ENCLOSURE

NRC INSPECTION REPORT NO. 50-458/99-09
pages 9-18

startup from the current outage and stated that the updated operability assessment would be completed as an engineering request. This effort was completed prior to unit startup, and the licensee concluded that operability was not adversely affected. This finding was consistent with the inspectors' expectations, based on the licensee's preliminary analyses that were discussed during the onsite portion of the inspection.

In conjunction with revising the operability assessment, the licensee was pursuing a margin improvement plan, which included proposals to add insulation, lower the design service water temperature, remove calculational conservatism, and increase air flow through the unit coolers by adjusting fan blade pitch.

While assembling plans to regain margins, the licensee discovered one aspect of the design calculations that could result in a further margin reduction. Specifically, the heat balance calculations did not account for heat generation from piping that was less than 10 inches in diameter. Since piping under 10 inches in diameter existed in some areas serviced by marginal unit coolers, the overall result of heat margin gains and losses was not immediately determinant. In any case, the licensee's representative indicated that an extension of the design temperature nonconformance may be needed over the upcoming anticipated 9-month fuel cycle until full compliance with the Updated Final Safety Analysis Report design temperature was achieved.

The licensee tested Unit Cooler HVR-UC6 on June 18, 1999. This test was expected to show an improvement in capacity as a result of tube-side cleaning that had taken place since the last test of this cooler. However, as described in Condition Report CR-99-1080, the unit cooler failed its performance test. The extrapolated capacity was determined to be only 659,938 Btu/hr. Under the most limiting conditions (high outside temperature), this would result in a peak post-accident room temperature greater than 122 degrees but less than 132 degrees F. The licensee's condition report indicated that further examination and cleaning would be considered.

Safety Evaluation of the Temperature Change

The licensee's representative stated that they had not performed a 10 CFR 50.59 safety evaluation even though the Updated Safety Analysis Report, Table 9.4-1, stated that the auxiliary building would be maintained at less than or equal to 122 degrees F, for both normal and post-accident conditions, whereas, the operability determination (CR-1998-0794) acknowledged the possibility of temperatures as high as 132 degrees F. The basis for the licensee's decision to not perform a safety evaluation was their interpretation of Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," Revision 1. This generic letter presents the following guidance:

In the case of a nonconforming condition, there are three potential scenarios for addressing the condition:

Scenario 1

> "If the condition is accepted "as-is" resulting in something different than described in the SAR or is modified to something different than described in the SAR, then the condition should be considered a change and subjected to a 10 CFR 50.59 safety evaluation unless another regulation applies (i.e., 10 CFR 50.55a)."

Scenario 2

> "If the licensee intends to restore the SSC back to its previous condition (as described in the SAR), then this corrective action should be performed in accordance with 10 CFR Part 50, Appendix B (i.e., in a timely manner commensurate with safety), and a 10 CFR 50.59 safety evaluation is not required. "

Scenario 3

> "If an interim compensatory action is taken to address the condition and involves a procedure change or temporary modification, a 10 CFR 50.59 review should be conducted and may result in a safety evaluation. The intent is to determine whether the compensatory action itself (not the degraded condition) impacts other aspects of the facility described in the SAR."

The licensee was taking credit for Scenario 2 (listed above) in justifying the nonperformance of a safety evaluation. However, the inspectors considered the lengthy time that the unit cooler nonconformances were known to exist (approximately 4 years) and the lack of a clear plan to restore the coolers to the required design heat removal capability (by either modification or rerating of the limiting design temperature) to have, in effect, accepted the condition "as-is" (Scenario 1). On this basis, the inspectors determined that the licensee should have initiated a 10 CFR 50.59 evaluation. Had this been accomplished, the licensee would most likely have evaluated the full extent of the operability question and addressed the temperature-related performance issues.

10 CFR 50.59 states, in part, that the licensee shall maintain records of changes in the facility to the extent that these changes constitute changes in the facility as described in the safety analysis report, and that these records must include a written safety evaluation, which provides a basis for the determination that the change does not involve an unreviewed safety question. The licensee's failure to perform a safety evaluation pursuant to 10 CFR 50.59 was identified as a violation. This Severity Level IV violation is being treated as an noncited violation (50-458/9909-02: EA 99-150), consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as Condition Report CR-99-1135.

High Pressure Core Spray Room Insulation

The inspectors reviewed Condition Report CR-96-1581, dated August 30, 1996, which documented that the high pressure core spray room unit cooler (Unit Cooler HVR-UC5) could not maintain the pump room temperature under 122 degrees F conditions as specified in Calculation G13.18.2.1*061-1A and the Updated Safety Analysis Report. The operability assessment attached to Condition Report CR-96-1581 stated that Unit Cooler HVR-UC5 was operable based on the following facts: (1) the room temperature was being monitored every 12 hours, (2) if the high pressure core spray pump room temperature exceeded 122 degrees F then the action statement provided 8 hours to restore the temperature, and (3) high pressure core spray did not have to be declared inoperable unless the temperature increased by more than 30 degrees (based on the licensee's review of the environmental qualification of the equipment in the room).

Prior to January 1996, licensee personnel walked down the auxiliary building rooms and found that there was no insulation on the high pressure core spray piping in the high pressure core spray pump room, Room 5. The lack of insulation would cause an increased temperature in the room following a design basis accident because of the additional heat transfer into the room from the bare piping. The licensee found that previous calculations erroneously assumed that the piping in the room was insulated. On January 5, 1996, the licensee issued Calculation G13.18.2.1*061-0, "Auxiliary Building Heat Loads and Unit Cooler Sizing Verification," Revision 0, which calculated the cooling capacity of Cooler HVR-UC5 required to maintain the room at 122 degrees F. The licensee revised the calculation assuming that there was no insulation on the piping. The revised required cooling capacity of the cooler was determined to be 655,824 Btu/hr, which was greater than the design cooling capacity of 592,300 Btu/hr.

The licensee did not prepare a condition report for either the discovery of the missing insulation nor the determination of Calculation G13.18.2.1*061-0 that the calculated unit cooler required load for Unit Cooler HVR-UC5 was greater than the vendor reported capacity. In addition, Calculation G13.18.2.1*061-0 showed that the design capacity of Unit Cooler HVR-UC10 was less than its required capacity, but no condition report was prepared. The calculated Unit Cooler HVR-UC10 required load was 167,647 BTU/hr, and the vendor reported capacity was 118, 000 BTU/hr. The calculated required heat load for Unit Cooler HVR-UC10 was later revised to 110,557 BTU/hr based on a recalculation of the pump motor heat generation in the rooms it serviced.

In regard to the missing insulation, the as-found configuration of the plant was found to be contrary to the design. The failure to write a condition report led to a failure to determine the cause of the missing insulation and to determine if other insulation was missing. In response to the inspectors' questions, the licensee issued Condition Report 99-0885 on May 17, 1999, to investigate the missing insulation issue. In this effort and during this inspection, licensee personnel walked down the auxiliary building rooms that were serviced by the most marginal unit coolers (i.e., HVR-UC5, 6, 9, and 10) and found no other insulation configuration discrepancies.

The inspector noted that Calculation G 13.18.2.1*061-0 stated the following:

> "Since the calculated unit cooler entering air temperature is greater than the existing design value (122 degrees F) and the calculated cooling load exceeds the vendor design cooling capacity, the current Unit Cooler 5 (1HVR-UC5) sizing is marginal."

The same statement was made concerning Unit Cooler HVR-UC10. However, the licensee did not write condition reports as a result of these conditions. The inspectors noted that on the basis of information provided in Calculation G 13.18.2.1*061-0 and the 1995 test results, Unit Cooler HVR-UC5 appeared to be undersized rather than marginally sized. Apparently this nonconservative conclusion was not recognized by those involved in the review of the calculation and the related condition report. The inspectors concluded that this resulted in a failure to immediately evaluate the operability of these two unit coolers.

The licensee completed Calculation G13.18.2.1*061-1, Revision 1, on August 29, 1996. This revision to the calculation reported the same heat load requirements and capacities for Unit Cooler HVR-UC5 as listed in Revision 0 of the calculation. On August 30, 1996, the licensee issued Condition Report 96-1581 to document the results of Calculation G13.18.2.1*061-1, Revision 1, showing a maximum high pressure core spray room temperature of 124.6 degrees F versus a design temperature in the Updated Safety Analysis Report of 122 degrees F. The operability evaluation associated with the condition report stated that, "high pressure core spray does not have to be declared inoperable unless the temperature increases by more than 30 degrees. This statement was based on the equipment qualification temperature profile of the room. However, the effects of high temperatures on the performance of equipment, such as motor-operated valves, pump motors, and temperature isolations and alarms were not considered. The inspectors considered this operability evaluation to be inadequate.

The inspectors determined that the licensee had failed to adequately perform this objective for the insulation problem, in that the impact of the higher calculated temperatures on safety-related equipment had not been fully determined. The licensee's failure to perform an adequate operability evaluation was considered to be an additional example of a noncited violation (50-458/9909-01) of 10 CFR Part 50, Appendix B, Criterion V.

The licensee added insulation to the high pressure core spray piping on September 17, 1998. On September 23, 1998, Calculation G13.18.2.1*061-1, Revision 1A was issued, and included the assumption that the piping was insulated. In the calculation, the vendor design capacity was acceptable since it exceeded the revised required capacity of 569,938 Btu/hr (the test value was still less than the vendor capacity, but this fact was considered in another condition report (CR-RBS-1998-0794)). The inspectors noted

that the insulation was installed on the piping in the high pressure core spray pump room approximately 3 years after the problem was discovered. Because the condition caused a marginal heat transfer condition to exist, with the potential for temperatures to exceed the design temperature, the inspectors concluded that the corrective action taken by the licensee was not timely.

10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, deficiencies, and deviations are promptly identified and corrected. The licensee's failure to take prompt actions to restore the design insulation configuration of the high pressure core spray piping was identified as an example of a violation of 10 CFR Part 50, Appendix B, Criterion XVI. Although this failure was influenced by the failure to write a timely condition report, the inspectors concluded, based on interviews of licensee personnel, that the licensee's staff was aware of the insulation discrepancy and was also aware that this condition caused an already deficiently performing unit cooler in the high pressure core spray room to be less capable. This Severity Level IV violation is being treated as a noncited violation (50-458/9909-03), consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as Condition Report CR-99-0885.

Summary Finding

In summary, the inspectors concluded that the licensee's response to the auxiliary building unit cooler problems over the past 4 years was not adequate. As a result of the licensee's failure to take adequate corrective actions to resolve the degraded conditions in Unit Coolers HVR-UC5, 6, and 9, the plant would have been unable to meet the design basis limiting temperatures for auxiliary building rooms housing emergency core cooling system pumps and other safety-related components. As in the case of the high pressure core spray pump room insulation problem discussed above, the inspectors concluded that the failure to write condition reports was not the only cause of the licensee's failure to correct this problem. The degraded conditions were understood by plant personnel and management, and actions taken over this period were not effective in resolving the problem. This issue was identified as an additional example of a violation of 10 CFR Part 50, Appendix B, Criterion XVI. This Severity Level IV violation is being treated as a noncited violation (50-458/9909-03), consistent with Appendix C of the NRC Enforcement Policy. The violation is in the licensee's corrective action program as Condition Report CR-99-1135.

Generic Review of Other Heat Exchangers

In an effort to determine if other heat exchangers were experiencing capacity problems similar to the auxiliary building unit coolers, the inspectors reviewed calculations and other information supporting the operability of the following heat exchangers:

Diesel Generator Lube Oil Pump A
Reactor Water Cleanup Regenerative Heat Exchanger A
Heating, Ventilating, and Air Conditioning Chilled Water Chiller A
Service Water System Radiation Monitor 11A

Fuel Pool Cooler A
Containment Unit Coolers A, B, and C

The inspectors noted that the containment air coolers were somewhat marginal in capacity with margins for air flow ranging from approximately 2 to 5 percent for various accident scenarios. However, the inspectors noted that a quarterly surveillance test was being implemented to ensure that the required air flow requirements were being met. Overall, sufficient information was available to support the operability of the selected heat exchangers.

Generic Review of Other Degraded But Operable Equipment

The inspectors reviewed the following condition reports that addressed equipment that was considered by the licensee to be degraded but operable:

96-2028, RBS Design Outside Ambient Air Temperature;

97-0300, Diesel Generator Heat Loads;

97-1079, Division III Batteries Do Not Meet Acceptance Criteria,

98-0926, Use of Pullout Efficiency in Rising-Stem Motor-Operated Valves;

98-1460, Service Water Pumps Not Meeting Pressure and Flow Requirements; and

98-1501, Service Water Pumps Acceptance Criteria Not Consistent with Design Basis Values.

No issues were identified in this review.

II. Maintenance

M8 Miscellaneous Maintenance Issues (92902)

M8.1 Maintenance Rule Issues

At the time of this inspection, all the auxiliary building unit coolers were in Category a(2) of the Maintenance Rule program, indicating that they were meeting their performance measures. The following two performance measures applied to the unit coolers:

F-409-001, "Auxiliary building ventilation provides an environment which ensures the operability of the equipment and the safety of plant personnel during all modes of plant operation, including the design basis accident (DBA)."

F-409-010, "Auxiliary building ventilation is to control the building temperature and the movement of potential airborne radioactivity contaminants."

The licensee's representative explained that Performance Measure F-409-001 was being met, even with the potential for elevated temperatures as high as 132 degrees F, because the operability evaluation of record stated that all equipment cooled by the marginal coolers was still operable. Performance Measure F-409-010 was being met because no temperatures had been logged in any of the rooms that were in excess of the limiting Updated Safety Analysis Report limit of 122 degrees F and no unintended pathways for transportation of airborne radioactivity contaminants existed.

However, the inspectors questioned the adequacy of the existing performance measures, specifically asking whether a unit cooler that failed to achieve its design heat removal capability should be captured within the program as a functional failure. The licensee's representative stated that the Maintenance Rule provides a flexibility in this case that would permit a re-evaluation of the limiting temperature, such that a higher temperature than the existing design temperature could be determined to still maintain the function of all affected equipment. In this case, the licensee re-evaluated the room components and determined that maintaining a temperature of 132 degrees F would ensure the operability of all of the exposed equipment. The licensee's representative stated that the degraded cooler conditions should be dispositioned through the corrective action program (as they have) and that it would be necessary to invoke the Maintenance Rule re-categorization review if any component is thereby rendered inoperable. The inspectors identified this issue as an unresolved item (50-458/9909-04) pending additional NRC review of the licensee's handling of the unit coolers within the Maintenance Rule Program.

M8.2 Generic Letter 89-13 Issues

The inspectors reviewed Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989, which required licensees to initiate a program to ensure the adequate performance of heat exchangers cooled by the service water system. Section II of the generic letter required the licensee to conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water. The generic letter recommended that if corrective actions were taken, they should be accomplished prior to testing in order to establish baseline data for future monitoring of the heat exchangers. In addition, the generic letter recommended that, after three tests, the licensee should determine the best frequency for testing to provide assurance that the equipment will continue to perform the intended safety function.

The inspectors reviewed the licensee's history of cleaning and testing Unit Coolers HVR-UC5, 6, and 9. On April 12, 1995, testing was performed on Unit Cooler HVR-UC5. On April 18, 1995, the licensee cleaned the air side of the unit cooler. The fact that the cleaning occurred after the test was not consistent with the recommendation of the generic letter. The intent of the generic letter recommendation to test after cleaning was to establish a baseline performance level that could be

correlated to a known (clean) condition. Other similar examples were found. Unit Cooler HVR-UC6 was cleaned (soon after being tested) on the air side on March 23, 1995, but was not subjected to a subsequent performance test until October 1996. Unit Cooler HVR-UC9 was tested on March 17, 1995, with no inspection or maintenance prior to the test. The inspectors determined that the licensee did not follow the recommendations of Generic Letter 89-13 for developing a baseline test program.

Following the unit cooler test failures discussed earlier in this report, the licensee decided to clean the auxiliary building unit coolers rather than conduct additional tests. The licensee's representative stated that the principal reason for suspending cooler testing was because insufficient margin existed to conduct a successful test. That is, it was understood that even if the cooler performed consistent with its design rating, when the test results were adjusted to account for measurement uncertainties, the final result would not meet the required heat transfer rate. Generic Letter 89-13 stated that frequent regular maintenance of a heat exchanger would be acceptable in lieu of testing for degraded heat exchanger performance. The inspectors considered that the intent of the generic letter was that maintenance could be used in place of testing for heat exchangers that had sufficient margin between the design capacity and the required capacity, but not for heat exchangers whose operability was in question (i.e. HVR-UC5, 6, and 9). Therefore, the inspectors concluded that the licensee's decision to clean the marginal unit coolers (HVR-UC5, 6, and 9) in lieu of testing was not consistent with the intent of Generic Letter 89-13.

The inspectors reviewed ASME Standard OM-S/G-1997, Part 21, "Inservice Performance Testing of Heat Exchangers in Light-Water Power Reactor Power Plants," which described a method for selecting the testing or monitoring method for heat exchangers. The licensee was not formally committed to this standard but used it in several conversations with the inspectors to explain how decisions were made. The selection methodology included various inclusion and exclusion criteria. For the temperature difference monitoring method, the exclusion criteria stated that "if the degree of operating margin is known to be small (in which case one of the more rigorous test methods, combined with parameter trending, may be required), then the temperature difference monitoring method shall not be considered." The pressure loss monitoring method and the visual inspection monitoring method also included a similar statement concerning more rigorous testing for heat exchangers with a small margin.

Section 8 of the ASME standard, which discussed errors, sensitivities, and uncertainties, stated that "if the total uncertainty of the test or monitoring result was determined to be too great to allow for meaningful results (i.e., total uncertainty is greater than the available margin) then either measurement errors should be decreased or whatever actions are necessary should be taken to increase the available margin."

Section 10 of the ASME standard stated that corrective actions should be performed such as flushing, or mechanical or chemical cleaning after failure to meet the acceptance criteria. The inspectors reviewed Condition Report CR-96-1581, dated August 30, 1996, which listed the proposed frequency of preventive maintenance tasks for the 11 unit coolers. The proposed schedule was to perform preventive maintenance

every other refueling cycle for Unit Coolers HVR-UC3, 5, 6, 9, and 10, every third cycle for unit cooler HVR-UC4, every fourth cycle for unit coolers HVR-UC2, 7, and 8, and every fifth cycle for unit coolers HVR-UC11A, and B. The licensee established the preventive maintenance frequency based on the margin between the design capacity and the required capacity, with coolers having the smallest margins being tested more frequently.

The inspectors observed that the licensee's program deviated from the standard practices presented in ASME Standard OM-S/G, Part 21, by not exploring more rigorous testing methods, taking actions to increase the available margin, or cleaning the coolers after each test failure. These were considered to be an additional aspect of the weaknesses in the licensee's program.

M8.3 Failure to Identify an Operator Workaround

The inspectors reviewed Technical Specification Table 3.3.6.1-1, which listed the primary containment and drywell isolation instrumentation. The table listed the nominal setpoint of 117 degrees F for isolation of the residual heat removal system, which was based on an assumed leak into the residual heat removal system. The inspectors noted that the residual heat removal rooms are cooled by Unit Coolers HVR-UC6 and HVR-UC9.

Since the licensee had determined that the unit coolers were operable by raising the calculated temperature of the rooms from 122 degrees F to 132 degrees F in an operability evaluation, the inspectors questioned whether the residual heat removal system could inadvertently isolate under normal or accident conditions without a leak in the system. The licensee's representative stated that the residual heat removal isolation setpoint of 117 degrees F was designed to detect a 25 gpm leak when shutdown cooling was placed into service. In addition, a local alarm would sound when the room reached 110 degrees F. For normal operation in Mode 1, the licensee's representative stated that the residual heat removal valves were closed, so, in effect, they were already isolated. However, for accident conditions when the residual heat removal system was required to operate, the licensee's representative stated that if the room temperature exceeded the setpoint, the residual heat removal system would isolate. In addition, the licensee's representative stated that operator actions would be necessary to restore residual heat removal following such an isolation, by bypassing the isolation signal and opening the residual heat removal valves necessary to initiate shutdown cooling.

The inspectors determined that the emergency operating procedures did not address the possibility of losing shutdown cooling due to an elevated room temperature isolation and the expected operator actions when such occurred. In addition, based on information supplied by the licensee's representative, the operators were not aware of this possibility. The licensee's representative stated that this operator workaround was not on the current workaround list. The licensee initiated Condition Report CR-RBS-1999-0890, dated May 18, 1999, to address this issue.

The inspectors determined that this operator workaround was in existence since initial operations because the design temperature of the auxiliary building has always been

122 degrees F. With the maximum temperature potentially increased to 132 degrees F because of the marginal unit coolers, the inspectors concluded that the probability of a spurious residual heat removal isolation was greater than if all coolers had been meeting their design capacity. Although this issue may have been relevant to a 10 CFR 50.59 evaluation, such an evaluation was not performed, as discussed earlier in this report. The inspectors confirmed that no licensee procedures required the listing of operator workarounds, but identified the failure to properly categorize the condition and train operators accordingly.

V. Management Meetings

X1 Exit Meeting Summary

An exit meeting was conducted by telephone on July 1, 1999. The licensee's management acknowledged the findings of the inspection. The licensee's management stated that no proprietary information had been reviewed during the inspection.