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Licensee:	Indiana Michigan Power Company
Facility:	Donald C. Cook Nuclear Plant, Units 1 and 2
Location:	7700 Red Arrow Highway Stevensville, MI 49127
Dates:	September 9-13, 1996
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EXECUTIVE SUMMARY

Donald C. Cook Nuclear Plant, Units 1 and 2
NRC Inspection Reports No. 50-315/96009(DRS); 50-316/96009(DRS)

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 report covers a one week onsite inspection by regional and NRR inspectors, and an NRC consultant.

Operations

- Operators' knowledge was consistent with their responsibilities for implementation of the maintenance rule. There was no indication that the maintenance rule distracted from the operators' ability to safely operate the plant. Using a risk matrix chart actually helped operators monitor and limit risk (Section O4.1).

Maintenance

- The licensee correctly identified the systems, structures and components (SSCs) that were required to be within the scope of the maintenance rule. Documentation associated with the technical scoping basis was extensive. There were examples of undefined scoping decisions, but after discussions with the licensee, the team concluded that the justifications were acceptable (Section M1.1).

- The licensee's approach to establishing SSC importance from the Probabilistic Risk Assessment (PRA) was a strength. The licensee elected to apply the importance criteria at the level at which each SSC was scoped into the maintenance rule. Generally, this meant the criteria were applied at the train level (Section M1.2).

- The following weaknesses were observed: the licensee's PRA group's decision to label an SSC as high safety significant only if it met at least two of the NUMARC 93-01 importance criteria; the licensee's expert panel's use of a criterion of high perceived reliability to justify ranking of an SSC in the low safety significant category; the expert panel's ranking of another SSC as low safety significant because the SSC was not modeled in the PRA; and the lack of documentation associated with the expert panel's decisions (Section M1.2).

- The licensee's approach to assessing the impact of voluntary on-line maintenance on plant safety was acceptable; however, a weakness in the risk matrix contained in Plant Manager Instruction (PMI) 2293, "On-line Maintenance of Important Systems," was noted where there could have been fewer restrictive approximations in the supporting PRA calculations (Section M1.5).

- Two violations of the maintenance rule were identified. In four (a)(1) and 14 (a)(2) SSC examples, the licensee used FFs as a means to measure SSC reliability. Appropriate reliability goals were not established, commensurate with safety. Also, one example was identified where the licensee had not established an adequate

basis for the unavailability goal for the containment hydrogen control system, a low safety significant standby system (Section M1.6).

- The corrective actions associated with failures of SSCs were appropriate, except that the classification of battery systems and air dryers functional failure definitions potentially masked problems in these systems. Accuracy in the classification of FFs, the associated definitions, and evaluations are an unresolved item. The team observed a potential weakness in the identification of repetitive maintenance preventable functional failures (RMPFFs) on motor-operated-valve (MOV) generic failures (Section M1.6).

- The program utilizing industry-wide operating experience was effectively implemented during the development of the licensee's maintenance rule program (Section M1.6).

Quality Assurance (QA)

- The Maintenance Rule Readiness Audit was a crucial part of the licensee's overall implementation of the maintenance rule and was considered a strength. It was comprehensive and provided meaningful feedback to management. (Section M7.1).

Engineering

- System Engineers (SEs) were generally knowledgeable of their assigned systems and demonstrated sufficient knowledge to adequately implement their responsibilities under the maintenance rule. However, some communication weaknesses were evident between SEs and the Maintenance Rule Coordinator (MRC), apparently because the maintenance rule program had only recently been implemented and had been changed as a result of the self-assessment (Section E4.1).

Report Details

Summary of Plant Status

Unit 1 was at 86.5 percent power and Unit 2 was at 100 percent power during this inspection.

Introduction

The primary focus of this inspection was to verify that the licensee had implemented a maintenance monitoring program which satisfied the requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (the maintenance rule). The inspection team of six inspectors included regional and headquarters inspectors and one NRC consultant. Assistance and support were provided by one member of the Quality Assurance and Maintenance Branch (HQMB), NRR.

I. OPERATIONS

04 Operator Knowledge and Performance

04.1 Operator Knowledge of the Maintenance Rule

a. Inspection Scope (62706)

The team interviewed four licensed reactor operators and six senior reactor operators to determine if they understood the general requirements of the maintenance rule, their particular duties, and responsibilities for its implementation.

b. Observations and Findings

The team found that the operators had a general working knowledge of the maintenance rule and their role in its implementation. They stated their primary duties included review of maintenance activities and comparison of these activities with the probabilistic safety assessment (PSA) matrix chart. The unit supervisors stated that they used the PSA matrix chart to identify systems that were within the scope of the maintenance rule. In addition, they were tasked with the timely removal and restoration of equipment and accounting of equipment out-of-service time. The operators stated that they had received no feedback from the Maintenance Rule Coordinator or the system engineers on whether their efforts to improve the equipment out-of-service logs were meeting the needs of the individuals trending equipment unavailability.

The operators indicated that the maintenance rule was implemented with little impact on their day-to-day activities, nor did it impose additional administrative burdens that distracted them from their responsibility to safely operate the plant.

c. Conclusions

Operators' knowledge was consistent with their responsibility for implementation of the maintenance rule. There was no indication that the maintenance rule distracted from the operators' ability to safely operate the plant. Using a risk matrix chart actually helped operators monitor and limit risk.

II. MAINTENANCE

M1 Conduct of Maintenance (62706)

M1.1 Scope of SSCs Included Within the Rule (62706)

a. Inspection Scope

The team reviewed the licensee's scoping documentation to determine if the appropriate SSCs were included within the maintenance rule program in accordance with 10 CFR 50.65(b). The team used NRC Inspection Procedure (IP) 62706, NUMARC 93-01, and Regulatory Guide 1.160 as references during the inspection.

b. Observations and Findings

Two Hundred and twenty-eight SSCs were considered in the scoping phase. Of these, 173 SSCs were scoped within the maintenance rule, and 64 SSCs were identified as high safety significant. Of the 55 SSCs not scoped in the maintenance rule program as separate SSCs, approximately half were included with other SSCs already within the scope of the maintenance rule. The SSCs within the scope of the maintenance rule were listed as an attachment to procedure 12 PMP 7030.MNT.001, Rev. 1, "Corrective Action Program Interface with the Maintenance Rule Program." This listing identified the SSCs and their associated maintenance rule functions.

The licensee's maintenance rule implementation plan broke down the scoping process into ten manageable tasks. These included developing an initial list of systems, a generic list of maintenance rule functions, and a list of specific system functions. Based on the results of these tasks, lists were developed of systems in and out of the scope of the maintenance rule. Justifications for not including systems within the scope of the maintenance rule were also identified. The systems, both in and out of scope, were then divided into 228 SSCs and included in the licensee's maintenance rule data base. The data base indicated whether the SSCs were high safety significant, and whether normally running or in standby. In addition, the data base included performance criteria, maintenance rule functions, and FF definitions. Including a list of FF definitions was a good method to perform the initial failure review.

The team reviewed documentation associated with the listed SSCs to see whether the licensee properly justified its conclusions for each SSC. The team determined that the licensee had correctly identified the plant systems that were required to be scoped within the maintenance rule. In some cases the documentation detailing the technical basis of scoping justifications was not well defined. After discussions with the licensee, the team concluded the justifications were acceptable.

Some SSCs were not included in scope, but their functions were included in the scope of other SSCs. For example, lightning protection, freeze protection, and grounding were not separate SSCs, but if an SSC failed due to these generic systems, the SSC where the failure occurred would assess the FF. Because these failures may cross numerous SSCs, the corrective action process, as designed, must take into account the generic implications of these failures.

c. Conclusions

The team concluded that the licensee had correctly identified the SSCs that were required to be within the scope of the maintenance rule. Documentation of the technical basis for some scoping decisions was not always sufficiently detailed, but after discussions with the licensee, the team concluded the justifications were acceptable.

M1.2 Safety (Risk) Determination, Risk Ranking, and Expert Panel (62706)

a. Inspection Scope

Paragraph (a)(1) of the maintenance rule requires that SSC performance goals be established, commensurate with the safety significance of each SSC. Additionally, implementation of the maintenance rule using the guidance contained in NUMARC 93-01 requires that safety be taken into account in setting performance criteria and monitoring under paragraph (a)(2) of the maintenance rule. This safety consideration would be used to determine if the SSC should be monitored at the system, train, or plant level. The team reviewed the methods and calculations that the licensee had established for making these safety determinations. The team also reviewed the safety determinations that were made for the specific SSCs reviewed during this inspection, the expert panel's process, and the information available which documented the decisions made by the expert panel.

b.1 Observations and Findings on Expert Panel

The team found the expert panel process, excluding several examples in the risk ranking area, was performing its intended function. However, the expert panel's activities were not sufficiently proceduralized, and documentation was insufficient to reconstruct the basis for some of the expert panel's decisions. These deficiencies (such as quorum requirements and meeting minutes) were also identified by the recent self-assessment, and corrective actions were being implemented to address the concerns. The licensee attempted to reconstruct some previous meeting minutes and revised its procedure to require meeting minutes.

However, the composition of the expert panel had changed considerably following a recent licensee reorganization; only the most recent meeting minutes could be effectively reconstructed.

The expert panel members had a variety of experience and knowledge, including PRA expertise. PRA training was provided to several expert panel members. The expert panel continued to meet to address issues such as scoping changes and returning systems to (a)(2).

b.2 Observations and Findings on Risk Ranking

The maintenance rule requires that a determination be made as to the safety significance of each SSC that was in scope. A plant-specific PRA was used to rank SSCs with regard to safety significance. NUMARC 93-01 recommendations for risk reduction worth (RRW), risk achievement worth (RAW), and core damage frequency (CDF) cut set contribution were used. A strength observed was the manner in which the PRA group established SSC importance. NUMARC 93-01 was not clear about whether the importance measure criteria were to be applied at the system, train, or component level. The licensee elected to apply the criteria at the level at which each SSC was scoped into the maintenance rule. Generally, this meant the criteria were applied at the train level. The licensee extrapolated event-level importance from the PRA to train-level measures by choosing the highest RAW value for an event in the train and by summing the dominant RRW values for the train. The team judged this approach to be a reasonable one. The licensee's approach should avoid the potential pitfall that highly redundant systems might be judged to be of low safety significance because no particular component in the system was uniquely very important.

The licensee's PRA contained much plant-specific data, and the licensee had plans to continue periodically updating this data. The licensee used a cut set matching approach in quantifying its PRA model to estimate CDF. In this approach, individual system fault trees were first solved and then the minimal cut sets from these trees were combined using sequence logic from the event trees. This was a commonly used approximation to a fully linked approach. In solving the fault trees, various truncation levels were employed to achieve the necessary resolution. In combining fault tree cut sets to obtain sequence cut sets, a truncation level of 1E-10 was used. The licensee's overall CDF was approximately 7E-5 per year. The team found this approach to truncation to be acceptable.

The team observed weaknesses in the process by which the licensee's expert panel made their determinations of safety significance. First, for the containment, containment isolation components (CICs), and the ice condenser, the expert panel made a determination of low safety significance based on the perceived high reliability of these SSCs. High reliability was not a necessary and sufficient condition for low safety significance; high reliability may make these SSCs low contributors to risk, but another aspect of safety significance was the increase in risk that would be experienced if SSC performance were to degrade. The expert panel, in making its determination, did not appear to have considered this aspect.

The second observed weakness in the risk determination process was related to the first. NUMARC 93-01 lists three importance measures from the PRA that can be considered in making the safety significance determination, stating, "The panel's judgments should include consideration of the three specific risk importance calculational methods listed and described in Sections 9.3.1.1, 9.3.1.2, and 9.3.1.3." It goes on to explain that each of these three measures examines safety significance from a different perspective, and concluded that ". . . consideration should be given to using all of them in the decision making process." The licensee's PRA group adopted the position that an SSC must meet at least two of these three criteria in order to be considered safety significant from the PRA perspective. As a result, the control air dryer strings were ranked as low safety significant, because they only met the criterion of RAW. This importance measure examines the impact on risk of degraded SSC performance or of taking an SSC out of service. It was the only one of the three importance measures recommended in NUMARC 93-01 to do so. To conclude that an SSC was of low safety significance because it was only important from the perspective of risk achievement ignores the aspect of safety significance related to the impact on risk of degraded SSC performance or taking the SSC out of service.

The final weakness observed in the expert panel's determinations of safety significance pertained to the backup plant air compressor located on the roof of the auxiliary building. The stated basis for the expert panel's determination that this SSC was of low safety significance was that it was not modeled in the PRA. One of the roles of the expert panel was to compensate for PRA limitations, one of which was that not all SSCs were modeled. The PRA group was planning to add the backup compressor to the PRA model and expected it to provide some reduction in risk, but at the time of the inspection could not estimate the magnitude of the reduction.

c. Conclusions on Risk Ranking and Expert Panel

The team concluded that the licensee's approach to establishing SSC importance from the PRA was a strength, avoiding the possibility that very detailed PRA models could result in lower relative importance of the basic model elements than if system or super-component modeling had been used (i.e., with component-level importance measures, a very detailed system might not be determined to be important if the most important component were used as a surrogate for system importance).

The PRA group's decision to label an SSC as high safety significant only if it met at least two of the NUMARC 93-01 importance criteria was an observed weakness.

The team concluded that the expert panel process was acceptable, with certain exceptions. For example, the expert panel did not appear to compensate in all cases for the limitations of the PRA. The expert panel used a criterion of high perceived reliability and accepted SSCs not being modeled in the PRA to justify ranking an SSC in the low safety significant category. Documentation associated with the expert panel's decision process was weak and had to be reconstructed for the team.

M1.3 (a)(3) Periodic Evaluations (62706)

a. Inspection Scope

Section (a)(3) of the maintenance rule requires that in evaluating performance and condition monitoring activities and associated goals and preventive maintenance activities, industry-wide operating experience be taken into account, where practical. This evaluation was required to be performed at least once during each refueling cycle, with no more than 24 months between evaluations. The team reviewed the procedural guidelines for these evaluations and the prototype quarterly assessment for the period ending July 1996. The team also discussed the quarterly assessment process with the licensee personnel.

b. Observations and Findings

The licensee's procedures for preparation of the refueling cycle assessment were specific and detailed. All areas specified by NUMARC 93-01 were addressed.

Although the maintenance rule does not require it, the licensee's procedures mandate the preparation of a quarterly assessment. This was to be prepared by the Maintenance Rule Coordinator (MRC) and the SEs. Engineering Head Instruction (EHI) 5035, Maintenance Rule Program Administration, Rev. 1, dated September 4, 1996, provided very little guidance on the scope and content of this quarterly assessment. Since the quarterly assessment feeds into the refueling cycle assessment, it is important that these quarterly reports be consistent. Absent specific guidance for the MRC and SEs, this consistency is uncertain, especially if key personnel are reassigned. The prototype report provided examples of how issues could be addressed, but was not a complete representation of the status of maintenance rule implementation. The licensee indicated that guidance for scope and content of the quarterly reports would be clarified.

c. Conclusions

At the time of the inspection, no refueling cycle assessment had been completed; therefore, no evaluation for quality of implementation could be made. The procedures for performing the periodic evaluations appear to meet the requirements of the maintenance rule and were consistent with the guidance in NUMARC 93-01. The forthcoming assessment, due at the next refueling outage, should be reviewed to ensure those refueling cycle evaluations are properly performed and will be identified as an inspection follow-up item (IFI 50-315/96009-01(DRS); 50-316/96009-01(DRS),"Refueling Cycle Assessment").

Because the report contained only examples and was not complete, and because procedural guidance for scope and content of the report was nonspecific, the team could not evaluate the quality of the report, nor determine whether it would provide an adequate input for the refueling cycle assessment. The licensee's procedures for this report should be reexamined after the guidance is clarified and a sample of quarterly reports should be reviewed to ensure that a complete, consistent input for

the refueling cycle assessment is prepared and will be identified as an inspection follow-up item (IFI 50-315/96009-02(DRS);50-316/96009-02(DRS),"Quarterly Assessments").

M1.4 (a)(3) Balancing Reliability and Unavailability (62706)

a. Inspection Scope

Paragraph (a)(3) of the maintenance rule requires that adjustments be made where necessary to assure the objective of preventing failures through the performance of preventive maintenance was appropriately balanced. This balance should address the objective of minimizing unavailability due to monitoring or preventive maintenance. The team reviewed the licensee's plans to ensure this evaluation was performed as required by the maintenance rule.

b. Observations and Findings

The licensee's approach for optimizing availability and reliability was being developed with the licensee's procedure, EHI 5035. In preparing the refueling cycle assessment, the licensee must balance availability and reliability based on reviews of SSC performance during the assessment period. However, as later discussed in Section M1.6, the licensee failed to set adequate reliability performance criteria, commensurate with safety, for SSCs of high safety significance when it used FFs to measure reliability. This approach does not take into account the number of failures, the number of demands, or the total time in service. Meaningful estimates of reliability must reflect demands and time in service and PRA assumptions. Therefore, the licensee would not use a valid reliability measurement in the balancing reliability and unavailability.

c. Conclusions

Although not required at the time of the inspection, the team concluded that the licensee would not be able to balance reliability and unavailability under the current program. The issue of using FF as a measurement of reliability should be resolved and the program adjusted prior to the upcoming first periodic assessment balancing reliability and unavailability. This issue will be reviewed after the licensee performs the first required periodic assessment of the maintenance rule program as part of inspection follow-up item IFI 50-315/96009-01(DRS);50-316/96009-01(DRS).

M1.5 (a)(3) Plant Safety Assessments Before Taking Equipment Out of Service (62706)

a. Inspection Scope

Paragraph (a)(3) of the maintenance rule states that the total impact on plant safety should be considered before equipment is taken out of service for monitoring or preventive maintenance. The team reviewed the licensee's procedures and discussed the process with appropriate licensee personnel.

b. Observations and Findings

The licensee used PMI-2293, Rev. 1, "On-line Maintenance of Important Systems," to control the scheduling of elective maintenance on plant systems in Modes 1-3. This procedure was reviewed and found to be acceptable for controlling on-line maintenance, with one important caveat. The procedure cautions that cross-train maintenance was not to be scheduled at power, and the risk matrix used by schedulers (Attachment 3 to PMI-2293) was predicated upon this assumption. This means that the trains listed as "OK" in the risk matrix were both "A" trains or both "B" trains, the case of train "A" from one system and train "B" from another being out of service simultaneously was not covered by the matrix.

It was also important that operators and schedulers contact the PRA group before entering unanalyzed configurations. This contact is required by PMI-2293 and ensures that emergent maintenance does not place the plant in a high-risk configuration.

The licensee recently experienced several instances where the maintenance schedule did not meet the requirements of PMI-2293 (i.e., Condition Reports (CR) 96-1302, CR 96-1320, and CR 96-1324). In two of these instances, operators caught the inconsistency before systems were taken out of service. In the third instance, the inconsistency was not caught until after the fact. The licensee formed a task group to investigate these occurrences and develop recommendations to prevent future similar occurrences. This issue was also discussed in Inspection Report No. 50-315/96007(DRP);50-316/96007(DRP).

A weakness was noted in the risk matrix used for on-line maintenance scheduling. The basis for a configuration being "OK" was stated to be a core damage probability (for an assumed 72-hour outage duration) being $< 10^{-6}$. This corresponded to an instantaneous CDF for the configuration of approximately 10^{-4}/yr. In calculating the core damage probability for a configuration on the matrix, the PRA group made some approximations, as a result of limitations in the PRA software they were using. These approximations can lead to an underestimation of the core damage probability; in some cases this underestimation was quite significant, leading to single-train outages that can exceed the utility-established limit on core damage probability. This issue was discussed at length with the licensee, and the licensee stated its intent to reexamine some of the calculations used to develop the matrix. The licensee also discussed developing a formal calculation package detailing all calculations and supporting assumptions used in preparing the matrix.

Maintenance on plant systems during shutdowns was controlled by PMI-4100, Rev. 1, "Shutdown Risk Management," and PMP-4100, Rev. 4, "Plant Shutdown Safety and Risk Management." These procedures were reviewed by the team and judged to be acceptable for controlling maintenance during non-power modes of plant operation.

c. Conclusions

The team concluded that the licensee's approach to assessing the impact of voluntary on-line maintenance on plant safety was acceptable. However, a weakness in the risk matrix contained in PMI-2293 was noted where there could have been less restrictive approximations in the supporting PRA calculations.

M1.6 (a)(1) Goal Setting and Monitoring and (a)(2) Preventive Maintenance (62706)

a. Inspection Scope

The team reviewed program documents in order to evaluate the process established to set goals and monitor under (a)(1) and to verify that the established performance criteria and preventive maintenance were effective under (a)(2) of the maintenance rule. The team also discussed the program with appropriate plant personnel. The team performed detailed programmatic reviews on maintenance rule implementation for the following SSCs:

(a)(1) SSCs

- Auxiliary Feedwater (AFW) System and Train N
- Containment Hydrogen Control System (CHCS)
- Post Accident Sampling System (PASS)
- Reactor Coolant System (RCS) and Pressurizer Power Operated Relief Valves (PORVs)
- Main Steam (MS) System, Moisture Separator Reheater (MSR), and Extraction Steam
- Auxiliary Building Ventilation (ABV) System
- Non-Essential Service Water (NESW) System

(a)(2) SSCs

- Station Air (SA) System
- Essential Service Water (ESW) System
- Feedwater (FW) System
- Emergency Diesel Generators (EDGs)
- Spent Fuel Pit Cooling (SFPC) System
- Circulating Water (CW) System
- Vital Batteries
- Instrument Air (IA)
- Structures

The team reviewed each of these systems to verify that goals or performance criteria were established in accordance with safety, that industry-wide operating experience was taken into consideration where practical, that appropriate monitoring and trending were being performed, and that corrective actions were taken when an SSC failed to meet its goal or performance criteria or experienced an MPFF. The team also reviewed goals and performance criteria for SSCs not listed

above (e.g., compressed air, component cooling water (CCW), containment spray, etc.).

The team also reviewed the licensee's documentation of its monitoring program for structures to verify that the licensee had implemented a program that met the requirements of 10 CFR 50.65 and that followed the guidance contained in NUMARC 93-01 and Nuclear Energy Institute (NEI) 96-03, Rev. D, "Guideline for Monitoring the Condition of Structures."

b.1 Observations and Findings for Safety Considerations in Setting Goals and Performance Criteria

The maintenance rule was implemented using NUMARC 93-01, Rev. 2, dated April 1996. NUMARC 93-01, Rev. 0, dated May 1993, was endorsed by the NRC in Regulatory Guide (RG) 1.160, Rev. 1. The guidance required that safety (risk) be taken into consideration when establishing goals under (a)(1) or performance criteria under (a)(2).

The maintenance rule states that goals shall be established commensurate with safety. NUMARC 93-01, Section 9.3, "Determining the SSCs Covered by (a)(1)," states that risk (i.e., high safety) significant criteria should be developed using any of the following methods: (1) IPEs; or (2) the plant-specific PRA, etc. For high safety significant SSCs the goals and performance criteria include reliability, availability, or condition. The guidance also states those performance criteria for high safety significant SSCs should be established to assure that reliability and availability assumptions used in the plant-specific PRA, IPE, Individual Plant External Events Evaluation (IPEEE), or other risk analyses were maintained or adjusted when determined necessary by the utility. In the recent revision to the licensee's procedure EHI-5035, the licensee defined reliability as "a measure of the expectation (assuming that the SSC is available) that the SSC will perform its intended function upon demand at any instant in time. Monitoring MPFFs is an indicator of reliability."

In monitoring FFs, the licensee used per unit time period as a reliability goal and performance criterion for high safety significant SSCs. Monitoring reliability in terms of FFs per unit time period only indirectly measures reliability. FFs per unit time period were not a direct measure of reliability as modeled in the IPE/PRA. Reliability goals and performance criteria for eighteen high safety significant SSCs, four (a)(1) and 14 (a)(2) SSCs, were not established commensurate with safety nor established in accordance with the guidance contained in NUMARC 93-01. This is a violation of the 10 CFR 50.65, the maintenance rule (VIO 50-315/96009-03(DRS);50-316/96009-03(DRS),"Monitoring Reliability").

The team also noted that several unavailability goals and performance criteria established for high safety significant SSCs were an order of magnitude less conservative than the unavailability values assumed in the PRA. These SSCs included the EDGs, the AFW system, and the compressed air system.

The CDF without these unavailability values was 7.41E-5. The licensee stated that it had recalculated the CDF value using the maintenance rule performance criteria unavailability values for the following SSCs:

- Emergency Diesel Generators (EDGs)
- Auxiliary Feedwater (AFW) System
- Essential Service Water (ESW) System
- Non-Essential Service Water (NESW) System
- Component Cooling Water (CCW) System
- Emergency Core Cooling System (ECCS)
- Compressed Air System
- Containment Spray (CS) System

The results of Calculation No PA-96-08, Rev. 0, dated June 28, 1996, indicated that the CDF changed to 7.99E-5. Based on this slight increase in the CDF, the team determined that the unavailability performance criteria established for high safety significant SSCs were acceptable.

In accordance with NUMARC 93-01, plant-level performance criteria were established for all remaining low safety significant normally operating SSCs. The plant-level performance criteria used at the Donald C. Cook Nuclear Plant include the following:

- unplanned automatic reactor scrams per 7000 hours critical
- unplanned safety system actuations
- unplanned capability loss factor
- unplanned entry into "red" condition
- unplanned entry into "orange" condition

The guidance contained in NUMARC 93-01 directed the use of the first three plant-level performance criteria noted above. The licensee established the unplanned entry into the "red" and "orange" condition criterion as a plant-level performance criterion for shutdown periods only. The licensee used a combination of the five plant-level performance criteria above to monitor the performance of low safety significant normally operating SSCs. The team considered the licensee's monitoring program for low safety significant normally operating SSCs to be a strength.

b.1.1 Observations and Findings for (a)(1) Goals

Since implementing the maintenance rule, the licensee had placed thirty SSCs into the (a)(1) category. The team's review of a selected number of these SSCs is discussed below.

The licensee's monitoring program used FFs per unit time as a reliability measurement for goals of high safety significant and low safety significant standby SSCs. Over a two-year period, SEs established goals using historical data without accounting for the number of demands. The goals were unrelated to the reliability numbers used in the PRA for high safety significant SSCs.

The team found that four of the reliability goals for high safety significant (a)(1) SSCs were inadequate to monitor performance in accordance with the guidance contained in NUMARC 93-01. This violation is described in Section M1.6.b.1. High safety significant (a)(1) SSCs identified with inadequate reliability goals included the following:

- Auxiliary Feedwater (AFW) System, Units 1 & 2 and Train N
- Non-Essential Service Water (NESW) System
- Containment Spray (CS) System
- Main Steam (MS) System, Unit 2

In addition, the team found that the basis for establishing the unavailability goal for the CHCS was inadequate. In accordance with NUMARC 93-01, the licensee should monitor unavailability for low safety significant standby SSCs. The licensee established an unavailability goal of 776 hours/year. This goal was based on the allowable outage time (AOT) in the technical specifications (TS) limiting condition for operation (LCO), plus an additional 46 hours. The licensee provided no justification or basis for using this high unavailability goal, nor was this goal compared to any assumptions used in a Level II PRA analysis.

The designated SE was unaware that the containment hydrogen control system SSC was a combination of four systems. These systems are the post accident containment hydrogen monitoring system (PACHMS), hydrogen skimmers, hydrogen recombiners, and hydrogen igniters. As a result, the unavailability performance criterion of 50 hours/year was established on an understanding that only two of these four systems were included in the SSC. Historically, the PACHMS averaged more than 900 hours/year unavailability for each of the four trains. Due to the poor availability of the PACHMS, all four trains of CHCS were placed into (a)(1) for exceeding the CHCS unavailability performance criterion.

The unavailability goal established was excessive and did not adequately address the causes of the high unavailability of the system: lack of ownership of the system, a long TS LCO so that repairs were not a high priority, and unavailability of replacement parts. The failure to establish a goal commensurate with safety and ensuring that the system's preventive maintenance would be adequate under (a)(2) of the maintenance rule constitutes a violation of 10 CFR 50.65(a)(1) (VIO 50-315/96009-04(DRS);50-316/96009-04(DRS),"Unavailability Goals").

The licensee recognized this problem and stated its intent to separate the four systems within the CHCS into separate SSCs to more effectively monitor the problems with PACHMS. Before these four SSCs are placed in (a)(2), unavailability performance criteria will need to be established for these SSCs to ensure the preventive maintenance will be effective.

c.1.1 Conclusions for (a)(1) Goals

Four (a)(1) examples were found where reliability goals were not properly established, commensurate with safety, and were not in accordance with NUMARC

93-01. The licensee failed to set adequate reliability performance criteria, commensurate with safety, for SSCs of high safety significance when FFs were used to measure reliability.

The team also found one example where the licensee failed to establish an adequate basis for the unavailability goal for the CHCS, a low safety significant standby system. This is a violation of 10 CFR 50.65(a)(1).

The remaining SSC (a)(1) goals examined were appropriately established for SSCs under the maintenance rule and met the requirements of the maintenance rule.

b.1.2 Observations and Findings for (a)(2) Performance Criteria

MPFFs were used as a measure of reliability for performance criteria for high safety significant and low safety significant standby SSCs. SEs established performance criteria using historical data without accounting for the number of demands over a two-year period. These performance criteria were unrelated to the reliability numbers used in the PRA for the high safety significant SSCs.

The team found that 14 of the reliability performance criteria for high safety significant (a)(2) SSCs were inadequate to monitor performance in accordance with NUMARC 93-01 guidance. This is a portion of the violation as described in Section M1.6.b.1. High safety significant (a)(2) SSCs identified with inadequate reliability performance criteria included the following:

- Auxiliary Feedwater (AFW) System, Train A & B
- Emergency Diesel Generators (EDGs)
- Emergency Core Cooling System (ECCS)
- Compressed Air System
- 120 Volt AC Buses & Inverters
- Vital Batteries
- Component Cooling Water (CCW) System
- Control & Plant Air Compressors
- Electrical Safety Buses
- Essential Service Water (ESW) System
- Main Steam (MS) System, Unit 1
- Residual Heat Removal (RHR) System
- Solid State Protection System
- Reactor Coolant System (RCS)

In reviewing the licensee's methods to monitor structures, the team determined that the licensee had three major structures under the scope of the maintenance rule (i.e., containment building, auxiliary building, turbine building). Several substructure components were also identified in procedure 12 EHP 5035.SMP.001, Rev. 1, "Plant Structure Performance Evaluation and Monitoring Program." Examples of substructures for the auxiliary building are the refueling water tank, the condensate storage tank, the primary water storage tank, the tank area pipe tunnel, and the MS enclosures. Substructures for the turbine building include the turbine pedestals,

main transformer foundation, 345 KV transformer fire walls, several electrical distribution system towers, transformer, and insulator (i.e., 345 KV, 765 KV) foundations, CW tunnels, the intake crib, and intake and discharge pipes.

The following performance criteria were established for the three major structures:

- Containment - four FFs/2 years.
- Auxiliary building - four FFs/2 years
- Turbine building - plant-level performance criteria (unplanned scrams, unplanned capability loss factor, etc.)

The licensee's procedure for monitoring structures, 12 EHP 5035.SMP.001, used condition monitoring performance criteria which were not clear on thresholds that would move a structure from (a)(2) to (a)(1). The procedure identifies several condition monitoring activities (inspection of walk cracks, water intrusion, etc.), but does not discuss moving a structure from (a)(2) to (a)(1). NEI 96-03 also did not provide specific condition monitoring criteria for moving a structure from (a)(2) to (a)(1). This is a generic, industry-wide issue and is an Inspection Follow-up Item item (IFI) (IFI 50-315/96009-05(DRS);50-316/96009-05(DRS),"Structural Monitoring") until the licensee establishes a method for moving a structure from (a)(2) to (a)(1) using condition monitoring performance criteria.

The licensee program indicated that the baseline report for structures under the scope of the maintenance rule for Unit 1 will be completed during the next refueling outage in spring 1997 and for Unit 2 structures in fall 1997. The baseline report will be done as part of the periodic assessment for structures under (a)(3) of the maintenance rule. This report will be reviewed after the licensee completes the first periodic assessment for structures and followed in conjunction with the IFI on refueling cycle assessments (IFI 50-315/96009-01(DRS)50-316/96009-01(DRS)).

c.1.2 Conclusions for (a)(2) Performance Criteria

The 14 examples of inadequate reliability performance criteria were a violation of the requirement of paragraph (a)(2) of 10 CFR 50.65 to demonstrate satisfactory performance.

The remaining SSC (a)(2) performance criteria examined were appropriately established for SSCs under the maintenance rule and met the requirements of the maintenance rule. The unavailability performance criteria established for high safety significant and low safety significant standby SSCs were found to be acceptable.

The licensee established five plant-level performance criteria and used a combination of these criteria to monitor the performance of low safety significant normally operating SSCs. NUMARC 93-01 only requires the licensee to use any one of three

plant-level performance criteria discussed above. The team concluded that the use of all five plant-level performance criteria enhanced the licensee's monitoring program.

The team concluded that the licensee at the Donald C. Cook Nuclear Plant had implemented a monitoring program for structures which followed the guidance contained in NUMARC 93-01 and NEI 96-03. However, an IFI associated with condition monitoring criteria for structures was identified. The licensee established condition monitoring criteria, but provided no guidance on when a structure should be dispositioned from (a)(2) to (a)(1) based on condition monitoring criteria.

b.2 Observations and Findings for Use of Industry-Wide Operating Experience

The licensee procedure EHI-5035, Attachment 6, "Use of Industry Operating Experience," provided the administrative guidelines to integrate industry-wide operating experience.

Interviews and the review indicated both formal and informal processes existed for reviewing industry events. The informal process was a routinely unfiltered transfer of information to the SEs, via the plant electronic mail system, about events that were recently received by the operating experience group. The SE determined whether to review these items. The formal process consisted of applicability screening by the operating experience group and assignment of review responsibility by plant management. This process prompted a formal review and required documentation that the review was completed and corrective action implemented as applicable. The team found that SEs were able to discuss the program, formal and informal, and how they used the information to identify system improvements.

b.3 Observations and Findings for Monitoring and Trending

In reviewing the licensee's maintenance rule implementation documentation, the team noted that the licensee monitored performance criteria trending data. However, the trending data was confusing to some SEs. For example, the licensee monitored MPFF trending data over a six and 24-month frequency period and compared it to the acceptable MPFF annualized rate. This data was later adjusted to the actual average annualized MPFF rate; however, this adjusted data confused some of the SEs. The licensee was cognizant of this situation and stated that computer software was being developed to graph SSC performance trends, which would make it easier for the SEs to understand negative trends in SSC performance.

b.4 Observations and Findings for Corrective Actions

The team reviewed the licensee's procedure for establishing corrective actions, PMI 7030, Rev. 22, "Corrective Actions," and reviewed the corrective actions taken for a sample of SSCs. The team interviewed each SE who had responsibility for establishing corrective actions. The corrective actions for the following SSCs were reviewed: feedwater (FW) system, main steam (MS) system, reactor coolant system (RCS), pressurizer power-operated relief valves (PORVs), auxiliary building

ventilation (ABV) system and dampers, the auxiliary building, station air (SA) system, vital batteries, and the auxiliary feedwater (AFW) system.

(1) Feedwater (FW) System

The team reviewed selected FF problems that have occurred with the FW system. The performance criterion for the Unit 1 and 2 FW system was two FFs/two years. The FW system was a low safety significant normally operating system.

The FW system had experienced two recent FFs, one in each unit. A review of the two related CRs, CR-96-0371 and CR-96-0938, revealed that the FW system had experienced an FF of the main feedwater pump differential pressure controller, 1-RU-5, and an FF of the 2-UPC-101 transmitter. The FF on the Unit 1 FW system occurred when the main feedwater pump differential pressure controller, 1-RU-5, failed. This caused a loss of feedwater to the #4 steam generator, which caused a reactor trip.

The licensee's cause determination in CR 96-0371 noted that the digital controller face went blank on a temporary loss of control power and caused both main feedwater pumps to reduce speed, resulting in the reactor trip. The licensee replaced and tested controller 1-RU-5 with no further problems. Plant engineering requested that the licensee's corporate office investigate the root cause for the controller failure. The investigation was ongoing.

The licensee continued to monitor the FW system for Units 1 and 2 under (a)(2) of the maintenance rule. The team found the licensee's corrective actions associated with the failure of 1-RU-5 and 2-UPC-101, appropriate to mitigate future FFs of these components.

(2) Main Steam (MS) System

The team noted that a number of problems have occurred with the MS system. The performance criterion for the MS was two FFs/two years.

A review of MS system CR-96-1075, CR-95-1282, and CR-94-2504 revealed that the licensee had experienced five FF events involving two components. An FF due to a design problem in the first component, the moisture separator reheater drain tank (MSDT) level turbine trip switch, Unit 2 MLS-418, had caused two spurious reactor trips. The second component, a Unit 2 MS stop valve's 2-XSO-232 control air solenoid valve, had failed three times due to water intrusion onto the solenoid, which also resulted in turbine and subsequent reactor trips.

The licensee installed a temporary modification to remove the MSDT turbine trip signal and was reviewing a permanent design modification that would remove the MSDT level turbine trip signal. The team determined that the corrective actions were acceptable.

The licensee had recently reclassified the MS system from (a)(2) to (a)(1) until the exact cause of the water intrusion problems which failed the 2-XSO-232 control air solenoid valve had been identified and corrected. The water intrusion problem had caused battery grounding on the Unit 2-XSO-232 control air solenoid valve, causing three failures during testing. The licensee's cause determination concluded that failure of 2-XSO-232 had resulted in the failure of MS stop valve 2-MRV-232 to perform its intended function due to loss of valve control air and entry into TS 3.7.1.5.

The licensee suspected that during rain storms, water was leaking past a seismic gap rubber boot between containment and the auxiliary building. Condensation problems on control air piping above the solenoid valve as a result of humidity in the auxiliary building could also have led to water intrusion. The licensee also found a gap in the solenoid circuitry and noted that the solenoid circuitry entered the valve from the top, providing a potential path for water intrusion. Based on these identified potential causes, the licensee installed an adhesive sealant on the gaps in the rubber boot and in the solenoid circuitry. During the next refueling outage, the licensee plans on rotating the solenoid circuitry to enter the valve from beneath, removing the potential water intrusion path.

The licensee continued to monitor the MS system under (a)(1) of the maintenance rule. The team found that the licensee's corrective actions should eliminate FFs associated with the Unit 2 MSDT level trip; however, corrective actions were still ongoing with the Unit 2-XSO-232 control air solenoid valve.

(3) Reactor Coolant System (RCS) and Pressurizer PORVs

The team noted historical problems with the reactor coolant system (RCS) and pressurizer PORVs. The licensee monitored the PORVs under (a)(1) of the maintenance rule and established a reliability goal of no PORV diaphragm failures over the next two years and an unavailability performance criterion of 50 hours/year. A review of CR 96-1046, 96-1050 and 95-1133 revealed that the licensee had experienced PORV diaphragm repetitive FFs as well as unavailability problems with the PORVs.

The PORV's performance exceeded the established unavailability criterion with an unavailability of 420 hours/year due to PORV FFs. One PORV FF was caused by an electrical ground due to water intrusion into a containment penetration, and another PORV block valve FF was caused by dirty MOV torque contacts. The FF of the PORV block valve required the licensee to close the PORV, making it unavailable. As part of the corrective action, the licensee eliminated pressure cleaning this area, which should abolish the water intrusion. The licensee also changed the PORV block valve preventive maintenance program to mandate cleaning of MOV torque contacts. The potential generic observation related to MOV contact failures is discussed in Section M1.6.b.4(8). The team considered the licensee corrective actions

acceptable to prevent the PORV from exceeding its unavailability performance criterion 50 hours/year.

The PORVs have also experienced repetitive FFs of the diaphragms. The licensee monitored the RCS PORVs as (a)(1) components due to the diaphragm failures at the beginning of the 1996 Unit 2 refueling outage. A goal of zero diaphragm failures over the next two-year period was established for the PORVs. The PORV failures were not considered maintenance preventable, but the licensee identified a design deficiency on the actuator. The licensee will continue to monitor the RCS under (a)(2) of the maintenance rule. The team determined that the licensee's corrective actions were appropriate to limit RCS PORV unavailability and to mitigate future FFs associated with the PORV diaphragms.

(4) Auxiliary Building Ventilation (ABV) System and Dampers

The team was able to complete a partial review of the ABV engineered safety feature (ESF) dampers to verify the licensee's implementation of the maintenance rule requirements on these dampers. Currently, the Units 1 and 2 ABV ESF systems were classified as a low risk significant normally operating systems. A performance criterion of four FFs/two years had been established for these systems.

A review of CR 96-0548, 96-0549, 96-0707, 96-0995, 95-0780, and 94-2540 revealed that the ABV ESF system had experienced several bypass damper seal failures during surveillance testing which failed to meet TS 3/4.7.6. The licensee dispositioned the bypass dampers to (a)(1) of the maintenance rule due to repeated failures of the dampers to seal. The team determined that the licensee was taking appropriate corrective actions by monitoring the ABV ESF bypass dampers under (a)(1) of the maintenance rule and by determining the root cause for damper FF problems.

(5) Auxiliary Building

The team reviewed CR-96-0543, CR-96-0544 and CR-95-1785, which identified an auxiliary building water intrusion problem that was causing numerous equipment problems such as an FF of 2-XSO-921, a control solenoid valve which controls containment isolation valve (CIV) 2-WCR-921, and FFs of two control panels, 2-HIV-A and 2-HIV-B, which controlled several CIVs and the post accident hydrogen sampling valves. During a surveillance test on the control panels, nine CIVs failed to close and the post accident hydrogen sampling valves failed to open as required during a design basis accident.

The licensee classified this event as a single MPFF of the auxiliary building, allowing water intrusion onto auxiliary building components. As part of a plant design modification on the auxiliary building roof, the licensee added a corrective maintenance activity to install sealant around the sheet metal

shroud which covers the seismic gap between the containment and the auxiliary building.

The team visually walked down the corrective maintenance completed on the auxiliary building sheet metal shroud and found it to be adequate to prevent future failures of equipment inside the auxiliary building steam tunnel. The licensee continues to monitor the auxiliary building under (a)(2) of the maintenance rule. The team found the corrective actions to eliminate water intrusion problems acceptable.

(6) Station Air (SA) System

The team reviewed the plant's air system with regard to aspects of maintenance rule implementation. Reviewing CRs and work orders for the air system, the team found a number of instances of what appeared to be FFs as defined by the licensee's program.

An examination of the high safety significant determinations for the air system's SSCs raised some concerns:

- The FF definition for the air headers and the dryer strings considered only the pressure boundary integrity of the system, i.e., leaks and pipe breaks, disregarding the active components and the failure modes of the air dryer strings.

- Air dryer strings were considered low safety significant, although a failure of certain active components could result in loss of the air dryers, loss of instrument air, and a reactor trip.

- The third air compressor was classified as low safety significant. Absent other documentation, the apparent reason was that it was not modeled in the PRA. This was also discussed above in the high safety significance determination as a PRA consideration.

Based on the team's findings, the licensee agreed to reevaluate the FF definition for the air dryers, considering the active system components and the effects on the SSCs. This is identified as an unresolved item (UNR 50-315/96009-06(DRS);50-316/96009-06(DRS),"Masking SSCs") because of the possibility that individual component failures would not be considered in the SSC's overall performance.

(7) Vital Batteries

The team reviewed the plant's vital batteries with regard to aspects of maintenance rule implementation. In addition to examining the relevant parts of the maintenance rule program, the team reviewed CRs and work orders for the vital batteries and discovered an occurrence where an operator, in preparing for a test, opened an incorrect disconnect, deenergizing a bus.

While this was properly classified as an FF, its relationship to overall maintenance was not recognized. Consequently, this occurrence was not appropriately classified as an MPFF. The FF definition for the batteries was based on entry into Technical Specification 3.8.2.3, which requires a DC bus, a 250 VDC battery, and a full capacity charger. Since each battery had two chargers, a charger failure would not result in an LCO entry; repeated charger failures would not trigger an FF nor be tracked under the maintenance rule.

Based on the team's findings, the licensee agreed to reevaluate battery charger failures and the appropriate classification of FFs. Reexamination of the battery system's maintenance history was necessary to identify other FFs and MPFFs and determine whether or not any battery system SSCs should be classified as (a)(1). This is an unresolved item (UNR 50-315/96009-06(DRS); 50-316/96009-06(DRS),"Masking SSCs") because of the possibility that individual component failures would not be considered in the SSC overall performance.

(8) Auxiliary Feedwater (AFW) System

The Unit 2 turbine driven auxiliary feedwater system (TDAFW) SSC was placed in (a)(1) due to reliability problems. CR 96-1060 identified three MPFFs and two RMPFFs. The RMPFFs pertained to operating difficulties for MOV 2-FMO-211, "TDAFW Pump Supply to Steam Generator #21," and erratic position indication for MOV 2-FMO-241, "TDAFW Pump Supply to Steam Generator #24." Each RMPFF was due to corroded torque switches. The corrective action, documented in CR 94-2381, dated November 17, 1994, stated that the corroded torque switches were cleaned. The corrective action also evaluated the generic applicability and revised multiple MOV electrical maintenance procedures to require mandatory switch contact cleaning. The procedure revision to institute contact cleaning revisions was completed in February 1996, after the 1996 refueling outage.

The RMPFF due to corroded torque switches occurred in the Unit 2 TDAFW system, but MOVs were installed in other SSCs so that the problem could have randomly occurred in other SSCs without exceeding an individual SSC performance criterion. Since MOVs were not collectively monitored as an SSC, potential larger generic problems could be masked if not appropriately identified and controlled in the existing corrective action program. In this case the corrective action was implemented for the two MOVs, but generic corrective action in the form of procedure changes to require contact cleaning was deferred for approximately 15 months until after the 1996 refueling outage, an ideal opportunity to implement the corrective action. The actual corrective action was deferred until the individual MOV five-year preventive maintenance.

In this case, the team observed a potential weakness in the area of generic component failures. The team questioned whether the current maintenance

rule program for goal monitoring at the Unit 2 TDAFW pump SSC would identify and properly classify additional RMPFF MOV failures.

c.2 Conclusions for Use of Industry-Wide Operating Experience

Industry-wide operating experience had been incorporated into the licensee's maintenance rule program. The program was set up to require a formal review of applicable events and to permit an unfiltered flow of information to the SE.

c.3 Conclusions for Monitoring and Trending

The team concluded that frequency of monitoring performance criteria made it difficult for the licensee to adequately monitor and trend performance. SEs needed a better understanding of what exceeding a performance criterion means and of how to effectively use the trending program.

c.4 Conclusions for Corrective Actions

The team concluded that the corrective actions associated with these SSCs were appropriate, except that the classification of battery charger and air dryer FFs could mask problems in SSCs. These classifications and associated evaluations are being treated as an unresolved item. The team observed a weakness in the area of generic type component failures and questioned if the goal monitoring at the Unit 2 TDAFW pump SSC would identify and properly classify additional RMPFF MOV generic failures.

M2 Maintenance and Material Condition of Facilities and Equipment (62706)

a. Inspection Scope

In the course of verifying the implementation of the maintenance rule using NRC IP 62706, "Maintenance Rule," the team performed a vertical-slice inspection of the SSCs listed below, and conducted walkdowns to examine the materiel condition of each SSC:

- Non-Essential Service Water System (NESW)
- Essential Service Water System (ESW)
- Containment Hydrogen Control System (CHCS)
- Spent Fuel Pit Cooling (SFPC)
- Plant and Instrument Air (IA) System
- Vital Batteries
- Structures
- Feedwater (FW) System
- Main Steam (MS) System
- Unit 2 Turbine Driven Auxiliary Feedwater (TDAFW) Pump
- Post Accident Sampling System (PASS)
- Emergency Diesel Generator (EDGs)
- Circulating Water (CW) System

b. Observations and Findings

Except as noted, the systems were free of corrosion, oil leaks, water leaks, and trash, and based upon external condition, appeared to be appropriately maintained. Some minor oil leaks were noted on the main feedwater pumps and the feedwater pump lube oil coolers; otherwise, the systems appeared to be in good condition.

c. Conclusions

In general, the materiel condition of the systems examined was acceptable.

M7 Quality Assurance (QA) in Maintenance Activities (62706)

M7.1 Licensee Self-Assessments of the Maintenance Rule Program

a. Inspection Scope

The team reviewed the "Maintenance Rule Readiness Audit Report," an independent audit performed for the licensee by MDC Engineering, PLLC, from June 24 to July 12, 1996.

b. Observations and Findings

The audit identified several areas in need of attention, for example: (1) potentially untimely determinations of MPFFs; (2) inconsistent determinations of MPFFs; (3) shadowing or masking of SSC performance, as in examples described above; (4) a lack of plant-level performance criteria; (5) ineffective performance criteria; and (6) an insufficiently defined structural monitoring program. The team noted that some of the audit findings had been acted upon; for example, plant-level performance criteria had been established and the structure monitoring program had been revised. The licensee indicated that it had responded to all the audit findings, but had not had time to complete all the appropriate actions.

c. Conclusions

The team concluded that the audit was a strength and a crucial part of the licensee's overall adequate implementation of the maintenance rule. While the licensee had responded to all the findings of the audit and completed corrective actions for a number of them, some important actions remained to be completed. Selected activities will be examined to ensure corrective actions for audit findings are effectively implemented. This is an IFI (IFI 50-315/96009-07(DRS); 50-316/96009-07(DRS),"MR Audit Corrective Actions").

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.3 Review of Updated Final Safety Analysis Report (UFSAR) Commitments

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

E4 Engineering Staff Knowledge and Performance (62706)

E4.1 Engineers Knowledge of the Maintenance Rule

a. Inspection Scope (62706)

The team interviewed SEs to assess their understanding of the maintenance rule and the associated responsibilities.

b. Observations and Findings

The SEs were knowledgeable of their systems and were familiar with related industry-wide operating experience. SEs were generally familiar with the maintenance rule requirements. However, SEs did not appear to be totally cognizant of all aspects of implementing the maintenance rule, perhaps because the maintenance program had been recently implemented and because the program had been changed as a result of the self-assessment. Following are some examples:

- Several SEs had different understandings of the performance criterion for whether the SSC should be placed into (a)(1). For example, if the performance criterion was two MPFFs per 24 months, some SEs stated that when two MPFFs were reached, the system was considered for (a)(1), whereas other SEs believed that three MPFFs were required before considering (a)(1). The licensee's position was to consider (a)(1) when the performance criteria were exceeded.

- The FF and MPFF process was recently implemented, and some SEs were unclear about which factor was the true performance criterion. Due to the potentially lengthy process to determine if a failure was maintenance preventable, the licensee initiated an interim performance criteria process. All CRs were to be sent to the MRC, who, in consultation with the SE, would initially determine if an FF occurred. If the FF criterion for an SSC was exceeded, a CR would be initiated to review all of the SSC's FFs within 30

days to determine if they were MPFFs and if the MPFF criterion was also exceeded. Exceeding the MPFF performance criterion would trigger the review of whether the SSC should be placed in (a)(1). This method appeared appropriate to resolve the concern about timely identification of MPFFs, although the licensee's corrective action procedure still allowed for extensions of CR actions.

- The defined SSC functions of CIC SSC and individual SSCs that have containment isolation valves were recently revised and not understood by all SEs. The licensee stated that local leak rate testing (LLRT) results and failures of containment isolation valves to close were to be assessed under the CIC SSC, while failures of the isolation valves to open would be assessed under the system SSC that contained the isolation valve.

c. Conclusions

SEs were knowledgeable of their assigned systems and demonstrated sufficient knowledge to adequately implement their responsibilities under the maintenance rule. However, some observed weaknesses were noted in the SEs' knowledge of certain aspects of implementing the maintenance rule, perhaps because the program had been changed as a result of the self-assessment.

V. Management Meetings

X1 Exit Meeting Summary

The team discussed the progress of the inspection with licensee representatives on a daily basis and presented the inspection results to members of licensee management at the conclusion of the inspection on September 13, 1996. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any material examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

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S. G. Tingen, Mechanical Engineer, NRR (NRC Staff Support)

LIST OF INSPECTION PROCEDURES USED

IP 62706 Maintenance Rule

LIST OF ITEMS OPENED

50-315/96009-01(DRS);50-316/96009-01(DRS)(IFI), "Refueling Cycle Assessment"
50-315/96009-02(DRS);50-316/96009-02(DRS)(IFI), "Quarterly Assessments"
50-315/96009-03(DRS);50-316/96009-03(DRS)(VIO), "Monitoring Reliability"
50-315/96009-04(DRS);50-316/96009-04(DRS)(VIO), "Unavailability Goals"
50-315/96009-05(DRS);50-316/96009-05(DRS)(IFI), "Structural Monitoring"
50-315/96009-06(DRS);50-316/96009-06(DRS)(UNR), "Masking SSCs"
50-315/96009-07(DRS);50-316/96009-07(DRS)(IFI), "MR Audit Corrective Actions"

LIST OF ACRONYMS USED

ABV	Auxiliary Building Ventilation
AFW	Auxiliary Feedwater
AOT	Allowable Outage Time
CCW	Component Cooling Water
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CHCS	Containment Hydrogen Control System
CIC	Containment Isolation Component
CIV	Containment Isolation Valve
CS	Containment Spray
CR	Condition Report
CRID	Control Room Instrumentation Distribution
CW	Circulating Water
DRCH	Division of Reactor Controls and Human Factors
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EHI	Engineering Head Instruction
EOP	Emergency Operating Procedure
ESF	Engineered Safety Feature
ESW	Essential Service Water
FEG	Functional Equipment Group
FF	Functional Failure
FW	Feedwater
HQMB	Quality Assurance and Maintenance Branch
IFI	Inspection Follow-up Item
IP	Inspection Procedure
IPE	Individual Plant Evaluation
IPEEE	Individual Plant External Events Evaluation
KV	Kilovolts
LCO	Limiting Condition for Operation
LLRT	Local Leak Rate Test
MOV	Motor Operated Valve
MPFF	Maintenance Preventable Functional Failure
MRC	Maintenance Rule Coordinator
MS	Main Steam
MSDT	Moisture Separator Reheater Drain Tank
MSR	Moisture Separator Reheater
NEI	Nuclear Energy Institute
NESW	Non-Essential Service Water
NRC	United States Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NUMARC	Nuclear Management and Resources Council
PACHMS	Post Accident Containment Hydrogen Monitoring System
PASS	Post Accident Sampling System
PDR	Public Document Room
PORV	Power-Operated Relief Valve

PRA	Probabilistic Risk Assessment
PSA	Probabilistic Safety Assessment
QA	Quality Assurance
RAW	Risk Achievement Worth
RCS	Reactor Coolant System
RG	NRC Regulatory Guide
RHR	Residual Heat Removal
RMPFF	Repetitive Maintenance Preventable Functional Failure
RRW	Risk Reduction Worth
SA	Station Air
SE	System Engineer
SFPC	Spent Fuel Pit Cooling
SSC	Structures, Systems, and Components
TDAFW	Turbine-Driven Auxiliary Feedwater
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UNR	Unresolved Item

LIST OF DOCUMENTS REVIEWED

EHI-5035, Rev. 1, Maintenance Rule Program Administration

PMI-2293, Rev. 1, On-line Maintenance of Important Systems

PMI-4070, Rev. Canceled, Criteria for Operating at a Reduced Reactor Coolant System Inventory (now covered under PMP-4100)

PMI-4100, Rev. 1, Plant Shutdown Safety and Risk Management

PMI-5035, Rev. 1, Maintenance Rule Program

PMI 7030, Rev. 22, Corrective Action

PMI 227710-STG-6800-01,IPE Data Collection and Analysis Instruction, Rev. 0, dated July 17, 1995

PMP-4100, Rev. 4, Plant Shutdown Safety and Risk Management

PMSO-122, Rev. 8, Voluntary Removal from Service of Technical Specification Required Equipment, Vital Secondary Equipment, and Fire Protection Equipment, and Work in Containment in Mode 1 (Canceled and contents incorporated into PMI-2293, Rev. 0)

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LIST OF DOCUMENTS REVIEWED (cont'd)

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Using PRA Results to Reduce Risk, letter from J.L. Bell to Department Heads, STAs, Shift Supervisors, Assistant Shift Supervisors, and Unit Supervisors, dated August 22, 1995

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