U. S. NUCLEAR REGULATORY COMMISSION

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Facility:	Shearon Harris Nuclear Plant, Unit 1
Location:	5413 Shearon Harris Road New Hill, North Carolina
Dates:	July 21 - 25, 1997
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EXECUTIVE SUMMARY

Harris Nuclear Plant
NRC Inspection Report 50-400/97-07

This inspection included a review of the licensee's implementation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" [the Maintenance Rule]. The report covers a one-week period of inspection.

- Overall, the inspection team concluded that with recent improvements the licensee was progressing adequately toward implementing a comprehensive Maintenance Rule program that met the requirements of 10 CFR 50.65.

Operations

- Licensed operators' understanding of the Maintenance Rule was commensurate with their specific duties and responsibilities as they related to the Maintenance Rule (Section O4.1).

Maintenance

- Required structures, systems, and components (SSCs) were included in the scope of the Maintenance Rule. However, a weakness was identified concerning the licensee's documentation of the basis for excluding some SSCs or functions referenced by the emergency operating procedures (EOPs) (Section M1.1).

- The licensee was performing periodic evaluations and assessments that met the requirements of the Maintenance Rule (Section M1.3).

- The licensee's method of balancing reliability and unavailability was reasonable and met the intent of the Maintenance Rule (Section M1.4).

- The licensee considered safety in establishment of goals and monitoring for the (a)(1) systems reviewed (Section M1.6).

- In general, operating data were being properly captured, and industry-wide operating experience was considered, as appropriate. However, a violation was identified for failure to identify an unavailability period for one (a)(1) Maintenance Rule component (Section M1.6).

- In general, corrective actions, goals, and monitoring were comprehensive for all the (a)(1) SSCs reviewed, which was considered a strength (Section M1.6).

- A weakness was identified relative to the inconsistent approach to identification of functional failures for the 6.9KV AC System, which might mask potential generic or common-mode problems with the system breakers (Section M1.6).

- In general, for (a)(2) SSCs, detailed performance criteria were properly established, industry-wide operating experience was considered, where practical, and appropriate trending was being performed (Section M1.7).

- Corrective actions were taken when (a)(2) SSCs failed to meet performance criteria or when a SSC experienced a functional failure (Section M1.7).

- Generally, operating data was being properly captured. However, a violation was identified for failure to capture one period of unavailability for the C Charging Safety Injection Pump (CSIP) and failure to capture one functional failure for the Steam Dump System (Section M1.7).

- Plant material condition and housekeeping observed during walkdowns were generally good. Some discrepancies in housekeeping and material condition were noted in the structural area (Section M2.1).

- Relative to audits and assessments, earlier assessments were not as thorough as they might have been. The last assessment (HESS 96-26) was detailed and thorough, although some problems still existed (Section M7.1).

- In response to assessment HESS 96-26, the licensee was in the process of totally re-vamping their Maintenance Rule program to monitor at the function level which will result in a much more detailed program. Changes, although not totally complete, appeared to result in a much improved program. Although the program has been improved, some of the changes could have been accomplished in a more timely manner to be more consistent with the implementation date of July 10, 1996, for the Rule (Section M8.1).

Engineering

- The licensee's approach to risk-ranking for the Maintenance Rule was adequate with one weakness noted as the result of not re-ranking after excluding the condensate transfer pump from the scope of the Maintenance Rule (Section M1.2).

- The licensee's use of performance criteria for reliability and unavailability for some risk-significant SSCs was not consistent with the Probabilistic Risk Assessment (PRA) and did not demonstrate that meeting the performance criteria was always indicative of an appropriate preventive maintenance and monitoring program (IFI 50-400/97-07-01)(Section M1.2).

- The Maintenance Rule database contained discrepancies associated with Modes 5 and 6 (Section M1.2).

- The overall approach to assessing the risk-impact of maintenance activities was considered adequate (Section M1.5).

- The process for ensuring that critical safety functions were available during planned outages was good (Section M1.5).

- Several weaknesses were identified regarding the licensee's assessment of the safety impact when removing SSCs from service for monitoring and preventive maintenance while in Modes 1- 4 (Section M1.5).

- A strength was identified relative to the strong operational experience level and the qualifications and training of the on-shift personnel and work control coordinators involved with assessment of safety impact when removing SSCs from service for maintenance. (Section M1.5)

- The System Engineers were knowledgeable of their systems and the Maintenance Rule and were implementing the Rule in a satisfactory manner (Section E4.1).

Report Details

Summary of Plant Status

Harris began the inspection period in Mode 3 (Hot Standby) following a reactor trip that had occurred on July 20, 1997. The reactor trip was due to a failure of the main generator exciter, a failure that licensee personnel were still investigating at the close of the inspection period. The team noted that the main generator exciter was properly scoped within the Maintenance Rule. The plant remained in Mode 3 for the duration of the inspection period.

Introduction

The primary focus of this inspection was to verify that the licensee had implemented a maintenance monitoring program which met the requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," (the Maintenance Rule). The inspection was performed by a team of inspectors that included a Team Leader, one Region II Inspector, one Region II Senior Reactor Analyst, and three Resident Inspectors. In addition, NRC staff support was provided by one Senior Operations Engineer from the Quality Assurance and Maintenance Branch, Office of Nuclear Reactor Regulation (NRR). The licensee provided an overview presentation of the program to the team on the first day of the inspection.

I. OPERATIONS

O4 Operator Knowledge and Performance

O4.1 Operator Knowledge of Maintenance Rule

a. Inspection Scope (62706)

During the inspection, the team interviewed six licensed operators involved in on-shift and work coordination duties to determine if they understood the general requirements of the Maintenance Rule and their particular duties and responsibilities for its implementation.

b. Observations and Findings

Operator and coordinator tasks associated with the Maintenance Rule focused mainly on evaluating equipment out-of-service combinations using the text, a matrix and a table provided in Procedure WCM-001, SYSTEMS OUTAGES, and planning maintenance work using Procedure PLP-710, WORK COORDINATION PROCESS. Personnel interviewed generally understood the purpose of the Maintenance Rule and their duties for Maintenance Rule implementation.

c. Conclusions

Licensed operators' understanding of the Maintenance Rule was commensurate with their specific duties and responsibilities as they related to the Maintenance Rule.

II. MAINTENANCE

M1 Conduct of Maintenance

M1.1 Scope of Structures, Systems, and Components Included Within the Rule

a. Inspection Scope (62706)

Prior to the onsite inspection, the team reviewed the Harris Nuclear Plant Updated Final Safety Analysis Report (UFSAR), Licensee Event Reports, previous inspection reports, the EOPs, Main Control Room Shift Superintendent logs, and other information provided by the licensee. The team selected an independent sample of SSCs that the team believed should be included within the scope of the Rule but had not been classified as such by the licensee. During the onsite portion of the inspection, the team used this sample to determine if the licensee had adequately identified the SSCs that be included in the scope of the Maintenance Rule in accordance with 10 CFR 50.65(b).

b. Observations and Findings

The licensee had reviewed approximately 240 SSCs as defined in its Equipment Database System (EDBS). Some of these systems were "pseudo" systems created by the licensee as a home for components that were part of other systems but had common Maintenance Rule functions (e.g., System 9001, Containment Isolation Valves; or System 9002, Pipe Supports). Of the approximately 240 SSCs reviewed about 140 were determined to be within the scope of the Maintenance Rule.

The licensee had performed a system scoping review for each SSC considered for the Rule. Each SSC was divided into its various functions and those individual functions, instead of the SSC itself, were evaluated against the scoping criteria. Any SSC with at least one function within the scope of the Rule was also considered in scope. Since the functions, and not the SSCs themselves, were individually scoped, they formed the bases for the performance monitoring and criteria required by paragraph (a)(2) of the Rule. If performance criteria were exceeded for a particular function being monitored under paragraph (a)(2), then the system would be presented to the Maintenance Rule Expert Panel for consideration for further goal setting and corrective actions [per paragraph (a)(1) of the Rule] for that function only.

The team reviewed the licensee's database for those systems that were excluded from the Maintenance Rule and selected approximately 40 to verify the appropriateness of the exclusion. For many of the excluded systems, the licensee produced a Scoping Basis and Justification sheet which documented the specific reasons for not including the SSC in the Maintenance Rule. The team identified that some of the SSCs excluded from the Rule had mitigating value in the plant EOPs. For certain of those systems, the licensee's Scoping Basis and Justification sheet did not thoroughly document why the SSC was excluded from the Rule. One example was the Diesel Driven Fire Pump, which was referenced in EOP-EPP-001 LOSS of AC POWER to 1A-SA and 1B-SB Busses, Revision 14, as an alternate fill source for

the condensate storage tank. Other excluded functions that were not thoroughly justified were a Component Cooling Water System Seal Water Heat Exchanger low flow alarm referenced in EOP-EPP-020, SGTR With Loss of Reactor Coolant Subcooled Recovery, Revision 7; and two valves (1CE-26 & 27) referenced in EOP-EPP-001 for isolating the Condensate Storage Tank from the Main Condenser Hotwell.

The team obtained an EOP/FRP System/Component Scoping document from the licensee which contained the results of their formal EOP review. This document identified systems and components used in the EOPs and included a determination of their importance to the completion of the EOP. Only those SSCs whose failure would affect the successful completion of a primary or preferred EOP function were considered by the licensee as significant EOP contributors to be included in the Maintenance Rule scope. The team concluded from reviewing the EOP scoping document that the licensee had given adequate consideration to the SSCs included in the EOPs.

Other systems not referenced in EOPs but whose functions were unclear to the team were also reviewed to verify the appropriateness of their exclusion. Certain non-safety related SSCs like Reservoir Blowdown and HVAC-Turbine Building were considered, respectively, by the team to be systems with potential impact on the safety-related Emergency Service Water (ESW) system, a system whose failure could ultimately lead to a plant level transient. The licensee's Scoping Basis and Justification for these two systems did not adequately describe why they were not within the scope of the Rule. After discussions with licensee personnel, the team confirmed that the systems did not have immediate or significant impact on the plant or the systems with which they interacted. The team discussed with licensee personnel the need to provide better documentation for the basis for Maintenance Rule scoping decisions. The team's comments were acknowledged by licensee management.

During the onsite inspection, the licensee was continuing its corrective actions for a previous NRC violation (Violation 50-400/96-09-02) and a licensee self-assessment on Maintenance Rule implementation. Both of these items are discussed further in Sections M7.1 and M8.1 of this report. The violation concerned a Maintenance Rule scoping issue and the licensee's self-assessment identified additional problems in scoping, classification of functional failures, and establishing performance criteria for SSCs. Maintenance Rule scoping decisions were continuing for some systems at the time of the inspection. The licensee was still updating scoping documents to reflect changes in scoping status resulting from the late management decision to scope SSCs by individual functions rather than by the SSCs themselves, and from other continuing corrective efforts. The team identified no examples of SSCs or functions that were inappropriately excluded from the Rule.

c. Conclusions

Based on the SSCs and functions reviewed, the required SSCs were included in the scope of the Maintenance Rule. However, a weakness was identified concerning the licensee's documentation of the basis for excluding some SSCs or functions referenced by the EOPs.

M1.2 Safety or Risk Determination

a. Inspection Scope (62706)

Paragraph (a)(1) of the Maintenance Rule requires that performance monitoring and goals be commensurate with safety. Implementation of the Maintenance Rule using the guidance contained in NUMARC 93-01 requires that safety be taken into account when setting performance criteria and monitoring under (a)(2) of the Maintenance Rule. This safety consideration would then be used to determine if SSC functions should be monitored at the train, system, or plant level. Also, Section 9.3.2 of NUMARC 93-01 recommends that risk-significant SSC performance criteria be set to assure that the availability and reliability assumptions used in the risk determining analysis (i.e., PRA) are maintained. The team reviewed the licensee's methods for making these required safety determinations.

b. Observations and Findings

The licensee used an Expert Panel to approve (in addition to other aspects of Maintenance Rule implementation) which SSC functions were within the scope of the Rule, the risk-significance ranking of SSC functions, the performance criteria of SSC functions, and where necessary, goals for SSC functions. The final risk-significance ranking was based on a combination of results from probabilistic risk assessments and Expert Panel judgement based on deterministic considerations. The licensee established the Expert Panel in accordance with Section 9.3.1 of NUMARC 93-01. Expertise in the areas of operations, maintenance, engineering and PRA were embodied in the membership of the Expert Panel.

Consistent with NUMARC 93-01 the licensee used quantitative importance measures (risk achievement worth, risk reduction worth, and 90% SSC contribution) associated with core damage frequency and large early release fraction derived from a PRA model for determining which systems and functions would be considered risk-significant. The threshold for these importance measures was consistent with NUMARC 93-01. Based upon these importance measures, only the Containment Cooler System was non-risk significant. However, as a consequence of scoping efforts, the Expert Panel excluded the Condensate Transfer Pump from the Maintenance Rule. This pump and its operation was included in the PRA model used to determine the quantitative importance measures for risk-ranking. The importance measures were not re-quantified with this equipment excluded to ascertain whether the risk-rankings were affected. Failure to do so was considered a weakness. No other system or function contained in the PRA model appeared to be excluded from the Maintenance Rule scope.

Truncation limits were imposed on the PRA model used to create the importance measures in order to limit the size and complexity of the results to a manageable level. The licensee used a truncation level greater than four times the magnitude of the overall core damage frequency, and the team considered this acceptable.

In some instances, the licensee elected to use performance criteria for reliability and availability for the risk-significant SSCs that were less conservative than were used in the risk determination. The licensee had performed sensitivity studies for numerous systems allowing a core damage frequency increase based upon an industry standard. The results of these sensitivity studies were used as the performance criteria for a number of risk-significant SSCs. The sensitivity study for the Auxiliary Feedwater System resulted in train A and B having identical performance criteria. However, due to the dependency of the turbine driven and one of the motor driven pumps on train B electrical power, train A was more risk-significant as reflected in a magnitude difference in risk achievement worths between train A and train B pumps. A sensitivity analysis dealing with the cumulative effects of each individual system's sensitivity study on core damage frequency indicated that by using the reliability performance criteria, for the baseline core damage frequency of approximately 5.5E-5 would increase by greater than 200%. A similar analysis for availability also showed a baseline core damage frequency increase of greater than 200%. The methodology used for determining the cumulative effects was highly conservative and the licensee indicated a more traditional means of deriving these results would be performed. The team acknowledged that operation of the facility with all equipment simultaneously performing at these levels was highly unlikely. However, the licensee did not demonstrate to the team that meeting the performance criteria was always indicative of an appropriate preventive maintenance and monitoring program, given the potential cumulative effects on core damage frequency and that the performance criteria were not fully consistent with the historical performance of the risk-significant SSCs. Inspector Followup Item (IFI) No. 50-400/97-07-01, Evaluation of Not Fully Maintaining the PRA Assumptions When Establishing Performance Criteria, was identified.

The results of the Expert Panel's decisions regarding performance criteria, risk-significance and applicability to the Maintenance Rule were contained in the Maintenance Rule database. The database contained discrepancies as to which systems required performance monitoring in Modes 5 and 6. Also, the database contained sub-optimal performance criteria for some of the Mode 5 and 6 systems. The licensee indicated the database was in error and that the discrepancies would be expeditiously corrected.

The Maintenance Rule database designated the capability of providing an auxiliary feedwater suction source via the Condensate Makeup System as risk-significant. The database indicated that condition monitoring was the appropriate performance criterion to preclude any functional failures. The database discussed observing the structural integrity of the Condensate Storage Tank and inspecting the nozzle welds as the extent of the condition monitoring. The database did not discuss the piping section from the nozzle weld to the suction of the Auxiliary Feedwater Pumps, the common manual valve within the piping section, the bladder within the tank, or the valve in the piping section between the hotwell and the Condensate Storage Tank.

The team did determine through interview with the backup System Engineer that erosion/corrosion inspections were performed on the auxiliary feedwater common suction piping. However, the full extent of condition monitoring being performed and not documented in the database could not be ascertained in the limited time prior to completion of the inspection. IFI No. 50-400/97-07-02, Followup on Performance Monitoring of the Condensate Makeup System, was identified.

c. Conclusions

Based on the review of the sampled SSCs, the licensee's approach to risk-ranking for the Maintenance Rule was adequate with one weakness in not re-ranking after excluding the Condensate Transfer Pump from the scope of the Maintenance Rule. The licensee's use of performance criteria for reliability and unavailability for some risk-significant SSCs was not consistent with the PRA and did not demonstrate to the team that meeting the performance criteria were always indicative of an appropriate preventive maintenance and monitoring program. This was identified as an IFI. Also, the Maintenance Rule database contained discrepancies associated with Modes 5 and 6. In addition, the full extent of monitoring for the condensate makeup system was not clear. This was identified as an IFS.

M1.3 Periodic Evaluation

a. Inspection Scope (62706)

Paragraph (a)(3) of the Rule requires that performance and condition monitoring activities and associated goals and preventive maintenance activities be evaluated taking into account, where practical, industry-wide operating experience. This evaluation was required to be performed at least one time during each refueling cycle, not to exceed 24 months between evaluations. The team reviewed the licensee's periodic evaluation.

b. Observations and Findings

At the time of this inspection, the licensee was not required to have completed the first periodic evaluation. The licensee has performed one surveillance and two assessments in the area of 10 CFR 50.65 which are discussed further in paragraph M7.1 below.

The licensee plans to have completed a Periodic Maintenance Assessment covering the portion of Fuel Cycle 7 from July 10, 1996, to the start of Fuel Cycle 8, within 115 days of the start of Fuel Cycle 8 (September 30, 1997).

c. Conclusions

The team concluded that the licensee was performing periodic evaluations and assessments that met the requirements of the Maintenance Rule.

M1.4 Balancing Reliability and Unavailability

a. Inspection Scope (62706)

Paragraph a(3) of the Rule required that adjustments be made where necessary to assure that the objective of preventing failures through the performance of preventive maintenance was appropriately balanced against the objective of minimizing unavailability due to monitoring or preventive maintenance. The team met with the Maintenance Rule Engineer, System Engineers, and members of the Expert Panel to discuss the licensee's methodology for balancing reliability and unavailability.

b. Observations and Findings

The team reviewed the licensee's approach to balancing system reliability and unavailability for risk-significant systems to achieve an optimum condition. Requirements for balancing were contained in Administrative Procedure ADM-NGGC-0101, MAINTENANCE RULE PROGRAM, Revision 6. The licensee's approach to balancing reliability and unavailability consisted of monitoring SCC performance against the established performance criteria for the SCCs. The performance criteria for the SCCs were established based on the Probabilistic Safety Assessment (PSA) assumptions which developed optimum SCC reliability and unavailability requirements relative to core damage. This approach considered functions to be balanced if the performance criteria for the SCCs were met.

The licensee assigned responsibility to System Engineering personnel to evaluate the balancing of reliability and unavailability each time a functional failure was identified. Specifically, the engineers were required to assess the adequacy and frequency of preventive maintenance tasks when reliability performance criteria were exceeded and to determine if excessive preventive maintenance activities were scheduled or if planned maintenance activities had excessive duration if unavailability criteria were exceeded. In addition to the event based monitoring approach for balancing, the licensee performed a higher level summary assessment every refueling cycle (less than 24 months) to review the effectiveness of the balancing.

c. Conclusions

The team concluded that the licensee's method for balancing reliability and unavailability was satisfactory and met the intent of the Maintenance Rule.

M1.5 Plant Safety Assessments Before Taking Equipment Out-of-Service

a. Inspection Scope (62706)

Paragraph (a)(3) of the Maintenance Rule states that the total impact on plant safety be taken into account before taking equipment out-of-service for monitoring or preventive maintenance. The team reviewed the licensee's procedures and discussed

the process with plant operators and work coordinators. The team selected numerous hypothetical equipment out-of-service configurations for review to ascertain whether the established process was properly implemented.

b. Observations and Findings

The licensee performed long range outage evaluations and adjusted their overall systems to be considered for removal from service during each weekly window for on-line maintenance to ensure a relatively balanced risk during each week.

The licensee implemented the requirements to assess the impact on plant safety when removing equipment from service when in Modes 1-4 via Work Coordination Manual Procedure WCM-001, SYSTEM OUTAGES. This procedure contained a matrix indicating equipment out-of-service combinations that were approved, not recommended or prohibited based upon PRA insights and Technical Specification (TS) requirements. In addition, risk-significant functions were listed such that even approved configurations could not be entered into without further evaluation if one of these risk-significant functions was not available. The matrix was used by work schedulers and plant operators to ensure that the proposed scheduled maintenance was acceptable.

The team reviewed the written program direction and matrix and identified some weaknesses as well as a strength. The weaknesses were:

- The risk-significant functions listing did not contain emergency service water as a backup cooling source for auxiliary feedwater, which was a risk-significant function.

- What equipment applied to a specific risk-significant function was open to interpretation. During the operator/work coordinator interviews, there were some inconsistencies as to whether a specific component was part of a risk-significant function.

- The procedure lacked mandatory PRA expertise involvement, including such areas as emergent work and non-risk significant configurations, where limited guidance was provided.

These limitations were partially compensated for through the strength of the operational experience level and qualifications/training of the on-shift personnel and work control coordinators. Also, the procedure text did provide for the consideration of severe weather and other trip hazards as event initiators when planning system outages.

As a result of self-assessment corrective actions, the licensee made substantive changes to their Maintenance Rule program including conspicuously increasing the number of functions considered risk-significant. Consequently, the listing of such

functions was revised just prior to the team's arrival. However, the increase in risk-significant functions was not highlighted in Operations Night Orders dated July 17, 1997, discussing Maintenance Rule changes. This represented a minor weakness.

The licensee implemented a separate Shutdown Safety Assessment (SSA) process for planned outages (Modes 5 & 6). The SSA took into account the need to maintain certain critical safety functions during shutdown operations. These functions included reactivity control, electrical power, inventory control, containment integrity, and decay heat removal. The process allowed outage planners to schedule maintenance activities in a manner that would ensure the availability of the critical safety functions by redundant SSCs. The licensee implemented these requirements via Outage Management Procedure OMP-003, OUTAGE SHUTDOWN RISK MANAGEMENT.

c. Conclusions

The team identified several weaknesses regarding the licensee's assessment of the safety impact when removing SSCs from service for monitoring and preventive maintenance while in Modes 1- 4. The team also identified a strength, strong operational experience level and qualifications and training of the on-shift personnel and work control coordinators, which partially offset the weaknesses. The licensee's process for ensuring that critical safety functions were available during planned outages was good. The overall approach to assessing the risk-impact of maintenance activities was considered adequate.

M1.6 Goal Setting and Monitoring for (a)(1) SSCs

a. Inspection Scope (62706)

Paragraph (a)(1) of the Rule required, in part, that licensees shall monitor the performance or condition of SSCs against licensee-established goals, in a manner sufficient to provide reasonable assurance the SSCs are capable of fulfilling their intended functions. The Rule further required goals to be established commensurate with safety and industry-wide operating experience to be taken into account, where practical. Also, when the performance or condition of the SSC did not meet established goals, appropriate corrective action be taken.

The team reviewed the systems and components listed below which the licensee had established goals for monitoring of performance to provide reasonable assurance the system or components were capable of fulfilling their intended function. The team verified that industry-wide operating experience was considered, where practical, that appropriate monitoring was being performed, and that corrective action was taken when SSCs failed to meet goal(s) or when a SSC experienced a Maintenance Preventable Function Failure (MPFF).

The team reviewed program documents and records for six systems or components that the licensee had placed in the (a)(1) category in order to evaluate this area. The team also discussed the program with licensee management, the Maintenance Rule Engineer, System Engineers, and other licensee personnel.

b. Observations and Findings

b.1 High Head Safety Injection - System 2080

The High Head Safety Injection (HHSI) System was placed in the (a)(1) category on July 17, 1997, for low torque values of valves in the Boron Injection Tank (BIT) safety injection path (Valve 1SI-1) and HHSI to Cold Leg -Train A (Valve 1SI-52). The Safety Injection to Reactor Coolant System Thermal Sleeves were also placed in category (a)(1). The HHSI components, which provide containment isolation, are included in the Containment Isolation Valve (CIV) System which is described in Section M1.6 b.6 below. The licensee has determined that the HHSI system was their second most safety significant system.

The HHSI System was inter-related with the Chemical and Volume Control System (CVCS) and the HHSI leak detection function was monitored under CVCS. CVCS is addressed in Section M1.7 b.2 below. The containment isolation function was monitored by the CIV Performance Monitoring Group (PMG). The team reviewed the maintenance history, Condition Reports (CRs), scoping documents, and interviewed the System Engineer. The licensee had not yet assigned performance goals to this system due to its recent addition to the (a)(1) category. The team reviewed the minutes of the Expert Panel's July 17, 1997, meeting during which the system's classification was changed. The performance goals for the high safety significant items were to be submitted for review on August 19, 1997, and those of low significance were to be submitted on September 22. The team considered this schedule to be reasonable. The Panel proposed changes to the scoping document which the team found acceptable. The team considered the system's functional performance criteria to be reasonable. The HHSI system was walked down, and its material condition was observed to be acceptable.

The licensee plans to perform maintenance on the two valve motor operators (1SI-1 and 1SI-52) to improve their torque performance. The System Engineer informed the team that there were no plans to replace the motor operators with larger units to improve the torque performance. Improved torque performance of these two valve operators and sustained performance improvement would return this system to the (a)(2) category.

b.2 Main Feedwater (MFW) - System 3050

The MFW System was placed in the (a)(1) category on December 6, 1994, because the Steam Generator-Feedwater Isolation Valves (S/G-FWIVs) had five functional failures within the previous 36 months with a performance criterion of one or less in the same time period. As a result, the licensee set a goal of not more than two functional failures in a rolling 36 months, which commenced on February 1, 1997. The MFW System was not monitored for unavailability at the pump train level there was an economic incentive that would cause the return of the failed or degraded pump train to be expedited. The MFW System was monitored at the plant level criteria of Plant Trip, Engineered Safety Features (ESF) Actuation and Unplanned Capability Loss Factor (UCLF) with a goal of zero plant level events caused by the

MFW System. The licensee had five UCLF events during the previous 18 months, which placed it in the (a)(1) category. The MFW CIV function was placed in the (a)(1) category and was being tracked by the CIV System described in Paragraph M1.6 b.6.

The team reviewed maintenance history, CRs, Tag Out and Unit Logs, and the System Scoping Document. The MFW System was walked down, and the team considered that the material condition was good. The System Engineer was interviewed, and the team concluded that he was aggressive about improving the performance and reliability of his system. The team also reviewed incorporated and planned modifications to the MFW System. The licensee's efforts during the recent refueling outage (RFO) indicated that they were diligent in their efforts to improve MFW availability and reliability. The licensee monitored individual functions for each system. The team considered that the goals set for each function were reasonable and achievable.

b.3 Normal Service Water (NSW) - System 4060

The NSW pumps experienced four failures to start over a four month period. Subsequently, on June 19, 1996, the NSW system was placed in (a)(1) status. NSW system goals were revised on December 19, 1996, due to a pump run failure (failed shaft) and another start-failure, which occurred on September 3, 1996.

The team reviewed the corrective action for these failures and the goals and monitoring under the (a)(1) status, and concluded that the corrective action, goals and monitoring were appropriate. The team also reviewed additional work order data concerning performance of this system for the period June 1995 to the beginning of the inspection.

The team compared periods of unavailability identified by a review of Tag Out and Unit Logs with the unavailability data base for the NSW system. The team noted an unavailable period for the B NSW pump, from 2:58 a.m. to 6:42 p.m. February 6, 1997, a period of 15 hours and 44 minutes. This was documented in clearance 97-00236 but was not included in the Maintenance Rule Data Base. It be noted that the PMG, that included the B NSW pump, was already in (a)(1) status because the B NSW pump exceeded the performance criteria of $\leq$ 393 hours of unavailability in a rolling 18-month period with 1475.43 hours of unavailability. The licensee documented this failure to identify unavailability period for a Maintenance Rule component in CR No. 97-03605. This failure to capture unavailability time was considered a violation of 10 CFR 50.65(a)(1) for failure to monitor the performance or condition of an (a)(1) system and was identified as Violation 50-400/97-07-03, Failure to Effectively Monitor the Performance or Condition of the Normal Service Water System.

b.4 6.9KV AC Distribution - System 5165

The 6.9KV AC Distribution system was placed in the (a)(1) category because of previous failures of feeder breakers supplying the non-safety busses. System function "B" was affected. This function was to provide a reliable source of 6.9 KV power from

the non-safety related Auxiliary Busses 1A, 1B, 1C, 1D, and 1E and General Service Busses 1-4A (Left) and 1-4B (Right) when required for startup, shutdown, and normal operating conditions. The PMG for which the system's performance exceeded the licensee's criteria involved Auxiliary Bus 1E. The 1E bus had experienced three functional failures of breakers over a rolling 36-month period, exceeding the licensee's criteria of zero.

The breaker problems involved the failure to transfer power supply from Startup Transformers (SUT) to the Unit Auxiliary Transformers (UAT). The licensee determined the root cause of the failures to be associated with the breaker close coil "solenoid armature gap" adjustment. The gap was set about mid-range of the specified 3/16 to 1/4 inch noted in the vendor manual. The control power voltage at the switchgear where the breakers were housed was not adequate to actuate the close coil while at the mid-range setting. As a result, the close coil settings were readjusted for the UAT/SUT breakers in 1996. The breakers were later overhauled, and the System Engineer has monitored their subsequent performance. Because of the previous failures, the licensee had set a goal of zero additional failures to transfer from either the SUT or the UAT through the remainder of fuel Cycle No. 7 and the recently completed refueling outage. No additional failures to transfer have occurred since the licensee's corrective actions were implemented. With the recent successful transfers satisfying the established goal, the licensee expected this system function to be removed from (a)(1) status early in the current fuel operating cycle (Cycle No. 8). The inspection team considered the licensee's goal setting and monitoring for the 6.9 KV system to be appropriate.

The team reviewed the maintenance history and current status of the 6.9 KV AC distribution system. Several examples were noted where one of the bus supply breakers had failed to close during testing. In each of those cases, however, the affected electrical bus remained energized because the other supply breaker was closed onto the bus. These examples were not among those counted as functional failures by the licensee. The team considered that the failures to close were potentially functional failures that had not been realized during the licensee's three-year historical review for this system. Further discussion with the licensee indicated that a functional failure was defined for the 6.9KV AC busses as one which resulted in the loss of bus power. Since none of the failures caused the busses to be de-energized, the licensee did not classify them as functional failures. The team noted that this approach to functional failures was inconsistent with that used for other electrical systems (e.g., the 125 Volts Direct Current (VDC) Electrical Distribution system) with redundant power supplies. In the other cases, individual supply breaker failures were captured as functional failures and monitored against the licensee's performance criteria. The inconsistent approach to functional failures for the 6.9KV AC system might mask potential generic or common-mode problems with the breakers and was considered a weakness.

The team also identified a 1995 functional failure for the 6.9 KV 1B-SB emergency bus in which an undervoltage timing relay was found set at 33 seconds instead of the required 13 seconds. This failure was not listed among the functional failures in the licensee's database. When questioned by the team, the licensee indicated that PMGs

were only recently established identifying the unavailability and reliability of the bus undervoltage function as a monitored parameter. A week prior to the onsite inspection, the System Engineer had been given an action item to perform an additional three-year historical review of work history to include undervoltage relays. This review had not yet begun when the team identified the 1995 failure. In response to NRC Violation 50-400/96-09-02, the licensee had previously committed to complete the historical review for all Maintenance Rule systems by August 31, 1997, (See Section M8.1 below). The licensee's ongoing activities for the 6.9 KV AC undervoltage relays were bounded by this commitment.

A recent 1997 functional failure of 6.9KV Bus 1A to transfer automatically from the Unit Auxiliary Transformer (UAT) to the Startup Transformer (SUT) feeder breaker had not yet been added to the Maintenance Rule database, but the engineer was well aware of the incident and was involved in the ongoing root cause determination. The engineer indicated that the failure would be added to the database.

In general, the 6.9KV AC distribution system was being monitored in accordance with the Rule. Appropriate performance criteria and goal setting had been established. An inconsistent approach to performance criteria was being used for this system when compared to other electrical distribution systems and was identified as a weakness.

b.5 <u>125V DC Electrical Distribution (Class 1E) - System 5232</u>

Unit 1 Train A Battery Charger 1A-SA was placed in the (a)(1) classification as a result of exceeding its reliability performance monitoring criteria of two functional failures within 36 rolling months. Data from the historical review indicated that three failures of the AC output breaker associated with this charger occurred within a 12 month period in 1994 and 1995. The team questioned the timeliness of the licensee's (a)(1) declaration since the charger apparently exceeded the reliability performance criterion at the time of the third failure in 1995.

In June 1997, the licensee revised the performance criteria after identifying that the performance criteria for the battery chargers did not properly account for the charging system configuration and operation. There were two parallel chargers that can supply each train of the 125V DC system. One charger was disconnected and in standby; the other charger was connected to the system and supplied all loads and maintained battery charge. The charger alignment was rotated every three months.

Prior to 1997 the battery charger performance criteria only monitored for the loss of all battery charger function. This would not monitor for the failure of an individual battery charger because battery charger function would not be impaired by the loss of one charger since the standby charger could be connected to supply loads and battery charging. The team found the licensee's actions to revise the performance monitoring criteria for the battery charger and reclassify Battery Charger 1A-SA in (a)(1) status appropriate.

The team reviewed corrective actions and the established goals and monitoring for the 125V DC system and found them to be appropriate. Surveillance frequency for

operation of the 1A-SA charger and on/off cycles for monitoring the performance of the replacement breaker were sufficient. The team observed a lack of attention in documentation of the goals and monitoring. Specifically, the expected removal date of the charger from (a)(1) status was in error and did not consider extended periods of planned unavailability for charger rotation when the charger is placed in standby.

The team performed a walkdown of the 125V DC electrical system equipment and areas. Material condition was considered good.

b.6 Containment Isolation Valves (CIVs) - System 9001

The licensee elected to create several "pseudo" systems to track components which had a common function. CIVs fit this criteria and were designated as a "pseudo" system. The licensee had recently added CIVs as a system and was in the process of deleting the functional criteria from the parent system and incorporating it into the CIV System. CIVs were incorporated as a system by the Expert Panel in their July 16, 1997, meeting. The team reviewed the meeting minutes which included the Panel's comments to the Scoping Document and the recommendation to assign the Target Rock CIVs to the (a)(1) category. The CIV System was monitored for CIV Position Indication, leakage, and closing time.

The CIV System was placed in the (a)(1) category because of functional failures of position indication for Target Rock CIVs. The licensee experienced a significantly higher functional failure rate of position indication with Target Rock CIVs than with CIVs of other vendors and placed them in a separate sub-category. Target Rock CIVs had 14 functional failures of position indication in the previous 36 months while all other CIVs had one functional failure during the same period. The licensee had not set a performance criteria for Target Rock valves pending the results of a Root Cause Analysis. The criterion for the balance of the CIVs was no more than two position indication functional failures in 36 months, and the licensee had experienced one functional failure in the previous 36 months. For the total population, the criterion for leakage was no more than seven functional failures per Refueling Outage (RFO), and the criterion for stroke time functional failures was no more than seven in 36 months. The team noted that at the time of the inspection, the licensee's actual performance in this area was at the maximum to allow the system to remain in (a)(2), (i.e., 14 leakage functional failures and seven stroke time functional failures) in the last 36 months.

The team was not able to review historical data for the CIV System as the licensee had not assembled all the data due to the relative newness of the system. The team considered that placing CIVs in a separate system will give the licensee a more focussed visibility of this function regardless of the actual system function.

c. Conclusions

The licensee considered safety in establishment of goals and monitoring for the (a)(1) systems and components reviewed. Also, corrective actions, goals, and monitoring were comprehensive for all the SSCs reviewed, which was considered a strength. In

general, operating data were being properly captured, and industry-wide operating experience was considered, as appropriate. However, a violation was identified for failure to identify an unavailability period for one Maintenance Rule component. A weakness was identified relative to the inconsistent approach to functional failures for the 6.9KV AC system, which might mask potential generic or common-mode problems with the system breakers.

M1.7 Preventive Maintenance and Trending for (a)(2) SSCs

a. Inspection Scope (62706)

Paragraph (a)(2) of the Rule states that monitoring as required in paragraph (a)(1) is not required where it has been demonstrated that the performance or condition of an SSC is being effectively controlled through the performance of appropriate preventive maintenance, such that the SSC remains capable of performing its intended function.

The team reviewed selected SSCs listed below for which the licensee had established performance criteria and was trending performance to verify that appropriate preventive maintenance was being performed, such that the SSCs remain capable of performing their intended function. The team verified that industry-wide operating experience was considered, where practical, that appropriate trending was being performed, that safety was considered when performance criteria were established, and that corrective action was taken when SSCs failed to meet performance criteria or when a SSC experienced a MPFF.

The team reviewed program documents and records for selected SSCs the licensee had placed in the (a)(2) category in order to evaluate this area. The team also discussed the program with licensee management, the Maintenance Rule coordinator, System Engineers, and other licensee personnel.

b. Observations and Findings

b.1 Structures

To establish a baseline for plant structures, the licensee completed their baseline building inspection June 11, 1996. This baseline inspection was documented in Procedure EGR-NGGR-0351, PERFORMANCE MONITORING OF STRUCTURES, "Baseline Inspection Checklist for normally accessible structures". The baseline inspection for normally inaccessible structures was mandated to be completed by July 10, 2000, in Procedure EGR-NGGR-0351, PERFORMANCE MONITORING OF STRUCTURES, Revision 4, dated June 30, 1997. The licensee used the Law Engineering and Environmental Services, Inc., June 1995 "INSPECTION OF WATER CONTROL STRUCTURES FOR SHEARON HARRIS NUCLEAR POWER PLANT CAROLINA POWER & LIGHT COMPANY" report dated December 14, 1995, as the baseline inspection for embankment, spillway, and intake and discharge structures. The team reviewed Procedure EGR-NGGR-0351, to evaluate the adequacy of the acceptance criteria and performance criteria for evaluation of the concrete and structural steel.

The team conducted a walkdown inspection of the Emergency Service Water Intake Structure, the Main Dam, the Diesel Generator Building, and portions of the Reactor Auxiliary, Tank and Fuel Handling Buildings, in order to observe the condition of the concrete and steel structures located within and without the buildings. Although some minor surface cracking in the concrete walls was observed, the inspectors concluded from the visual observations that the buildings appeared structurally sound. No unacceptable conditions were noted. The team identified some minor material condition deficiencies discussed further in paragraph M2.1 below. During the walkdown inspection, the team was accompanied by civil engineers who were knowledgeable and qualified to perform structural evaluations.

The team noted that Procedure EGR-NGGR-0351, ATTACHMENT 1, Sheet 1 of 6, states in part: "Settlement of the containment structure within anticipated (design) limits should be demonstrated." The licensee indicated that their settlement program conducted during construction, demonstrated that stability had been achieved, and was subsequently terminated. The licensee was unable to provide objective quality evidence to support the assertion. The licensee issued Engineering Service Request (ESR) 9700585 to locate objective quality evidence that supports containment settlement stability.

The team noted that other than masonry walls, Procedure EGR-NGGR-0351 was silent as to the inspection attributes and acceptance criteria for non-metallic wall surfaces. The licensee indicated that walls were included in the sections labeled "CONCRETE SURFACES (Slabs, Beams Columns and Foundations)", though not explicitly specified. The licensee indicated that they would make appropriate changes to clarify the procedure.

b.2 Chemical and Volume Control System (CVCS) - System 2060

Review of the CVCS system determined that appropriate performance criteria had been established and monitoring was being accomplished against those criteria. Review of the problems associated with the system indicated that appropriate corrective actions had been taken for failures. Operating experience was being used in system monitoring. The team compared periods of unavailability identified by a review of operator logs and clearance logs with the unavailability data base for the CVCS system.

The team noted an unavailable period for the C CSIP, from 4:45 a.m., March 10, 1997, to 11:06 p.m., March 20, 1997, a period of 10 days, 18 hours and 21 minutes, or approximately 258 hours, documented in clearance 97-00445, that was not included in the Maintenance Rule Data Base. Although not identified by the licensee, the approximately 258 hours of unavailability, when combined with the existing 148 hours, exceeded the performance criteria of $\leq$262 hours of unavailability in a rolling 18-month period by approximately 144 hours. As documented in Expert Panel Meeting 97-24 minutes (dated July 24, 1997), on July 17, 1997, the C CSIP was classified as (a)(1) based on the number of functional failures exceeding the established performance criterion (i.e., 4 failures versus the criterion of $\leq$ 1 per 36 months). However, since approximately 10.75 days of unavailability (ending

March 20, 1997), had not been captured, the licensee had not recognized that the unavailability performance criteria of ≤ 262 hours in 18 months had been exceeded. Therefore, the pump had been outside its performance criterion since March 20, 1997, and had not been evaluated to determine the need for re-classification from (a)(2) to (a)(1). On July 22, 1997, the licensee documented this failure to identify unavailability period for a Maintenance Rule component in CR No. 97-03606. This failure to capture all unavailability for the C CSIP is considered to be a violation of 10 CFR 50.65(a)(2) and is identified as an example of Violation 50-400/97-07-04 discussed further in Section M1.7 b.4 below.

CVCS function P, identified in the Maintenance Rule Database as, " Minimize thermal stress at CVCS/Reactor Coolant System (RCS) transition", (CVCS/RCS thermal sleeves) was erroneously identified as High Safety Significant when the Expert Panel had determined that CVCS function P was Low Safety Significant. This was indicative of inattention to detail.

b.3 Reactor Protection - System 1080
Engineered Safety Features Activation (ESFAS) - System 1090

Since the Reactor Protection System and ESFAS shared many components and many functions overlapped, the licensee opted to monitor both systems for Maintenance Rule purposes under system 1080. PMG and performance criteria were established for both systems' primary functions. The team found that the licensee had established appropriate performance monitoring criteria, used industry-wide operating experience and appropriate corrective actions were taken when failures were identified.

The team reviewed a historical summary listing of maintenance work tickets to determine if the licensee adequately identified functional failures. The team identified one ticket that appeared to be a functional failure that was not classified as a functional failure by the licensee. The item involved the failure of a Reactor Protection System Latching Relay associated with a Steam Dump System interlock for a loss of load transient.

The licensee initially determined that this was not a functional failure since the Reactor Protection System would have remained capable of performing its established functions. However, the team questioned whether the failure of this latching mechanism resulted in a functional failure of the Steam Dump System rather than the Reactor Protection System. Following review of operation of the Steam Dump System, the licensee agreed with the team that failure of the latching mechanism constituted a functional failure of the Steam Dump System. Performance monitoring criteria for the Steam Dump System, specifying that failure of the latching mechanism was a functional failure, was established and CR 97-03621 initiated to document this error.

This failure to identify a functional failure for the Steam Dump System and the failure to capture unavailability time for the C CSIP, as discussed in section 1.7 b.2 above, was considered to be a violation of 10 CFR 50.65(a)(2) for failure to demonstrate that the performance of the Steam Dump System and the C Charging Safety Injection

Pump had been effectively controlled through the performance of appropriate preventive maintenance. This violation was identified as 50-400/97-07-04, Failure to Demonstrate Performance of the Steam Dump System and the C Charging Safety Injection Pump. The team concluded that weak interface between system owners whose systems shared components contributed to the failure to identify properly the latching mechanism problem as a functional failure.

The team also performed a walkdown of the Reactor Protection System cabinets. Cleanliness and material condition was considered good.

b.4 Pressurizer - System 2050

The majority of functions scoped for the Pressurizer System were high safety significant, as defined in Regulatory Guide 1.160. The team verified that the licensee established appropriate performance monitoring criteria for the system's functions and incorporated industry experience. The team reviewed listings of condition reports and maintenance work tickets for the previous two years and observed that the licensee had taken appropriate corrective actions and was effectively monitoring the Pressurizer System against established criteria.

b.5 Control Room Area Ventilation (CRAV) - System 8220

The team reviewed the performance criteria associated with the CRAV System. The system was only being monitored for reliability since it was not a safety (risk) significant system and because the licensee considered that the plant's TS would force the return of the CRAV equipment to service once removed from service for either planned or unplanned maintenance. Of the seven functions defined for the system, five were considered to be within the scope of the Maintenance Rule. The licensee established performance criteria of less than or equal to six functional failures per train on a rolling 36-month basis for four of the five functions. The remaining function (post-accident monitoring) had a criterion of no more than four functional failures in a rolling 36-month period. The actual performance of the system as of July 1, 1997, had not exceeded the (a)(2) performance criteria for any of the functions. The team noted that the system's functions were standby in nature and that the loss of these functions would not result in a plant trip. The team concluded that the licensee's performance criteria and monitoring was appropriate for the CRAV System.

b.6 Emergency Diesel Generator (EDG) -System 5095

The EDG system was being monitored under 50.65(a)(2) and was considered a high safety significant system, as defind in Regulatory Guide 1.160, with standby functions. The licensee identified and established performance criteria and monitoring for six Maintenance Rule functions. Performance criteria selected were no more than three functional failures per EDG per rolling 36 months and no more than 120 hours unavailability per EDG per rolling 18 months. The team walked down the EDGs and interviewed the System Engineer. The material condition of the EDGs was acceptable and the System Engineer was knowledgeable and appeared to be aggressive in implementing the preventive maintenance program. The team also reviewed the maintenance history, Unit and Limiting Condition for Operation (LCO) logs,

Unavailability Trend Reports, and the Scoping Document. One EDG had experienced two functional failures and the other had experienced no functional failures during the previous 36 months. Each EDG had an unavailability of approximately one half of that allowed by the performance criteria. The team concluded that the EDGs were adequately monitored and were reliable.

c. Conclusions

For (a)(2) SSCs, the team concluded that, in general, performance criteria were properly established; industry-wide operating experience was considered, where practical; appropriate trending was performed; corrective action was taken when SSCs failed to meet performance criteria or when a SSC experienced a functional failure; and operating data was being properly captured. However, a violation was identified for failure to capture one period of unavailability for the C Charging Safety Injection Pump and failure to capture one functional failure for the Steam Dump System.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Material Condition Walkdowns

a. Inspection Scope (62706)

During the course of the reviews, the team performed walkdowns of selected portions of the following systems and plant areas, and observed the material condition of these SSCs.

- Main Feedwater System (3050)
- Normal Service Water System (4060)
- 6.9KV AC Distribution System (5165)
- 125V DC Distribution System (5232)
- Chemical and Volume Control System (2060)
- Reactor Protection and ESFAS Systems (1080)
- Control Room Area Ventilation System (8220)
- High Head Safety Injection System (2080)
- Emergency Diesel Generator (5095)
- Main Dam
- Emergency Service Water System Intake Structure
- Diesel Generator Building
- Reactor Auxiliary Building
- Normal Service Water Intake Structure

b. Observations and Findings

Housekeeping in the general areas around equipment was adequate. Piping and components were painted, and very few indications of corrosion, oil leaks, or water leaks were evident.

The team conducted the walkdowns accompanied by the responsible System Engineer. In general, the engineers demonstrated a good level of knowledge and familiarity with their assigned system. During the walkdown inspection of SSCs, the team noted the following conditions.

- A number of long diagonal cracks, not noted in the 1996 Structures Baseline inspection, were noted by the team[1]. The licensee issued Work Item No. 97-06001 to address this item.

- Diesel Generator Building roof hatch cover corrosion and loose or missing hold down fasteners, not noted in the 1996 Structures Baseline inspection, were noted by the team[1]. The licensee added these items to Work Request/Job Order WR/JO No. 96-AEUD1 and increased the priority for the start of work.

- Emergency Service Water, Reactor Auxiliary Building, and Diesel Generator Building missing damaged or mis-located roof drain covers, not noted in the 1996 Structures Baseline inspection, were noted by the team[1]. The licensee issued Deficiency List Entry (DLE) No. 97D01705 to address this item.

- Reactor Auxiliary Building rain water ponding, not noted in the 1996 Structures Baseline inspection, was noted by the team[1]. The licensee added this item to Action Request Item No. 95-03009 to address this item.

- Reactor Auxiliary Building buildup roof damage, not noted in the 1996 Structures Baseline inspection, was noted by the team[1]. The licensee added this item to the Reactor Auxiliary Building PERFORMANCE MONITORING OF STRUCTURES Baseline Checklist.

- Efflorescence and leaching from ground water infiltration on the 190 foot elevation of the Reactor Auxiliary Building, not noted in the 1996 Structures Baseline inspection, was noted by the team[1]. The licensee added this item to the Reactor Auxiliary Building PERFORMANCE MONITORING OF STRUCTURES Baseline Checklist.

- Several pieces of abandoned electrical conduit were noted on the Diesel Generator Building roof. The licensee added this item to WR/JO No. 96-AEUD1.

- Closure devices on a number of electrical panels were not properly secured such that the gasket was not properly compressed potentially compromising the panel's environmental integrity. The licensee corrected these items by the end of the inspection.

- Thermal insulation was crushed, damaged or missing in several locations. The licensee issued DLE No. 97-D017219 and DLE No. 97-D01722 to address this item.

- A number of illumination lamps were out. The licensee issued DLE 97-D01723 to address this item.

- Leakage was noted from a flange upstream of 1CVD-215. The licensee issued DLE No. 97-D01712 to address this item.

- Leakage was noted from eye wash station 1PW-E022. The licensee issued DLE No. 97-D01711 to address this item.

- Conduit associated with I/P 01SW-950 was damaged. The licensee issued DLE No. 97-D01715 to address this item.

- Exterior pipe cap adjacent to 1P-79 was missing. The licensee issued DLE No. 97-D01713 to address this item.

- Limit switches for 3WG-139 had loose wire conduit connections. The licensee issued Condition Report CR No. 97-03643 to address this item.

[1]Although these items were not noted in the 1996 Structures Baseline inspection, it could not be determined whether the structural discrepancies existed at the time of the 1996 inspection.

c. Conclusions

Plant material condition and housekeeping observed during walkdowns were generally good. Preservation of equipment by painting was considered to be good. The housekeeping and material condition discrepant items noted were apparently items indicative of lack of attention to detail on the part of operations and maintenance personnel who made frequent tours of the areas. For the discrepant conditions identified corrective actions were initiated by the licensee.

M7 Quality Assurance In Maintenance Activities

M7.1 Licensee Self-Assessment

a. Inspection Scope (62706)

The team reviewed the licensee's self-assessments and surveillances to determine if Maintenance Rule independent evaluations were conducted and the findings of the audits were addressed.

b. Observations and Findings

The licensee has performed one surveillance and two assessments in the area of 10 CFR 50.65. Surveillance HNAS 95-262 was conducted December 4-13, 1995, to determine the effectiveness of the then-current Maintenance Rule Program implementation. The areas assessed by HNAS 95-262 included: Scoping; Risk Determination; Condition Monitoring; Risk Management; Preventive Maintenance; Training; and Program Implementation. HNAS 95-262 determined that the performance criteria were not being met in accordance with management expectations. Assessment 96-08-MA-C was conducted April 15-19, 1996, to ensure that the Harris Plant was prepared to implement the Maintenance Rule. Assessment 96-08-MA-C determined that the Harris Plant was on track to implement the Maintenance Rule, with

findings related to insufficient justification for the exclusion of systems from the Maintenance Rule and the lack of some Maintenance Rule documentation to contain an appropriate level of detail. Assessment HESS 96-26 was conducted December 2-5, 1996, to assess implementation of the Maintenance Rule. Assessment HESS 96-26 determined that the Maintenance Rule was marginally implemented at Harris. Findings, identified by HESS 96-26, included: failures not appropriately evaluated; PSA was not re-qualified after modeling changes in March 1996; EOP components not included in the scope of the Maintenance Rule as appropriate; potential problems regarding developing and monitoring unavailability and reliability; and Maintenance Rule software data base not effectively used.

The audits were independent and of an appropriate scope and depth, however, as the response process for the audit findings was incomplete, evaluation of corrective actions was not done. The team noted problems still existed related to: insufficient justification for the exclusion of systems from the Maintenance Rule, lack of some Maintenance Rule documentation to contain an appropriate level of detail, and monitoring unavailability.

c. Conclusions

Based on the magnitude of problems identified in HESS 96-26, the team concluded that earlier assessments were not as thorough as they might have been. The team concluded the last assessment was detailed and thorough, but some problems still existed. The status of corrective actions is discussed further in Paragraph M8.1.

M8 Miscellaneous Maintenance Issues

M8.1 (Open) VIO 50-400/96-09-02, Inadequate Maintenance Rule Scoping

a. Inspection Scope (92901)

This violation involved failure to include a number of components in the scope of the Maintenance Rule. The violation occurred because the EDBS, which was used by the Expert Panel for scoping determinations, had the components listed in the wrong system. Concurrent with inspection of the Maintenance Rule implementation, the inspectors reviewed the status of corrective actions for the violation.

b. Observations and Findings

After issue of Violation 50-400/96-09-02, the licensee performed a self-assessment of the Maintenance Rule implementation (HESS 96-25 - December 2-5, 1996). This self-assessment identified additional problems with implementation of the Maintenance Rule. The licensee's letter of response, dated December 9, 1996, described the corrective actions for the violation and stated, "Preliminary results of the assessment indicates other items which need further review to ensure full compliance with the MR." The letter further stated, "Items from the MR self-assessment discussed above which could result in noncompliance will be resolved prior to February 28, 1997, or a supplemental response to this violation will be provided with an updated schedule for resolution." A supplemental response was issued on February 28, 1997.

The supplemental response identified three high priority areas for corrective action of self-assessment findings and specified a schedule for completion of the corrective actions. The three areas were; (1) deficiencies in identifying and/or misclassifying functional failures as maintenance preventable or repetitive maintenance preventable functional failures; (2) systems that need re-evaluation for scoping within the MR; and (3) issues related to structure, system, or component performance criteria. These corrective actions resulted in the licensee essentially re-vamping the program, including re-scoping and much more detailed performance criteria. A complete list of functions was developed for each system and scoping was accomplished based on asking the five scoping questions of the Maintenance Rule for each function. Monitoring and performance criteria were changed to monitor at the function level, versus the system or train level. For some systems, performance criteria were specified at the channel level to better monitor component performance. These changes resulted in much more detailed monitoring and performance criteria. The February 28, 1997, letter of response indicated that some of the corrective actions would be completed by March 14, 1997, some by July 31, 1997, and the remainder by August 31, 1997.

The required corrective actions were documented in the Maintenance Rule Self-Assessment Action Plan for CR 96-02175-10, Maintenance Rule Self-Assessment Issue Resolution. As of July 24, 1997, the following actions remained to be completed: (1) complete development of more detailed performance criteria for Systems 1900, 8006, 5230, 6080, and 6150 - scheduled to be completed by September 30, 1997; (2) review of revised scoping criteria for Systems 1065, 5250, 5255, and 7070 - scheduled to be completed by July 31, 1997; (3) verify disposition of corrective actions for five of 149 identified Self-Assessment Field Observations (mostly completion of data fields in the Maintenance Rule data base) - scheduled to be completed by September 30, 1997; and (4) completion of validation of three-year historical events for Maintenance Rule systems - scheduled to be completed by August 31, 1997. For corrective actions not completed within the schedule specified in the February 28, 1997, response letter, the licensee planned to provide a supplemental response to the NRC (supplemental response submitted July 30, 1997).

c. Conclusions

As noted, in response to an NRC violation and a self-assessment, the licensee was in the process of totally re-vamping their Maintenance Rule program to monitor at the function level resulting in a much more detailed program. Although not totally complete, corrective actions were nearing completion and changes appeared to result in a much improved program. Although the program has been improved, some of the changes could have been accomplished in a more timely manner to be more consistent with the implementation date of July 10, 1996, for the Rule.

III. ENGINEERING

E2 Engineering Support of Facilities and Equipment

E2.1 Review of Updated Final Safety Analysis Report (UFSAR) Commitments (62706)

A recent discovery of a licensee operating their facility in a manner contrary to the UFSAR description highlighted the need for a special, focused review that compares plant practices, procedures and parameters to the UFSAR descriptions. While performing the inspections discussed in this report, the team reviewed the applicable portions of the FSAR that related to the areas inspected. The team verified that the FSAR wording was consistent with the observed plant practices, procedures and parameters.

E4 Engineering Staff Knowledge and Performance

E4.1 Engineer Knowledge of the Maintenance Rule

a. Inspection Scope (62706)

The team interviewed licensee system owners (System Engineers) for the SSCs reviewed in Sections M1.6 and M1.7 to assess their understanding of the Maintenance Rule and associated responsibilities.

b. Observations and Findings

The team verified that each System Engineer was implementing the Maintenance Rule and the licensee's Maintenance Rule procedures in a satisfactory manner. The System Engineers for those systems reviewed were experienced and knowledgeable of their assigned systems and understood how to apply the Rule to their systems.

For one case reviewed (125 VDC electrical system), the team observed that, when the primary System Engineer was absent, the backup engineer was knowledgeable and understood how to apply the Maintenance Rule to the backup system. Interface between engineers responsible for systems with shared components, (i.e., components which affect multiple Maintenance Rule systems), could be strengthened. One example of weak interface was identified that resulted in a failure to recognize a functional failure of a shared component (refer to Section M1.7 b.3, Steam Dump Relay Latch).

c. Conclusions

The team concluded the System Engineers were knowledgeable of their systems, the Maintenance Rule, and were implementing the Rule in a satisfactory manner. However, interface between engineers responsible for systems with shared components, (i.e., components which affect multiple Maintenance Rule systems), could be strengthened.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

The Team Leader discussed the progress of the inspection with licensee representatives on a daily basis and presented the results to members of licensee management and staff at the conclusion of the inspection on July 21, 1997. The licensee acknowledged the findings presented.

At the time of the exit, one violation against 10 CFR 50.65 (a)(1) and (a)(2) with three issues was identified. Subsequent to the inspection, NRC management revision determined that the three issues should be documented as two violations; one against 10 CFR 50.65 (a)(1) for failure to effectively monitor the performance or condition of the NSW System and one against 10 CFR 50.65 (a)(2) for failure to effectively demonstrate performance of the Steam Dump System and the C CSIP. The violations for the NSW system and the C CSIP involved failure to identify periods of unavailability. The violation for the Steam Dump System involved failure to identify a functional failure. Licensee personnel were notified of this change in the number of violations by telephone on August 14, 1997.

PARTIAL LIST OF PERSONS CONTACTED

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B. Clark, General Manager, Harris Plant
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J. Eads, Supervisor, Licensing and Regulatory Programs
M. Hamby, Supervisor, Regulatory Compliance
B. Meyer, Manager, Operations
R. Oliver, Superintendent, PSA
W. Peavyhouse, Superintendent, Design Control
W. Robinson, Vice President, Harris Plant
G. Rolfson, Manager, Harris Engineering Support Services
D. Tibbitts, Manager, Nuclear Assessment
V. Stephenson, Manager, Engineering Rapid Response/Reliability
M. Wallace, Senior Analyst, Licensing

NRC:

J. Brady, Senior Resident Inspector
P. Fredrickson, Branch Chief, Special Inspection - RII

LIST OF INSPECTION PROCEDURES USED

IP 62706 Maintenance Rule

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

Type	Item Number	Status	Description and Reference
IFI	50-400/97-07-01	Open	Evaluation of Not Fully Maintaining the PRA Assumptions - Section M1.2.
IFI	50-400/97-07-02	Open	Followup on Performance Monitoring of the Condensate Makeup System - Section M1.2.
VIO	50-400/97-07-03	Open	Failure to Effectively Monitor the Performance or Condition of the Normal Service Water System - Section M1.6 b.3.
VIO	50-400/97-07-04	Open	Failure to Effectively Demonstrate Performance of the Steam Dump System and the C Charging Safety Injection Pump - Sections M1.7 b.2, and M1.7 b.3.

DISCUSSED

Type	Item Number	Status	Description and Reference
VIO	50-400/96-09-02	Open	Inadequate Maintenance Rule Scoping - Section M8.1.

LIST OF ACRONYMS USED

AC	-	Alternating Current
BIT	-	Boron Injection Tank
CIV	-	Containment Isolation Valves
CR	-	Condition Report
CSIP	-	Charging Safety Injection Pump
CVCS	-	Chemical and Volume Control System
DLE	-	Deficiency Log Entry
EDBS	-	Equipment Database
EDG	-	Emergency Diesel Generator
EOP	-	Emergency Operating Procedure
ESFAS	-	Engineered Safety Feature Actuation System

ESR	-	Engineering Service Request
ESW	-	Emergency Service Water
HHSI	-	High Head Safety Injection
KV	-	Kilovolt
LCO	-	Limiting Condition for Operations
MFW	-	Main Feedwater
MPFF	-	Maintenance Preventable Functional Failure
NEI	-	Nuclear Energy Institute
NPF	-	Nuclear Power Facility
NRC	-	Nuclear Regulatory Commission
NRR	-	Office of Nuclear Reactor Regulation
NUMARC	-	Nuclear Management and Resources Council, Inc.
NWS	-	Normal Service Water
P.E.	-	Professional Engineer
PDR	-	Public Document Room
PMG	-	Performance Maintenance Group
PRA	-	Probabilistic Risk Assessment
PSA	-	Probabilistic Safety Assessment
QA	-	Quality Assurance
RAW	-	Risk Achievement Worth
RCS	-	Reactor Coolant System
RFO	-	Refueling Outage
RMPFF	-	Repetitive Maintenance Preventable Functional Failures
SSA	-	Shutdown Safety Assessment
S/G-FWIV	-	Steam Generator Feedwater Isolation Valve
SSC	-	Structures, Systems, or Components
SUT	-	Startup Transformer
TS	-	Technical Specification
UFSAR	-	Updated Final Safety Analysis Report
UAT	-	Unit Auxiliary Transformer
UCLF	-	Unplanned Capability Loss Factor
VDC	-	Volts Direct Current
WR/JO	-	Work Request/Job Order

LIST OF PROCEDURES REVIEWED

Nuclear Generation Group Standard Procedure ADM-NGGC-0101, "MAINTENANCE RULE PROGRAM", Revision 6.

Nuclear Generation Group Standard Procedure EGR-NGGC-0351, "CONDITION MONITORING OF STRUCTURES", Revision 4.

Work Coordination Manual Procedure WCM-001, SYSTEM OUTAGES, Revision 4, July 1997.

Outage Management Procedure OMP-003, OUTAGE SHUTDOWN RISK MANAGEMENT, Revision 8.