "Corrective Action Plan Implementation and Effectiveness" of Enclosure 2 of the NRC letter transmitting the Specific Checklist had been met.

The inspectors reviewed a comprehensive and thorough evaluation of liner corrosion and structural integrity, described in report SL-5311 "Engineering Investigation Report Containment Liner Corrosion", Revision 0 and accepted by the licensee as report NED-1999-00001. The investigation into the liner pitting included: removal of the original floor seal, excavation of concrete, visual inspections aided by fiber optics, and a corrosion investigation of the liner seal area, top deck curtain support, bottom liner area and slab seal joints. The results of this investigation identified that the most significant corrosion existed in the liner seal area. Over time, the existing seal had degraded which allowed ingress of moisture between the containment liner plate and seal material. The crevice between the steel liner plate and the sealant material created a small volume of stagnant water and provided conditions which promoted pitting corrosion. The pitting was localized and decreased with increasing depth from the floor level and ultimately vanished. This evaluation concluded that due to the high pH and low chloride concentration of residual water in the bottom liner area and the recoating and resealing of the affected areas no further measurable corrosion was expected. The inspectors considered the investigation and corrosion evaluations thorough and rigorous.

In report NED-1999-00001 the licensee concluded that the pitting did not compromise the structural integrity of the liner. The most notable impact caused by the pitting was the reduction of the ultimate strain value for the metal liner. In this report, the licensee concluded that the allowable design tensile membrane liner strain was unaffected by the corrosion due to large safety margins to the ultimate strain. Specifically, the ultimate strain ratio to actual membrane tensile strain in the corroded state was 70 vice 85 for the uncorroded state. The inspectors considered that this evaluation used a technically defendable approach and demonstrated the existence of a substantial safety margin. However, the conclusions of this report conflicted with the conclusions documented in LER 50-315/98011-02. In this LER, the licensee stated that the allowable strain in the liner near the cylinder base should be limited to 0.0025 inch/inch, which was half of the allowable design value for strain. This conclusion was based on earlier calculations DC-D-3195-271-SC, Revision 1 "Structural Evaluation of D. C. Cook Containment Liner Corrosion" and DC-D-3195-280-SC, Revision 0 "Structural Evaluation of D. C. Cook Containment Liner Corrosion". The licensee stated that they intended to revise this LER to reflect the latest containment analysis by January 31, 2000.

Corrective actions for resolving the containment liner pitting included recoating of corroded areas and resealing of the containment liner floor interface. The licensee had recoated the less significantly corroded areas of the liner at the bottom side of the top deck ice condenser curtain supports. The inspectors visually examined portions of this corroded area before and after recoating and identified no discrepancies. The inspectors reviewed 12 DCP-0881 "Containment Liner Plate Corrosion Inspection and Seal Repair", Revision 0, which documented the design changes for the corroded liner and replacement of the containment liner seal. The licensee recoated the corroded areas with Carboline 890 Epoxy and installed Sikaflex-2C polyurathane elastomeric sealant at the liner plate floor crevice to prevent moisture intrusion. The licensee had identified an outstanding action to complete environmental qualification testing of this seal material. The inspectors reviewed pictures of the containment pitting at the liner floor seal interface and visually inspected the seal areas in each Unit after seal reinstallation. No discrepancies were noted.

The licensee had accepted a report NED-1999-00006, Revision 0 "Transmittal of Technical Comments on Modified Plant Operating Procedures under Restart Action Plan No. 0012", which documented review comments by an engineering contractor on D. C. Cook plant procedures which could impact liner integrity. These procedures included: containment inspection, pressure washing, protective coating inspection, and decontamination procedures. The licensee had scheduled a February date for incorporation of the comments into the affected procedures as tracked under CRs 99-26096 and 99-29316. The inspectors considered that the proposed procedures revisions would address the root causes associated with inadequate procedures.

c. Conclusions

Comprehensive and thorough investigations of the containment liner pitting corrosion had been completed. Corrective actions for resolving the containment liner pitting included recoating of corroded areas and resealing of the containment liner floor interface and completion of an engineering evaluation to confirm liner integrity. The inspectors considered the corrective actions adequate to resolve this issue and CSC item 12 is closed.

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on December 30, 1999, and in a final teleconference exit held on January 5, 2000. The licensee acknowledged the findings presented and did not identify any of the potential report input as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

American Electric Power

R. Powers, Senior Vice President Nuclear Generation Group
M. Rencheck, Vice President Engineering
S. Lacey, Director Engineering Restart
S. Greenlee, Director Design Engineering
J. Pollock, Plant Manager
W. Kropp, Director Performance Engineering
R. Gaston, Regulatory Compliance Manager
R. Crane, Regulatory Compliance
N. Jackiw, Regulatory Compliance
B. Kovarik, Safety-Related Mechanical Systems
P. Schoepf, Supervisor, Safety-related Mechanical Systems
L. Castle, Senior Coordinator, Maintenance
S. Grulke, Ice Condenser Project Closure Package Coordinator
E. Johnson, Ice Condenser Project Engineering Assistant Manager
P. Schoepf, Ice Condenser Project Engineering Manager
S. Chakrabarti, Design Engineer
R. Tinkle, Maintenance Projects Manager

US NRC

B. Bartlett, Senior Resident Inspector
K. Coyne, Resident Inspector
J. Maynen, Resident Inspector

INSPECTION PROCEDURES USED

IP 37700	Design Changes and Modifications
IP 61700	Surveillance Procedures and Records
IP 62700	Maintenance Program Implementation
IP 92700	Onsite Review of LERs
IP 92720	Corrective Action

ITEMS OPENED, CLOSED, AND DISCUSSED

ITEMS OPENED

None

ITEMS CLOSED

Report Item No.	Item Type	RAM Item No.	Description
EEI 50-315/98005-01(DRS) EEI 50-316/98005-01(DRS)	VIO A.1.a	R.2.6.1	Inadequate instructions for inspection of flow passages
EEI 50-315/98005-02(DRS) EEI 50-316/98005-02(DRS)	VIO A.1.a	R.2.6.2	Inadequate instructions for selecting flow passages
EEI 50-315/98005-03(DRS) EEI 50-316/98005-03(DRS)	VIO A.2.a	R.2.6.3	Insufficient margin to analysis limit for evaluating a degraded ice condenser
EEI 50-315/98005-04(DRS) EEI 50-316/98005-04(DRS)	VIO A.2.b	R.2.6.4	Insufficient margin to analysis limit for maximum gross ice basket weight
EEI 50-315/98005-05(DRS) EEI 50-316/98005-05(DRS)	VIO A.1.b	R.2.6.5	Inadequate instructions for entry into an unanalyzed condition (unpinning 60 ice baskets)
EEI 50-316/98005-06a(DRS)	EEI	R.2.6.6	Failure to follow the procedure change process for a completed surveillance test
EEI 50-315/98005-06b(DRS)	EEI	R.2.6.6	Failure to follow the procedure change process for a completed surveillance test
EEI 50-315/98005-07(DRS) EEI 50-316/98005-07(DRS)	VIO A.5	R.2.6.7	Failure to select a representative sample of ice baskets to weigh per TS 4.6.5.1.b2
EEI 50-315/98005-08(DRS) EEI 50-316/98005-08(DRS)	VIO A.3	R.2.6.8	Failure to assess and control the quality of work by ice condenser contractors
EEI 50-315/98005-09(DRS) EEI 50-316/98005-09(DRS)	VIO A.4	R.2.6.9	Failure to inspect accessible areas of the lower ice basket per TS 4.6.5.1.d
EEI 50-315/98005-10(DRS) EEI 50-316/98005-10(DRS)	EEI	R.2.6.10	Insufficient margin to TS 4.6.5.3.1.b limit for lower ice inlet door opening torque
EEI 50-315/98005-11(DRS) EEI 50-316/98005-11(DRS)	EEI	R.2.6.11	Insufficient margin to TS 4.6.5.3.2.b limit for intermediate deck door opening force
EEI 50-315/98005-12(DRS) EEI 50-316/98005-12(DRS)	VIO B.2	R.2.2.6	Failure to identify/evaluate missing ice segments in lower section of ice baskets
EEI 50-315/98005-13(DRS) EEI 50-316/98005-13(DRS)	VIO B.3	R.2.2.7	Failure to identify/evaluate buckled webbing in lower section of ice baskets

Report Item No.	Item Type	RAM Item No.	Description
EEI 50-315/98005-14(DRS) EEI 50-316/98005-14(DRS)	EEI	R.2.2.8	Failure to identify/evaluate fibrous material in the ice condenser
EEI 50-315/98005-15(DRS) EEI 50-316/98005-15(DRS)	VIO B.1	R.2.2.9	Failure to promptly identify/evaluate missing ice basket sheet metal screws
EEI 50-315/98005-16(DRS) EEI 50-316/98005-16(DRS)	VIO B.4	R.2.2.10	Failure to prevent recurrence of loose U-bolt nuts
EEI 50-315/98005-17(DRS)	VIO B.5	R.2.2.11	Failure to prevent recurrence of separated ice baskets
EEI 50-315/98005-18(DRS) EEI 50-316/98005-18(DRS)	VIO B.6	R.2.2.12	Failure to take prompt effective corrective action ice baskets with failed fillet welds
EEI 50-315/98005-20(DRS) EEI 50-316/98005-20(DRS)	VIO C.1.a	R.2.3.10	WCAP-11902 analysis not incorporated into the FSAR per 50.71e
EEI 50-315/98005-21(DRS) EEI 50-316/98005-21(DRS)	VIO C.1.b	R.2.3.11	As-built ice basket bottom assembly not incorporated into the FSAR per 50.71e
EEI 50-315/98005-22(DRS) EEI 50-316/98005-22(DRS)	EEI	R.2.3.12	As-used ice form not incorporated into the FSAR description per 50.71e
EEI 50-316/98005-23(DRS)	VIO C.1.c .i	R.2.3.13	Ice basket modified by 02-MM-032 not incorporated into the FSAR description per 50.71e
EEI 50-315/98005-24(DRS)	VIO C.1.c .ii	R.2.3.14	Ice baskets modified by 01-MM-048 not incorporated into the FSAR description per 50.71e
EEI 50-315/98005-25(DRS) EEI 50-316/98005-25(DRS)	VIO C.1.d	R.2.3.15	Westinghouse ice basket seismic load study, dated February 28, 1990 not incorporated into the FSAR per 50.71e
EEI 50-315/98005-26(DRS) EEI 50-316/98005-26(DRS)	EEI	R.2.3.16	Revised replacement ice basket design not incorporated into the FSAR per 10 CFR 50.71e
EEI 50-315/98005-27(DRS)	VIO C.2.a	R.2.3.17	Unauthorized modification (bolt vice pin) installed in three Unit 1 ice baskets
EEI 50-316/98005-28(DRS)	VIO C.2.b	R.2.3.18	Unauthorized modification (sheath of sheet metal) installed on a Unit 2 ice basket
EEI 50-316/98005-29(DRS)	VIO C.2.c	R.2.3.19	Unauthorized modification (rivets vice screws) installed on a Unit 2 ice basket

Report Item No.	Item Type	RAM Item No.	Description
EEI 50-315/98005-30(DRS) EEI 50-316/98005-30(DRS)	EEI	R.2.3.20	Failure to follow design controls for ice basket cruciform modifications
50-315/98005-19(DRS) 50-316/98005-19(DRS)	URI	NA	Applicability of 10 CFR 50.72 and 10 CFR 21 reporting requirements to the ice baskets with failed fillet welds
50-315/98005-31(DRS) 50-316/98005-31(DRS)	URI	R.1.15	As-found operability of ice condenser in question for past plant operation
50-315/98007-17	URI	R.2.4.22	Review Divider Deck Barrier Seal Installation Procedure Which allowed Seal Material Configuration to Vary with Engineering Approval
50-316/98004-02	LER	R.1.12	Ice Condenser Bypass Potentially in Excess of Design Basis Limit
50-315/98004-02	LER	R.2.1.3	Restricted Ice Condenser Flow Passages
50-315/98005-03	LER	R.2.6.12	Screws Missing from Ice Condenser Ice Basket Coupling Rings Results in Potential Unanalyzed Condition
50-315/98006-02	LER	R.2.1.5	Interim LER - Ice Basket Weighing Option Results in Potential Unanalyzed Condition
50-315/98007-01	LER	R.2.1.6	Ice Condenser Weights Used to Determine Technical Specification Compliance Not Representative
50-315/98008-02	LER	NA	Failure of Ice Basket to Withstand Simulated Accident Loads
50-315/98015-01	LER	R.2.1.12	Ice Weight Requirements Potentially Not Met Due to Nonconservative Assumption in Software Program
50-315/98010-01	LER	R.2.2.15	Ice Condenser Intermediate Deck Door Structural Discrepancies Results from Failure to Follow Procedures
50-315/98011-02	LER	R.2.3.46	Steel Containment Liner Pitting in Excess of Design Basis
50-315/98017-01	LER	R.2.2.17	Debris Recovered from Ice Condenser Represents Unanalyzed Condition

50-315/98024-00	LER	R.2.6.13	Concern for Accuracy of Ice Basket Weights
50-315/98025-00	LER	NA	TS Surveillance Requirement Not Met
50-315/98032-00	LER	R.1.20	Defective and Missing Ice Condenser Basket Welds Represents Unanalyzed Condition, and 10 CFR Part 21 Report
50-315/98035-01	LER	NA	Lower Inlet Door Shock Absorbers Did Not Meet Design
50-315/98037-01	LER	R.1.21	Ice Condenser Bypass Leakage Exceeds Design Basis Limit of 5 Square Feet
50-315/98050-00	LER	R.1.23	Ancillary Equipment Installed in Ice Condenser Not Designed to Withstand Design Basis Accident/Earthquake

ITEMS DISCUSSED

None

LIST OF ACRONYMS

CFR	Code of Federal Regulations
CSC	Case Specific Checklist
CR	Condition Report
DIT	Design Information Transmittal
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
EEI	Escalated Enforcement Item
FME	Foreign Material Exclusion
LER	Licensee Event Report
NRC	Nuclear Regulatory Commission
PDR	Public Document Room
PR	Problem Report
RAM	Restart Action Matrix
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item

PARTIAL LIST OF DOCUMENTS REVIEWED

Condition Reports

CR 98-0326 "10-20 percent of the ice condenser flow passages were found to be blocked"
CR 98-0388 "Damage to Ice Baskets"
CR 98-0443 During a liner plate VT-3 exam, the seal area of the Unit 2 containment liner was found to have excessive pitting damage"
CR 98-0500 "Ice Condenser ice Weights used to determine compliance with Technical Specifications may not constitute a representative sample"
CR 98-0537 "Some ice baskets in both units, predominantly in radial row 9, but also in radial row 8 and azimuthal row 5, show ice loss due to sublimation"
CR 98-0687 "Instrument Uncertainties Are Not Factored Into Acceptance Criteria for Ice Condenser Surveillances"
CR 98-0721 "Damage to ice baskets resulting from contractor control problems"
CR 98-0805 "Noted by NRC inspectors that bolting is less than hand tight on missile blocks"
CR 98-0836 During examination of Unit 1 containment liner corrosion was noted in the floor seal area exceeding the allowable depth of 0.171 inches"
CR 98-1053 Cumulative bypass of the divider barrier seal in Unit 2 exceeds five square feet"
CR 98-1054 Violation of 10 CFR 50 Appendix B Criterion 3 for ice basket modifications outside the design change process"
CR 98-1055 "The NRC Ice Condenser Inspection resulted in seven apparent violations of 10 CFR 50, Appendix B, Criterion 16"
CR 98-1056 Violation of 10 CFR 50.71 failure to update the UFSAR"
CR 98-1058 "Ice Baskets Damaged by Contractors Performing 12.EHP.4030.STP.211"
CR 98-1059 "12EHP.4030.STP.211 Was Revised Without Proper Proceduralized Control"
CR 98-1060 "12.EHP.4030.STP.211 lack of margin in maximum weight acceptance criteria"
CR 98-1061 "12.EHP.4030.STP.250 inadequate instructions"
CR 98-1077 "Contract Employee observed damaging a basket during basket weighing activities"
CR 98-1764 "Ice condenser flow passage Surveillances may not be adequate"
CR 98-3152 "Ice Condenser Shock Absorbers in an Unanalyzed Condition Includes Torn or Worn Shock Absorber Bags, Torn Mesh and Broken or Dislodged Foam"
CR 98-5014 "Inspection procedure 12EHP4030.STP.212, "Ice Basket Inspection", does not include a requirement to inspect the lower ice basket area"
CR 98-5111 The structural evaluation for the containment liner issue incorrectly states the total number of corrosion areas with depth greater than 0.125 inches"
CR 98-5925 Containment liner corrosion at the Unit 2 ice condenser top deck curtain support"
CR 98-5926 Potential Corrosion on the containment bottom liner"
CR 98-6010 Containment liner corrosion at the Unit 2 ice condenser top deck curtain support"
CR 99-0594 "Design basis integrity not controlled, maintained and respected by the Cook Team"
CR 99-1612 "Welding Issues on Ice Condenser Basket Bottoms Support Cross Bars"
CR 99-2292 "Multiple Instances Of Discrepant Conditions Related to Ice Basket Screws"
CR 99-4704 "Deficiencies were identified in Westinghouse detrimental damage criteria calculations"
CR 99-6392 "The air box lower inlet door shock absorbers design change (DCP-892) and safety evaluation are silent on the welding code changes"

CR 99-6397 "Deficient procurement documentation permitted Cook design basis revisions without prior AEP concurrence"
CR 99-6400 "Failure to accept/approve safety evaluations performed by Westinghouse as described in PMP 1040 SES.001"
CR 99-6404 "Design basis documents and the FSAR were not revised to reflect increased ice basket gross weight limits"
CR 99-6405 "Failure to use, or revise, the ice basket design basis strength defined in WCAPs-8304 and 8887 as inputs to the engineering evaluations of 2 foot and 3 foot ice basket segments and detrimental damage criteria"
CR 99-6406 "Ice basket coupling screw styles have changed throughout plant life without 50.59 screenings or evaluations"
CR 99-6409 "The as-found installed top deck grating clips did not conform to the Westinghouse calculations or drawings"
CR 99-6410 "Westinghouse Cook Plant power uprating report failed to evaluate potential ice condenser impacts"
CR 99-9064 Divider barrier seal at ice condenser end wall is not designed or installed as pressure retaining boundary"
CR 99-10011 "Inadequate scheduling of A0180160 to re-torque missile block seismic restraint anchorages"
CR 99-11408 "CR 98-1055 states that specific preventative actions for the loose u-bolts were referenced in the respective CR. However, no unique CR was written for the loose u-bolts"
CR 99-18478 Investigations for CR 98-0433/0836 are incomplete"
CR 99-22974 "Maintenance 'Control of Contractors' was Identified as an Area in Need of Development and Improvement"

Action Requests and Job Orders

Action Request	156423 "Repair/Replace Unit 2 Ice Baskets"
Job Order	C0043831 "Repair Unit 2 Ice Condenser Ice Baskets"
Job Order	C004600, "U2 Ice Condenser Floor El Baseline Measurements"
Job Order	C005389, "U2 Ice Condenser Floor El Baseline Measurements"

Procedures and Completed Data

PMP 7200.RST.001, Revision 6, "Restart Action Plans"
12 CHP5021.MCD.004, Revision 4, "Removal and Replacement of Ice Condenser Ice Baskets" and completed data sheets of Attachment 2, documenting replacements.
12ISP5021.010.005, Revision 1g, "Ice Condenser Ice Baskets Removal, Inspection, Repair and Installation" and completed data sheets #1 documenting inspections and repairs.
PMI-5080, Revision 7, "Administration of Contractors".
12MHP5021.010.002, Revision 0, "Ice Condenser Ice Removal and Filling".
12MHP4030.010.001, Revision 0, "Ice Condenser Weight Surveillance".
12MHP4030.010.002, Revision 0, "Ice Condenser Flow Passage Surveillance".
12QHP 5070 NDE.005, Revision 0, "Visual Examinations: Metallic Containment Retaining Components and their Integral Attachments".
12THP 6010 RPP.314, Revision 1, "Pressure Washing of Plant Components and Structures".
227200-STG-5400-08, Revision 0, "Protective Coating Inspection".
12THP 6010 RPP.304, Revision 5, "Area and Equipment Decontamination".
PMI-2160, Revision 9, "Control of Chemical Materials".

Calculations
DC-D-3195-271-SC, Revision 1 "Structural Evaluation of D. C. Cook Containment Liner Corrosion"
DC-D-3195-280-SC, Revision 0 "Structural Evaluation of D. C. Cook Containment Liner Corrosion"
ENSM980601QSL "Unit 1 Ice Bed Estimated Weight", Revision 0

Design Changes and Field Change Notices
02-DCP 713 Revision 1A "Perform Divider Barrier Seal Rework"
FCN 713-13, 14, 15, 16, 21, 23, 24 and 27
12-DCP-887 Revision 3 "Ice Condenser System Restoration (Structural Components)"
12-DCP-0881 Revision 0 "Containment Liner Plate Corrosion Inspection and Seal Repair"
02-LDCP-645 Revision 0 "Document Configuration of Ice Baskets"

Design Information Transmittals
DIT S-00084-00 "Ice Condenser Basket Weighing Surveillance"
DIT S-00076-00 "Ice Condenser Flow Passage and Channel Surveillance"

Assessments and Reports
"Engineering Evaluation Review Report ER-ICE-99-001 Westinghouse Electric Company" dated March 24, 1999.
"Metallurgical Evaluation of Screws From Cook Power Plant Unit 1 Ice Baskets" Gelles Laboratories Inc. dated May 1998.
RST-1999-001-MNT, 1999 Maintenance Functional Area Self-Assessment, dated September 18, 1999
NED-1999-00006, Revision 0 "Transmittal of Technical Comments on Modified Plant Operating Procedures under Restart Action Plan No. 0012".
Sargent and Lundy (S&L) report SL-5311, Revision 0 "Engineering Investigation Report Containment Liner Corrosion".

Restart Related Plans and NRC Commitments
Restart Action Plan 6, Revision 1 "Address Ice Condenser Issues"
Licensee's response letter of March 19, 1999 to the NRC Notice of Violation, dated October 13, 1999.
Maintenance Department Leadership Plan, Revision 15ag

Lesson Plans
Lesson Plan SK-C-IC01, revision 1, "Ice Condenser Familiarization"
Lesson Plan SK-L-IC02, revision 1, "Ice Basket Weighing-Performance"

Miscellaneous Correspondence
Letter from J. Stang to R. P. Powers, dated October 25, 1999, regarding the NRC's review of proposed Operating License amendments involving the resolution of an unreviewed safety question related to certain small-break loss of coolant accidents.
Letter from J. E. Molden to B. J. Wallace, dated July 29, 1999, regarding Contractor Qualification Status.

Memorandum from L. Bush to All DC Cook Department Heads and Supervisors, dated December 2, 1999, regarding temporary stoppage of Unit 2 ice basket refilling.
Memorandum from J. E. Pollack to all DC Cook Plant Staff, dated November 23, 1999, regarding recent worker incidents and station manager expectations.
Memorandum from C. E. Shute, dated October 16, 1998, regarding acceptable incidental damage for the existing ice basket sections in the Units 1 and 2 ice condensers.