UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303

Docket No.:	50-395
License No.:	NPF-12
Report No.:	50-395
Licensee:	South Carolina Electric & Gas Company
Facility:	Summer Nuclear Plant
Location:	Jenkinsville, South Carolina
Dates:	May 12 - 16, 1997
Team Leader:	B. Crowley, Reactor Inspector Maintenance Branch Division of Reactor Safety
Inspectors:	W. Kleinsorge, P.E., Reactor Inspector, Maintenance Branch, RII T. Farnholtz, Resident Inspector, Summer Site R. Gibbs, Reactor Inspector, Maintenance Branch, RII W. Rogers, Senior Reactor Analyst, RII D. Taylor, Reactor Operations Engineer, NRR

Approved By: William E. Holland 6/17/97
William E. Holland, Chief
Maintenance Branch
Division of Reactor Safety
Date Signed

ENCLOSURE 2

EXECUTIVE SUMMARY

Summer Nuclear Plant
NRC Inspection Report 50-395/97-02

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 the licensee had a comprehensive Maintenance Rule program that met the requirements of 10 CFR 50.65, and the program was being effectively implemented.

Operations

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

Maintenance

- Required structures, systems and components (SSCs) were generally included in the scope of the Maintenance Rule. (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 met the intent of the Maintenance Rule (Section M1.4).

- The licensee considered safety in establishment of goals and operating data was being properly captured for SSCs in (a)(1) (Section M1.6).

- Engineering evaluations were technically sound, and corrective actions were appropriate when SSCs failed to meet performance criteria, or when a SSC experienced a functional failure, except for the Leak Detection (LD) system. (Sections M1.6 and M1.7).

- One violation for failure to take appropriate corrective action and one unresolved item (URI) for not performing a 10 CFR 50.59 evaluation were identified relative to effectiveness of corrective action for Maintenance Preventible Functional Failures (MPFFs) of level switches used in the LD system (Section M1.6).

- For (a)(2) SSCs, the team concluded that, in general, detailed performance criteria were properly established, operating data was being properly captured, and appropriate trending was being performed (Section M1.7).

- Industry wide operating experience was used, as appropriate (Sections M1.6 and M1.7).

- A weakness was identified in that the performance criteria for the Reactor Coolant (RC) system did not include all applicable modes for some sub-systems, the pressurizer spray function was not monitored, and the pressurizer safety valve did not include the function to open on demand (Section M1.7).

- In general, plant material condition and housekeeping observed during walkdowns was a good indication that equipment was being adequately maintained. Some discrepancies in housekeeping and material condition items were noted in the structural area (Section M2.1).

- Audits and assessments were detailed and thorough (Section M7.1).

Engineering

- The licensee's approach in performance of risk-ranking for the Maintenance Rule was adequate (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) resulting in an IFI (Section M1.2).

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

- Consideration of severe weather and other trip hazards as event initiators in assessment of the safety-impact when removing SSCs from service during on-line operation was considered a strength (Section M1.5).

- Omission of one risk-significant component from the risk matrix, not explicitly evaluating non-risk-significant equipment out-of-service configurations, and the limited mandatory contact of PRA expertise were considered weaknesses relative to removing SSCs from service during on-line operation (Section M1.5).

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

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

Report Details

Summary of Plant Status

Summer operated at power during 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). Inspection was performed by a team of inspectors that included a Team Leader, two Region II Inspectors, one Region II Senior Reactor Analyst, one Resident Inspector, and one NRR Operations Engineer. In addition, NRC staff support was provided by one Senior Reactor Analyst from the Probabilistic Safety-Assessment Branch, Office of Nuclear Reactor Regulation (NRR), and one Senior Operations Engineer from the Quality Assurance and Maintenance Branch, NRR. The licensee provided an overview presentation of the program to the team on the first day of the inspection. The overview handout is included as an Attachment to this report.

I. OPERATIONS

O4 Operator Knowledge and Performance

O4.1 Operator Knowledge of Maintenance Rule

a. Inspection Scope (62706)

During the inspection, the team interviewed three licensed operators 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 tasks associated with the Maintenance Rule focused mainly on authorizing and removing equipment from service per Station Administrative Procedure SAP-205, "Status Control and Removal and Restoration," Revision 8, and evaluating equipment out-of-service combinations using a matrix provided in Operations Administrative Procedure OAP-102.1, "Conduct of Operations Scheduling Unit," Revision 2. Operators 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 relate 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 Summer Nuclear Plant Final Safety Analysis Report (FSAR), Licensee Event Reports, the Emergency Operating Procedures, previous NRC Inspection Reports, and other information provided by the licensee. The team selected an independent sample of structures, systems, and components that the team believed should be included within the scope of the Rule, which had not been classified as such by the licensee. During the onsite portion of the inspection, the team used this list to determine if the licensee had adequately identified the structures, systems, and components that should be included in the scope of the Maintenance Rule in accordance with 10 CFR 50.65(b).

b. Observations and Findings

The licensee reviewed approximately 108 systems and determined that approximately 78 were in the scope of the Maintenance Rule.

The team reviewed the licensee's database of 30 systems excluded from the Maintenance Rule and selected a sample of 15 excluded systems to verify the appropriateness of the exclusion. For each excluded system, the licensee produced an exclusion basis to document the specific reasons for not including the system in the Maintenance Rule. The exclusion basis contained a system functional description, reasons why the system did not warrant inclusion in the scope of the Maintenance Rule, and appropriate references.

The team identified several SSCs that were included in the EOPs but were not included within the scope of the Maintenance Rule. These SSCs included:

- the Post Accident Sampling System (PASS);
- the diesel driven fire pump and associated building;
- the pressurizer spray components;
- radiation monitors RMA-3, RMA-11, and RMA-13;
- general area radiation monitors; and
- the open function of some fire doors.

The licensee had generated a Condition Evaluation Report (CER No. 97-0329) dated April 8, 1997, to address the scoping of EOP SSCs based on Regulatory Guide (RG) 1.160, Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Revision 2. Revision 2 to the RG was issued in March 1997 and provided clarification on scoping SSCs that were included in the EOPs. Based on this open CER to further review these scoping issues, the team identified IFI 50-395/97-02-01, Maintenance Rule Scoping of Systems Structures and Components Used in EOPs, to review this issue after the licensee has completed review of their program to Revision 2 of Regulatory Guide 1.160.

c. Conclusions

Based on the sample of systems reviewed, the required SSCs were generally included in the scope of the Maintenance Rule. An IFI was identified concerning a number of SSCs which were included in the EOPs but were not included within the scope of the Maintenance Rule.

M1.2 Safety or Risk Determination

a. Inspection Scope(62706)

Paragraph (a)(1) of the Maintenance Rule required that goals be commensurate with safety. Implementation of the Maintenance Rule using the guidance contained in NUMARC 93-01 required 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. The team reviewed the licensee's methods for making these required safety determinations. The team also reviewed the safety determinations that were made for the systems that were reviewed in detail during this inspection.

b. Observations and Findings

In addition, to determining which SSC functions were within the scope of the Maintenance Rule, the licensee's Expert Panel established the risk-significance ranking of SSC functions, 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 a probabilistic risk assessments and Expert Panel judgement based on deterministic considerations. The licensee used quantitative important measures of risk achievement worth and risk reduction worth associated with core damage frequency. The licensee did not use the SSCs accounting for 90% of the core damage frequency as a quantitative importance measure due to computer model limitations. However, the Expert Panel was provided with the functions associated with sequences leading to 90% of the core damage frequency for information. Cutoff values for high and low risk-significance were set according to the guidance provided in NUMARC 93-01,"Industry Guideline for Monitoring the

Effectiveness of Maintenance at Nuclear Power Plants." To further ensure proper risk-ranking the licensee re-quantified the importance measures for the non-risk significant systems using the present Maintenance Rule performance criteria for reliability and availability as input. After the re-quantification, three systems met the risk-significant cutoff. However, this was due to modeling limitations that were justified to the team's satisfaction. The Expert Panel compensated for limitations within the PRA through deterministic rationale such as when the facility was in an outage consistent with current industry standards. The risk-ranking identified 26 of the 77 systems applicable to the Maintenance Rule as risk-significant.

The licensee informed the team that a new computer model was being developed that would provide the SSCs involved in 90% of the core damage risk. Upon completion of the model the results would be provided to the Expert Panel for their consideration.

b.1 Risk-ranking Methodology

The team reviewed a sample of SSC functions covered by the Maintenance Rule that the Expert Panel had categorized as non-risk significant to assess if the Expert Panel had adequately established the safety significance of those SSC functions. All of the sampled functions were modeled in the PRA and were sufficiently detailed. Plant specific data were used when statistically sufficient data were available. Otherwise, the licensee used generic data. No Bayesian updating was used in the sample. Success criteria for the selected functions was derived from engineering analysis. The team determined that the licensee had included a consideration of initiating events in the ranking process.

The team also reviewed the truncation limits used during the risk-ranking process. Truncation limits were imposed on PRA models 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 which was adequate.

Based on the review of the sampled SSC functions, it appeared that the PRA's level of detail, truncation limits and quality were adequate to perform the risk-ranking for the Maintenance Rule.

b.2 Performance Criteria

The team reviewed the licensee's performance criteria to determine if the licensee had adequately set performance criteria under (a)(2) of the Maintenance Rule consistent with the assumptions used to establish safety significance. Section 9.3.2 of NUMARC 93-01 recommended 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) were maintained. In many instances, the licensee elected to use performance criteria for reliability and availability for many of the risk-significant SSCs that was less conservative than what was used in the risk determination.

The licensee had performed sensitivity studies for numerous systems allowing up to a 10% increase in core damage frequency. The results of these sensitivity studies were used as the performance criteria for a number of risk-significant SSCs. A sensitivity analysis using the reliability performance criteria values showed a 450% increase in the baseline core damage frequency of approximately 1E-4. A similar analysis for availability showed a baseline core damage frequency increase of 154%. Changes of this magnitudes, given the baseline core damage frequency were inconsistent with industry probabilistic safety-assessment guidance. 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 were always indicative of an appropriate preventive maintenance/monitoring program, especially given the potential cumulative effects on core damage frequency. Also, the performance criteria were not fully consistent with the historical performance of the risk-significant SSCs. This was considered a weakness and further evaluation of performance criteria following the periodic balancing of reliability and availability was warranted. IFI No. 50-395/97-02-02, Followup on Performance Criteria Established for Risk-Significant SSCs following Periodic Balancing, was identified.

Also, the licensee had not established performance criteria in all the applicable modes of operation for several SSC functions applicable to the Maintenance Rule. Problems in this area included the following:

- lack of performance criteria for the reactor coolant system pressure boundary in Modes 5 and 6;
- lack of performance criteria for the reactor vessel level indicating system in Modes 5 and 6; and
- lack of performance criteria for pressurizer level indications in Modes 5 and 6.

b.3 Expert Panel

The team reviewed the licensee's process and procedures for establishment of an Expert Panel. 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.

c. Conclusions

Based on the review of the sampled SSCs, the licensee's approach in performance of risk-ranking for the Maintenance Rule was adequate. 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/monitoring program. This is identified as an IFI. Also, performance criteria were not established for all the applicable modes of operation for several SSC functions applicable to the Maintenance Rule.

M1.3 Periodic Evaluation

a. Inspection Scope(62706)

Paragraph (a)(3)of the Rule required 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 two audits and a surveillance in the area of 10 CFR 50.65, which are discussed further in paragraph M7.1 below.

The licensee planned to have completed a Periodic Maintenance Effective Assessment covering the portion of Fuel Cycle 9 from July 10, 1996, to the start of Fuel Cycle 10, within 90 days of the start of Fuel Cycle 10. Data for the Periodic Maintenance Effective Assessment was being collected on a monthly basis from the System Engineers' monthly system assessments.

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 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. The requirements for balancing reliability and unavailability were discussed in the licensee's Engineering Services Procedure ES-514, "Maintenance Rule Program Implementation," Revision 0, Change A. This procedure required System Engineers to monitor and trend the system performance continuously. Should an adverse trend be identified, the System Engineer was responsible for initiating an evaluation at that time. Otherwise, the proper balance was considered to be achieved as long as system performance met the established performance criteria.

Discussion with licensee personnel established the fact that the licensee had completed an extensive review of preventive maintenance during the establishment of their Reliability Centered Maintenance Program, which was actively maintained at the site. This program, established in the early 1990s, included a review of the preventive maintenance for all systems, which were currently scoped under the Maintenance Rule. This program, in conjunction with the fact that plant overall performance was at a very high level, provides the licensee with confidence that the preventive maintenance program was effective. In addition, performance criteria established for monitoring in accordance with the Maintenance Rule were based on the PRA assumptions which took into account an optimum value relative to core damage. If these performance criteria were exceeded, a cause determination would assess the appropriateness of planned maintenance activities or the root cause of the failure and its impact on reliability. Based on this information, the team determined the balancing method met the intent of the Maintenance Rule.

c. Conclusions

The team concluded that the licensee's method of balancing reliability and unavailability 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 stated that the total impact on plant safety should 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 Expert Panel members, plant operators, and the head of the work scheduling. The Team selected numerous equipment out-of-service configurations for review to ascertain whether the established process was properly implemented.

b. Observations and Findings

The licensee implemented the requirements to assess the impact on plant safety when removing equipment from service when in Modes 1 - 4 via Operations Administrative Procedure OAP 102.1, "Conduct of Operations Scheduling Unit and Station Scheduling Procedure SSP 001, Planning and Scheduling On-line Outage Maintenance Activities," Revision 11. The licensee had 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 as indicated in an attachment to SSP 001. Procedure OAP 102.1 contained a matrix indicating equipment out-of-service combinations that were risk-significant based upon PRA insights. Also, association codes were "tagged" to the alpha-numeric designator for the SSCs involved in these risk-significant configurations highlighting their importance to the schedulers. Another facet of the matrix was based upon a barrier concept of whether the equipment removed from service would increase the possibility of the more probable initiating events, reduce core damage mitigation capability or reduce containment integrity. Depending upon the number of barriers affected, the plant would be classified as in an elevated or moderate risk. Each category, risk-significant, moderate risk or elevated risk required differing levels of management approval to enter into those conditions. The matrix was used by work schedulers and plant operators to ensure that the proposed scheduled maintenance had been previously evaluated to be acceptable.

The team reviewed the written program direction matrix and identified some weaknesses as well as a strength. The weaknesses were the omission of a risk-significant component, the steam generator power operated relief valve, from the matrix; the lack of explicitly evaluating non-risk significant equipment out-of-service configurations and; the lack of mandatory contact of PRA expertise except when the significant, moderate or elevated risk conditions were being considered and when personnel considered it appropriate. These limitations were partially compensated for through the experience level and qualifications/training of the personnel authorized to evaluate equipment out-of-service configurations. The matrix strength was the consideration of severe weather and other trip hazards as event initiators.

The team reviewed a sample of previous on-line equipment out-of-service configurations since the implementation date of the Maintenance Rule and did not identify periods when the plant was operating in a high risk configuration or had deviated from procedural requirements.

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 Quality Systems Administrative Instruction AI-600, "ISEG Outage Safety Review Guidelines," Revision 3, and Station Scheduling Procedure SSP-002, "Planning and Scheduling of Outage Maintenance Activities," Revision 3.

The licensee informed the team that a computerized risk monitor was being developed for use when on-line and, working was proceeding on a PRA model when the plant was shutdown.

c. Conclusions

The team identified a strength (consideration of severe weather and other trip hazards as event initiators) and weaknesses (omission of a risk-significant component from the matrix, limitations on mandatory contact of PRA expertise, the lack of explicitly evaluating non-risk significant equipment out-of-service configuration) when removing SSCs from service for monitoring and preventive maintenance while in Mode 1 - 4. 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 should 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 MPFF.

The team reviewed program documents and records for four 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 the licensee management, the Maintenance Rule Engineer, System Engineers, and other licensee personnel.

b. Observations and Findings

b.1 Residual Heat Removal - System RH

The Residual Heat Removal (RHR) system was placed in the a(1) category because the maintenance preventable unavailability of the A train Reactor Coolant System (RCS) cold overpressure protection function resulted in exceeding the criteria of no more than 13 hours per train in a rolling 18-month period during Modes 5 and 6 and in Mode 4 with the RCS less than 300°F. As a result, the licensee set a goal of no more than an additional two hours of maintenance preventable unavailability of the A train RHR suction relief valves and associated suction isolation valves through the end of refueling outage 10 (scheduled to begin in October 1997) with the plant in Modes 5 or 6 or in Mode 4 with the RCS less than 300°F. The team considered this goal setting to be reasonable and achievable to provide assurance that the cold overpressure protection feature of the RHR system would fulfill its intended function.

b.2 Leak Detection - System LD

The LD system was being monitored under 50.65(a)(1) and was considered a non-risk significant system with standby functions. The licensee identified and established performance criteria and monitoring for seven Maintenance Rule functions, including providing indication, alarm, and control for various temperature and level detectors. Of the seven Maintenance Rule functions, numerous MPFFs were identified by the licensee associated with the leakage detection level switches utilized to meet function six. Function six was to "Provide Auxiliary Building / West Penetration Access Area leakage alarms indicative of ECCS/RB Spray post-LOCA leakage." Approximately 40 level switches were part of this function. The other Maintenance Rule functions had not experienced failures.

The team verified that goals had been established in accordance with paragraph (a)(1) of the rule. Based on the level switches' poor performance, the licensee had concluded that the best fix to the problem would be a level switch modification. In the interim, the licensee had intended to maintain the existing switches' reliability as outlined in Evaluation 508-064. ES-508-064 was written to evaluate the LD level switch failures for implementation of the Maintenance Rule. The cause evaluation provided the bases for the goal which was to meet performance criteria six, after implementation of corrective actions identified in the cause evaluation. Long-term corrective action was to modify the level switch design at which time the (a)(1) goals would change. Expected implementation of the modification was June 1997.

The team reviewed the maintenance history and current status of these level switches. Approximately 25 failures had occurred in the population of 40 switches since 1989. The team noted that Switches ILS01914, ILS01966, and ILS01967 were currently out-of-service, and the team requested their work status. Level Switches ILS01914 had been out-of-service since February 11, 1996, ILS01966 since January 22, 1997, and ILS01967 since January 6, 1996. Level Switches ILS01966

and ILS01967 were located in the "A" and "B" RHR pump room sumps respectively, and were designed to detect ECCS leakage approaching 45 gpm. ILS01914 was located in the RHR/CS recirculation valve area, and provided alarm indication of a leak.

The team questioned why corrective actions (for ILS01914 and 1967) had not been implemented in over a year and more specifically, since the Maintenance Rule went into effect on July 10, 1996. Additionally, ILS01966 was inoperable for approximately four months due to a repeat MPFF. After some review, the licensee indicated that the switches had not been reworked because of the poor maintenance history and because of ALARA considerations. Switch ILS01914 had failed once, and ILS01967 had failed twice in the last 36 months. With regards to ALARA, the licensee estimated that 200 mR would be expended to perform the work for the detectors in the RHR sumps. The team noted that Cause Evaluation 508-064 indicated that the current switch configuration would be maintained until the implementation of the new design, currently scheduled for June 1997. The cause evaluation did not address ALARA. In addition, the licensee identified that Station Administrative Procedure SAP 1141, "Nonconformance Control Program," Revision 6, had not been followed. Specifically, paragraph 6.2.6.A.1 requires that if the disposition action implementation time for a Nonconformance Notice (NCN) is less than 90 days but the disposition is not implemented within 90 days, the NCN shall be routed to system and component engineering for a re-evaluation. NCN 5304 provided a "rework" disposition for ILS01914 and ILS01967. However, the rework was neither implemented within 90 days nor was the NCN routed to engineering for re-evaluation. The licensee initiated CER# 97-0476 to address this program issue.

Federal Regulations, 10 CFR 50.65 (a)(1), require in part that each licensee shall monitor the performance or condition of SSCs against licensee-established goals in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions. When the performance of a SSC does not meet established goals, appropriate corrective action shall be taken. The team concluded that for LD Level Switches ILS01914 and ILS01967 appropriate monitoring and corrective action had not been established. Specifically, these level switches were not capable of performing their intended function, and corrective action had not been taken since implementation of the Maintenance Rule on July 10, 1996. In addition, Level Switch ILS01966 was inoperable and had not been capable of performing its intended function since January 22, 1997, due to a repeat MPFF. The lack of monitoring and corrective action for the above level switches was identified as Violation 50-395/97-02-03, Failure to Take Appropriate Corrective Action For An (a)(1) SSC.

The team also reviewed the FSAR for the LD system and noted that the current LD system configuration did not meet FSAR descriptions for system operation. Specifically:

- FSAR Section 15.4.1.4.2, Radioactive releases from Recirculation Loops, stated that a 50 gpm leak from the failure of "a passive component is assumed starting at 24 hours after the accident and having a duration of 30 minutes."

- FSAR Section 6.3.2.11.2, Leakage from engineered Safety Features System Outside Containment, stated, "Leakage from the engineered safety features system is collected by the auxiliary building drain system. Excessive leakage is detected by level probes located in pump room sumps and specially provided alarm drains." Section 6.3.2.11.2 further stated "Leakage approaching 50 gpm into an alarm drain or pump room sump is detected in less than one minute and actuates an alarm in the control room. Upon actuation of this alarm, the operator can determine which level probe caused the alarm and, thus, identify which area housing ECCS or reactor building spray system equipment is affected. The operator then takes the required action to isolate the leak."

Level Switches ILS01966 and ILS01967, which have been out-of-service approximately four and 16 months respectively, were designed to detect leakage approaching 50 gpm in the RHR pump room sumps. Level Switch ILS01914, which had been out-of-service for approximately 15 months, was designed to detect leakage to the RHR/CS recirculation valve area. The team discussed with the licensee how this system's FSAR functions were meet and whether a safety evaluation in accordance with 10 CFR 50.59 was performed. The licensee indicated that these level switches were considered an operator work around and that the inoperable switches were compensated, in part, by operator rounds every 12 hours specifically looking at the RHR sumps. The team acknowledged the compensatory measures but noted that they would not compensate for a design bases accident function as described in Section 15.4.1.4.2 and 6.3.2.11.2 of the FSAR. With regards to the safety evaluation, the licensee indicated that there was no specific time frame for performing a 50.59 evaluation for a "re-work" disposition of an SSC (i.e., the licensee had always planned to restore the LD system configuration to the original design). The licensee also indicated that NCN program would normally require a re-evaluation for not implementing the disposition of an NCN as described above.

The team concluded that the LD system was being operated differently than described in the FSAR. 10 CFR 50.59(a)(1) states that a licensee may make changes to the facility or procedures as described in the safety analysis report, without prior Commission approval, unless the proposed change involves an unreviewed safety question. 10 CFR 50.59(b)(1) requires that the licensee maintain records of changes in the facility and of changes in procedures, made in accordance with 10 CFR 50.59. These records must include a written safety evaluation, which provides the bases for determination that the change does not involve an unreviewed safety question.

Although it was determined that the plant had been operating since January 6, 1996, with the leakage detection system configuration different than that described in the FSAR without performing a safety evaluation, it was not clear whether an unreviewed safety question existed. The extent of licensee compensatory measures was not fully understood at the conclusion of the inspection. Pending further review to determine the full extent of license compensatory measures in place and whether an unreviewed safety question exists, this matter is considered unresolved and is identified as Unresolved Item (URI) 50-395/97-02-04, Lack of a 50.59 Safety Evaluation for Inoperable Leak Detection Sump Level Switches.

b.3 Building Service - System BS

The licensee's historical review indicated that the BS system had experienced multiple Maintenance Preventable Functional Failures (MPFF)s resulting from the failure of the electric strike and lockset, for door DRAP 1514, which resulted in the inability of that door to close and stay closed. These circumstances occurred five times in the preceding 36 months. This failed the BS system's performance criteria 14b. (No more than two MPFFs in a rolling 36-month period on the same door). In addition, the licensee identified an MPFF and three Repetitive Maintenance Preventable Functional Failures (RMPFF)s, on doors which would not stay latched due to hinge misalignment. The BS system was subsequently placed in the (a)(1) category.

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 January 1995 to the beginning of the inspection.

b.4 Air Handling - System AH

The AH system at Summer included several separate plant systems as follows: Reactor Building Heating Ventilation and Air Conditioning (HVAC), Control Room/TSC HVAC, Main Relay Room HVAC, Cable Spreading Area HVAC, Battery and Charger Room HVAC, Fuel Handling Building HVAC, Diesel Generator HVAC, and Service Water Building HVAC. These systems were scoped in the Rule in order to provide assurance that equipment would provide the necessary post-accident cooling, airborne particulate and radioiodine removal (as applicable), and primary containment isolation (as applicable) for post-accident mitigation. The team verified that these systems had been properly classified in accordance with NUMARC 93-01 as to risk or non-risk and as to standby or continuously operating, as appropriate. The Team also verified that appropriate performance criteria had been developed in accordance with the NUMARC guidance (i.e., risk and non-risk standby monitored at the train level and non-risk continually operating at an appropriate level or at the plant level). In addition, the team verified that monitoring of unavailability and reliability was being accomplished. The team compared Maintenance Rule data to information in site deficiency reports, work orders, and various operating logs. This comparison did not

identify any instances where the licensee had failed to capture unavailability and reliability data. The team reviewed engineering evaluations and corrective actions for functional failures associated with this system, and determined that corrective actions for all failures were appropriate and were effectively implemented. The team also verified that industry operating experience was used in the system monitoring process. The AH system had been placed in (a)(1) by the licensee due to damper failures, which (due to electrical interlocks) resulted in failure of system fans to start. The team reviewed the goals and enhanced monitoring established for this problem and concluded that they were appropriate. The team also concluded that the (a)(1) classification for the AH system was proper.

c. Conclusions

The team concluded that the licensee had considered safety in establishment of goals and monitoring for systems, and components in (a)(1) status. Engineering evaluations were technically sound, and corrective actions for problems requiring (a)(1) evaluation were appropriate, except for the LD system. One violation for failure to take appropriate corrective action and one URI for not performing a 10 CFR 50.59 evaluation were identified relative to effectiveness of corrective action for MPFFs of sump level switches used in the LD system. Goals were comprehensive and operating data were being properly captured. No instances were identified where the licensee had failed to capture unavailability and reliability data. Industry-wide operating experience was considered, as appropriate.

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

a. Inspection Scope (62706)

Paragraph (a)(2) of the Rule stated that monitoring as required in paragraph (a)(1) was not required where it had been demonstrated that the performance or condition of a SSC was being effectively controlled through the performance of appropriate preventive maintenance, such that the SSC remained 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 operation experience was considered, where practical, that appropriate trending was being performed, that safety was considered when performance criteria was 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 the licensee management, the Maintenance Rule coordinator, System Engineers, and other licensee personnel.

b. Observations and Findings

b.1 Radiation Monitoring - System RM

The team reviewed the performance criteria associated with the individual radiation monitors that were included within the scope of the Maintenance Rule. The criteria included appropriate important to the Maintenance Rule functions that are further broken down to specific performance criteria. The team did not identify any concerns with these criteria.

In addition, the team reviewed the open and closed Maintenance Work Requests (MWRs), Off-Normal Occurrence (ONO) reports, NCNs, and CERs associated with the radiation monitoring system. These indicated that the licensee was identifying, documenting, and correcting problems with the radiation monitoring system in an appropriate manner. The System Engineer maintained reliability data for each radiation monitor included within the scope of the Maintenance Rule. No concerns were identified during these reviews.

b.2 Turbine Plant Closed Cycle Cooling - System TC

The team reviewed the performance criteria associated with the turbine closed cycle cooling system. These criteria were established at the plant level since a complete loss of the system function could result in a plant trip. In addition, the system provided cooling water to the instrument air compressors, which are credited in the PRA for feed and bleed. The team considered this plant level performance criteria to be appropriate for this system.

The team reviewed the supporting documents and drawings with the System Engineer. This system was completed and placed into service following refueling outage nine (April 1996). Initial system startup problems were being appropriately addressed by the System Engineer. The team did not identify any concerns with the turbine closed cycle cooling system as it related to the Maintenance Rule.

b.3 Feedwater - System FW

The FW system was being monitored under 50.65(a)(2) and was considered a non-risk-significant system with standby functions. The licensee identified and established performance criteria and monitoring for five Maintenance Rule functions. Performance criteria included both plant level and function specific reliability criteria. The team

reviewed a sample of CERs, work requests and NCNs to verify that the system was being properly monitored. No potential MPFFs were identified and plant level performance criteria monitoring appeared appropriate. The team concluded that the system was adequately monitored.

b.4 Reactor Coolant - System RC

The RC system was being monitored under 50.65(a)(2) and was considered a risk significant system with standby functions. The licensee identified and established performance criteria and monitoring for thirteen Maintenance Rule functions. Performance criteria included plant level and function specific reliability, availability and condition monitoring. The team noted that the RC system functions did not include the following: 1) the pressurizer safety valves did not include a function to open on demand (this item was promptly corrected); 2) pressurizer spray function was not monitored; and 3) several other function's performance monitoring did not include all applicable Modes; RCS pressure boundary was not listed as being monitored in Modes 5 and 6; and pressurizer level and RVLIS were not listed as being monitored in Modes 4, 5, and 6. The licensee's Expert Panel had recognized the mode limitations and had recommended a review be performed. For these items no performance issues were identified. In addition, the team did not identify functional failures or other monitoring deficiencies. With exception to the above discussed pressurizer spray and MODE exceptions, the team concluded that the system was adequately monitored.

b.5 Structures

The licensee conducted a review of inspections and surveillances conducted by the licensee, during the two years just prior to June 1996, to develop a base line for structures the licensee identified as Important To Maintenance Rule (ITMR) and documented the same in "Assessment of In-service Conditions of Important to Maintenance Rule (ITMR) Structures", dated September 19, 1996. The team reviewed Procedure ES-437: "Inspection for Maintenance Rule - Structures," Revision 0, dated April 29, 1997, to evaluate the adequacy of the acceptance criteria and performance criteria planned for evaluation of structural elements such as concrete and structural steels. The team noted that the definition of "Acceptable With Deficiencies and Unacceptable" were vague and not consistent with Regulatory Guide 1.160, Revision 2, Monitoring the Effectiveness of Maintenance at Nuclear Power Plants, Revision 2, dated March 1997, which specifically relates structures "Acceptable With Deficiencies and Unacceptable" to a failure of structures to meet their design basis. The licensee indicated that they had written ES-437 to be consistent with Regulatory Guide 1.160, Revision 0. Regulatory Guide 1.160, Revision 0, did not provide specific guidance for "Acceptable With Deficiencies and Unacceptable". The licensee compared Revision 0 with Revision 2 of Regulatory Guide 1.160 and identified the differences. This comparison was documented in Engineers Technical Work Record, Serial No. 13157, dated April 8, 1997, which was made a part of CER No. 97-0329, dated April 8, 1997. The issue discussed above is included in CER 97-0329. The licensee indicated that they were in the process of

evaluating their program in view of Revision 2 to Regulatory Guide 1.160 and would make changes as appropriate. Except as noted above, the team found the acceptance criteria adequate and consistent with design requirements.

The team conducted a walkdown inspection ofthe Circulating Water Intake Structure, the Service Water Building and the Diesel Generator Building in order to observe the condition of the concrete and steel structures located within and outside the buildings. Although some minor surface cracking in the concrete walls was observed, the team 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 a civil engineer who was knowledgeable and qualified to perform structural evaluations.

b.6 Fire Service - System FS

From a review of the FS system, the team determined that appropriate performance criteria had been established and monitoring was being accomplished against those criteria. Review of the problems associated with the system demonstrated that appropriate corrective actions had been taken for failures. Operating experience was being used in system monitoring. No deficiencies were noted concerning this system.

b.7 Component Cooling Water - System CC

The CC system serves as the intermediate, closed-loop cooling system to transfer heat from plant components to the service water system. The system has several Maintenance Rule functions during plant operations and following an accident. Maintenance Rule functions included maintaining component cooling flow for normal operations including flow to the reactor coolant pumps, maintaining cooling flow post-accident to the High Head Safety Injection (HHSI) pumps, RH pump seals, and RH heat exchangers, providing mitigation for a flooding event caused by the system itself, and providing for primary containment integrity. The team verified that the system functions had been properly scoped under the Rule and had been properly classified in accordance with NUMARC 93-01 as to risk or non-risk, and as standby or continuously operating, as appropriate. The team also verified that performance criteria had been developed in accordance with the NUMARC guidance (i.e., risk and non-risk standby monitored at the train level, and non-risk continually operating at an appropriate level or at the plant level). In addition, the team verified that monitoring of unavailability and reliability was being accomplished. The team compared Maintenance Rule data to information in site deficiency reports, work orders, and various operating logs. This comparison did not identify any instances where the licensee had failed to capture unavailability and reliability data. The team reviewed engineering evaluations and corrective actions for functional failures associated with this system, and determined that corrective actions for all failures were appropriate

and were effectively implemented. The team also verified that industry operating experience was used in the system monitoring process. The CC system had been classified by the licensee as (a)(2) under the Rule. Based on data reviewed, the team concluded that this classification was proper.

b.8 DC Power - System DE

The DC power system provided a source of class 1E reliable, uninterruptible dc power for essential control and instrumentation during normal operation and for orderly shutdown of Engineered Safety Features (ESF) equipment. Maintenance Rule functions included maintaining continuous power to safety buses, providing protection of 1E circuits against faults in non-1E circuits routed in cable trays without covers, and providing emergency lighting to the control room, intermediate building, and diesel generator building. The team verified that the system functions had been properly scoped under the Rule and had been properly classified in accordance with NUMARC 93-01 as to risk or non-risk, and as standby or continuously operating, as appropriate. The team also verified that performance criteria had been developed in accordance with the NUMARC guidance (i.e., risk and non-risk standby monitored at the train level, and non-risk continually operating at an appropriate level or at the plant level). In addition, the team verified that monitoring of unavailability and reliability was being accomplished. The team compared Maintenance Rule data to information in site deficiency reports, work orders, and various operating logs. This comparison did not identify any instances where the licensee had failed to capture unavailability and reliability data. The team reviewed engineering evaluations and corrective actions for functional failures associated with this system, and determined that corrective actions for all failures were appropriate and were effectively implemented. The team also verified that industry operating experience was used in the system monitoring process. The DC power system had been classified by the licensee as (a)(2) under the Rule. Based on data reviewed, the team concluded that this classification was proper.

c. Conclusions

For (a)(2) SSCs, the team concluded that, in general, performance criteria were properly established; engineering evaluations were technically sound, and corrective action was taken when SSCs failed to meet performance criteria, or when a SSC experienced a functional failure; operating data was being properly captured and appropriate trending was being performed - no instances were identified where the licensee had failed to capture unavailability and reliability data; and industry wide operating experience was used, as appropriate. A weakness was identified in that the performance criteria for the RC system did not include all applicable modes for some sub-systems, the pressurizer spray function was not monitored, and the pressurizer safety valve did not include the function to open on demand.

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.

- Residual Heat Removal System (RH)
- Radiation Monitoring System (RM)
- Turbine Plant Closed Cycle Cooling System (TC)
- Circulating Water System Intake Structure (BS)
- Service Water System Intake Structure (BS)
- Diesel Generator Building (BS)
- Fire Service System (FS)
- Turbine Building (BS)
- Plant Doors and Hatches (BS)
- Component Cooling Water (CC)
- DC Power (DE)
- Leak Detection (LD)
- Feedwater System (FW)
- Reactor Coolant System (RC)

b. Observations and Findings

The team conducted the walkdowns accompanied by the responsible System Engineer. The engineers demonstrated a good level of knowledge and familiarity with their assigned system.

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

During the walkdown inspection of the BS system structures, the team noted the following conditions:

- Paint on the Fire Pump Building was significantly deteriorated (cracking, flaking and large areas where bare block was exposed). The licensee issued Work Order (WO) 9702408to address this item.

- Rain water was ponding on the Fire Pump Building Roof. The licensee issued WO 9710678to address this item.

- Several roof drain covers were missing on the Service Water and Diesel Generator Buildings. The licensee issued WO 9710677 to address this item.

- The built-up roofing was bulging in several locations on the Service Water Building. Flashing was separated from the build-up roofing with associated wetted interior surfaces. The licensee issued WO 9710679 to address this item.

- Sections of exterior flashing associated with Service Water Building cooling coils were missing. The licensee issued WO 9710680 to address this item.

- Several building illumination lamps were out. The licensee added these lamps to open WO 9705165 to address this item.

- Fasteners were missing from five junction or splice boxes. The licensee issued Minor Maintenance Tag No. 1567 to address this item.

- Non-Nuclear Safety (NNS) HVAC duct supports on the Intermediate Building Roof were secured to the roof by studs and nuts over slotted holes without washers, which is not consistent with SMACNA, "Low Pressure Duct Construction Standards", Fifth Edition, dated 1976, which was identified as the applicable Code. The licensee documented this issue in Engineering Information Request (EIR) 97-09.

- Three of the six foundation anchors on the Floor Drain TankXTK0051-WL did not have full thread engagement by significantly more than one thread. The licensee documented this issue in Engineering Information Request (EIR) 97-11.

- Evidence of ground water intrusion was noted in several areas of the Service Water and Auxiliary Buildings. There was evidence of repair attempts which did not appear to be effective. The System Engineer indicated that many of these areas had been identified in the past and had been considered not to adversely affect any plant structure.

- The team noted that Door DRAS/28, marked FIRE DOOR, was standing open with no permit in evidence. The licensee indicated that Door DRAS/28 was not a fire door within the purview of the fire prevention program but was a security door. The licensee further indicated that there are a number of doors that are erroneously marked as FIRE DOOR. The licensee documented the security issue in Security Maintenance Work Order 97-091C. The miss-labeling issue will be corrected under Minor Maintenance Tag No. 1555.

c. Conclusions

In general, plant material condition and housekeeping observed during walkdowns was a good indication that equipment was being adequately maintained. Preservation of equipment by painting was considered to be good. The housekeeping and material condition discrepant items noted in the structural area 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 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 two audits and a surveillance in the area of 10 CFR 50.65. Audit QA-AUD-9521-0 was conducted December 18, 1995, to February 9, 1996, to evaluate the status of the implementation of the Maintenance Rule. The four areas assessed by QA-AUD-9521-0 included: Scope of the Rule 50.65(b); Goal Setting and Monitoring 50.65(a)(1); Preventive Maintenance 50.65(a)(2); and Periodic Evaluation 50.65(a)(3). No adverse findings were identified. Audit QA-SUR-97018-0 was conducted February 2 - March 4, 1997, to verify the adequate implementation of ES-514, "Maintenance Rule Implementation". One finding was identified relating to the determination of unavailability time. The Quality Assurance (QA) Department is still evaluating the finding responses. QA-AUD-97005-0, just completed, was conducted to verify that the requirements of the Maintenance Rule have been effectively implemented. The areas assessed included Personnel Knowledge of the Maintenance Rule; System Walkdowns; SCCs Within the Scope of the Rule; Safety (Risk) Determination, Risk-ranking, and Expert Panel; Periodic Evaluations; Balancing Reliability and Unavailability; On Line Maintenance Risk Assessment; and Goal Setting and Monitoring and Preventive Maintenance. The report in draft for QA-AUD-97005-0, yet to be issued, identified one finding relating to a failure to identify a MPFF and the resultant failure to identify the fact that a performance criteria had been exceeded.

The audits were independent and of an appropriate scope and depth; however, as the response process for the audit findings was incomplete, corrective actions were not inspected.

c. Conclusions

The team concluded the audits and assessments were detailed and thorough.

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 UFSAR that related to the areas inspected. The team verified that the UFSAR 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 MR procedures in a satisfactory manner. The System Engineers for those systems reviewed had considerable engineering experience and knowledgeable of their assigned systems and understood how to apply the rule to their systems. Additionally, the System Engineers had been proactive in corrective actions, and actively participated in Maintenance Rule development.

c. Conclusions

The team concluded the System Engineers were knowledgeable of the Maintenance Rule and were implementing it in a satisfactory manner.

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 May 16, 1997. The licensee acknowledged the findings presented, with the following exceptions: (1 a proposed violation was identified for failure to perform a 10 CFR 50.59 Evaluation when the decision was made to not re-work level switches in the Leak Detection system. The licensee took exception to this violation indicating that they did not require a time limit for when a 50.59 safety evaluation had to be done for a "re-work" disposition of a nonconforming condition; and (2) relative to IFI 50-395/97-02, the licensee stated that considering the cumulative core damage frequency greater than a designated value when establishing performance criteria was not consistent with their understanding of the regulatory requirements and pursuit of regulatory actions in this area did not appear appropriate. Also, the licensee expressed surprise at one aspect of the weakness when evaluating equipment to be removed from service. That aspect dealt with the limited mandatory PRA contact mandated by the implementing procedure.

The Team Leader asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

Subsequent to the inspection, after review by NRC management, the proposed violation of 10 CFR 50.59 was changed to an Unresolved Item pending further review to determine if an unreviewed safety question exists.

PARTIAL LIST OF PERSONS CONTACTED

LICENSEE:

S. Byrne, General Manager Nuclear Plant Operations
D. Gatlin, PRA Principle Engineer
M. Fowlkes, Manager, Operations
K. Nettles, General manager Planning and Development
D. Lavigne, General Manager Nuclear Support
L. Martin, Licensing Specialist
R. Osborne, Maintenance Rule Engineer
A. Paglia, Supervisor, Component Engineering
A. Rice, Manager, Nuclear Licensing and Operating Experience
G. Taylor, Vice President, Nuclear Operations
R. Waselus, Manager, System Engineering
B. Williams, General Manager Engineering Services

NRC:

B. Bonser, Senior Resident Inspector
H. Christensen, Branch Chief, Engineering Branch

LIST OF INSPECTION PROCEDURES USED

IP 62706	Maintenance Rule

LIST OF ITEMS OPENED

50-395/97-02-01	IFI	Maintenance Rule Scoping of Systems Structures and Components Used in EOPs - Section M1.1
50-395/97-02-02	IFI	Followup on Performance Criteria Established for Risk-Significant SSCs following Periodic Balancing - Section M1.2
50-395/97-02-03	VIO	Failure to Take Appropriate Corrective Action For An (a)(1) SSC - Section M1.6
50-395/97-02-04	URI	Lack of a 50.59 Safety Evaluation for Inoperable Leak Detection Sump Level Switches - Section M1.6

LIST OF ACRONYMS USED

AH	-	Air handling Systems
AI	-	Quality Systems Administrative Instruction
ALARA	-	As Low As Reasonable Achievable
BS	-	Building Service System
CC	-	Component Cooling System
CER	-	Condition Evaluation Report
CFR	-	Code of Federal Regulations
ECCS	-	Emergency Core Cooling Systems
EIR	-	Engineering Information Request
EOP	-	Emergency Operating Procedure
ES	-	Engineering Services Procedure
ESF	-	Engineered Safety Features
FS	-	Fire Service System
FSAR	-	Final Safety Analysis Report
FW	-	Feedwater System
HHSI	-	High Head Safety Injection
HVAC	-	Heating Ventilating and Air Conditioning
IFI	-	Inspector Followup Item
ITMR	-	Important to Maintenance Rule
LD	-	Leak Detection System
LOCA	-	Loss of Coolant Accident

mR	-	Millirem
MPFF	-	Maintenance Preventable Functional Failure
MWR	-	Maintenance Work request
NCN	-	Nonconformance Notice
NEI	-	Nuclear Energy Institute
NNS	-	Non Nuclear Safety
NPF	-	Nuclear Power Facility
NRC	-	Nuclear Regulatory Commission
NRR	-	Office of Nuclear Reactor Regulation
NUMARC	-	Nuclear Management and Resources Council, Inc.
OAP	-	Operations Administrative Procedure
ONO	-	Off-Normal Occurrence
PASS	-	Post-Accident Sampling System
P.E.	-	Professional Engineer
PDR	-	Public Document Room
PRA	-	Probabilistic Risk Assessment
QA	-	Quality Assurance
RAW	-	Risk Achievement Worth
RB	-	Reactor Building
RC	-	Reactor Coolant System
RG	-	Regulatory Guide
RH	-	Residual Heat Removal System
RM	-	Radiation Monitors
RMPFF	-	Repetitive Maintenance Preventable Functional Failures
RVLIS	-	Reactor Vessel Level Instrumentation System
SAP	-	Station Administrative Procedure
SMACNA	-	Sheet Metal and Air Conditioning Contractors National Association
SMWO	-	Security Maintenance Work Order
SSA	-	Shutdown Safety Assessment
SSC	-	Structure, System, or Component
SSP	-	Station Scheduling Procedure
TC	-	Turbine Plant Closed Cycle Cooling
TS	-	Technical Specification
UFSAR	-	Updated Final Safety Analysis Report
URI	-	Unresolved Item
VIO	-	Violation
WO	-	Work Order

LIST OF PROCEDURES REVIEWED

SAP-1252, "Maintenance Rule Program," Revision 0

ES-514, "Maintenance Rule Program Implementation," Revision 0, Change A

ES-437, "Inspection for Maintenance Rule - Structures," Revision 0, dated April 29, 1997

Technical Report TR00010-001, "Maintenance Rule Summary Document," Revision 0, Change A

"Assessment of In-service Conditions of Important to Maintenance Rule (ITMR) Structures," dated September 19, 1996

SAP-1141, "Nonconformance Control Program," Revision 6

ES-509, "Disposition of Nonconformances," Revision 3

SSP-002, "Planning and Scheduling of Outage Maintenance Activities," Revision 3, June 21, 1995

AI-600, "ISEG Outage Safety Review Guidelines," Revision 3, September 3, 1996

SSP-001, "Planning and Scheduling On-Line Outage Maintenance," Revision 11, March 31, 1997, Activities

OAP 102.1, "Conduct of Operations Scheduling Unit," Revision 2, Change A, April 28, 1997

SAP-205, "Status Control and Removal and Restoration," Revision 8, September 7, 1996

ATTACHMENT

VC SUMMER MAINTENANCE RULE IMPLEMENTATION

May 12, 1997

Bob Waselus, Al Paglia, Dan Gatlin & Ron Osborne

1

Presenter introductions

- Al Paglia - Program/Key individuals introduction.
- Ron Osborne - Program Aspects & unavailability Management
- Dan Gatlin - Safety Function Matrix & Cumulative unavailability Tracker

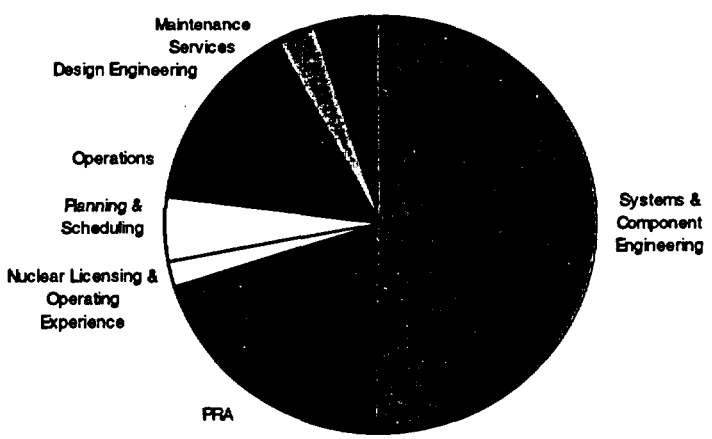
2

VCSNS *Program Bases*

- SAP-1252
- Meets 10CFR50.65
- Follows Regulatory Guide 1.160
- Follows NUMARC 93-01

3

Maintenance Rule Ownership



4

Expert Panel

Ron Osborne
Maintenance Rule Engineer
CHAIRMAN

Gary Williams	Dan Gatlin	Al Paglia	Mike Zaccone	Gerald Loignon
Associate Manager, Operations	PRA Principal Engineer	Supervisor, Component Engineering	Licensing Engineer	Senior Engineer, PRA
SRO	SRO		SROC	previous SRO

5

Ron Osborne - Program Aspects & Unavailability Management

6

50.65 (b) SCOPING & (a)(1) Vs. (a)(2)

- 78 of 108 Systems In Scope (ITMR)
- SCOPING approved by Expert Panel
- 9 Systems in (a)(1)
- ITMR Systems and (a)(1) Vs. (a)(2) status listed on the Status of Plant System Performance Indicator Chart

7

Risk Significance Determination

- Performed at System Level
- Includes insights from VCSNS PRA and IPEEE
- Established by Expert Panel for ALL Modes of Operation
- 26 Risk Significant Systems as listed on the Status of Plant System Performance Indicator *Chart*

8

Performance Criteria

- Established consistent with functions, operating mode of system and risk
- Risk Significant functions which are modeled in the PRA have criteria established based on PRA sensitivity analyses
- Criteria and Bases are documented in the System Function Worksheets

9

(a)(2) Performance Monitoring

- Performed by Systems & Component Engineering
- Review Removal & Restoration Logs, Maintenance Work Requests, Station Logs, etc.. for Unavailability/Reliability impact per ES-514
- Results are input to 5065 network drive

10

(a)(1) Systems

- AH Rep. MPFFs for dampers
- BP Rep. MPFFs involving 7300 process cards
- BS Rep. MPFFs of pressure barrier doors
- CS Excessive unavailability of "A" Charging/SI pump involving an MPFF
- LD Rep. MPFFs of Aux. Bldg. level switches
- RH Excessive unavailability of "A" train COPS
- SW Excessive unavailability of "C" SW pump
- VU MPFFs caused both the "B" & "C" chillers to exceed their unavailability criteria
- XI Rep. MPFFs involving 7300 process cards

11

(a)(3)Assessment of Plant Safety Prior to Removal From Service

- Planning & Scheduling uses Association Codes to schedule non-emergent activities per SSP-001
- PRA has reviewed the Association Codes for areas of Risk Reduction
- Operations Scheduling Unit and the Operations Shift review the impact of the activity using the Safety Function Matrix per OAP-102.1
- Outage Risk Management per SAP-1026 and SSP-002

12

VCSNS Tools for Maintenance Rule Implementation

- Unavailability Management System
- Safety Function Matrix
- Cumulative Unavailability Risk Tracker
- These and other Key items are located on the network CFR5065 drive.

13

Unavailability Management System

- Several (a)(1)s due to unavailability criteria being exceeded
- Included systems with 3 prime movers and 2 trains
- Train unavailability was being effectively managed
- Unavailability of the prime movers was not managed as effectively as for the trains
- Needed to project unavailability and manage based on projections

14

Unavailability Management System

	EF SYSTEM CRITERIA 1C				SHIFT	SCHEDULING	
					1/3 FUNCTIONAL	18 Month	PROCEED
		CRITERIA	Rolling 18	REAL OR	MR ALLOWED	Forecast Planning	WITH
	Hrs Unav	LIMIT	Month Total	PROJECTED	OOS TIME (hrs)	Margin (hrs)	WORK?
2/97	2.0	279.0	206.4	REAL			NA
7	2.0	279.0	206.4	REAL			NA
7	2.0	279.0	206.4	REAL			NA
5/97	2.0	279.0	206.4	PROJECTED	3.1	3.9	CALL System Engineer
6/97	19.8	279.0	179.5	PROJECTED		3.9	CALL System Engineer

15

Unavailability Management System

- Used by Operations Scheduling Unit and The Operation's Shift for emergent work to determine if work needs to proceed around the clock
- If MR Unavailability is going to be incurred, the Maintenance Rule Tracking stamp is applied to the work document to heighten awareness
- Gets the System Engineer involved in the Planning & Scheduling process if projected *unavailability margin is low*

16

Dan Gatlin - Safety Function Matrix & Tracker

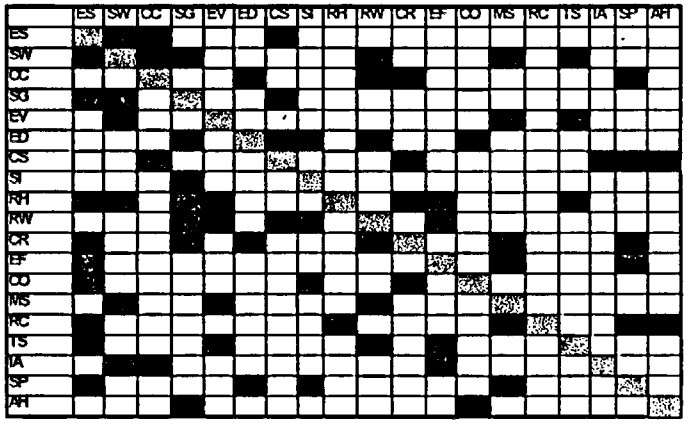
17

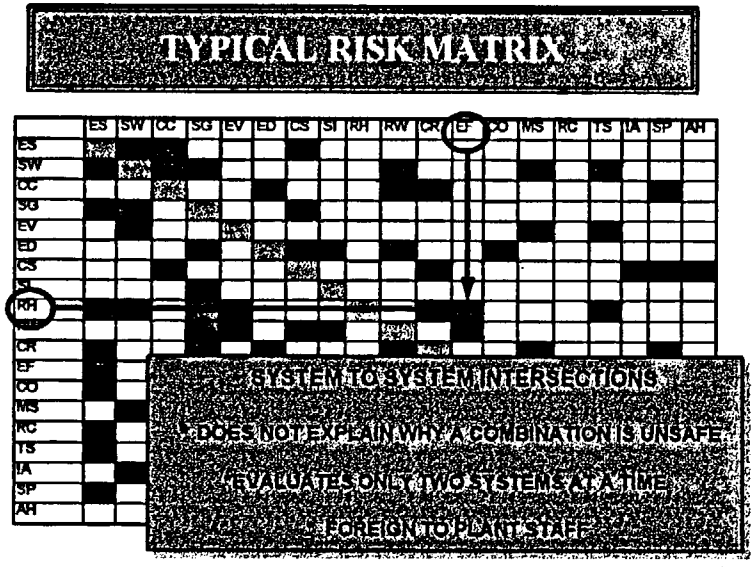
RISK MANAGEMENT AND THE MAINTENANCE RULE

SAFETY FUNCTION MATRIX

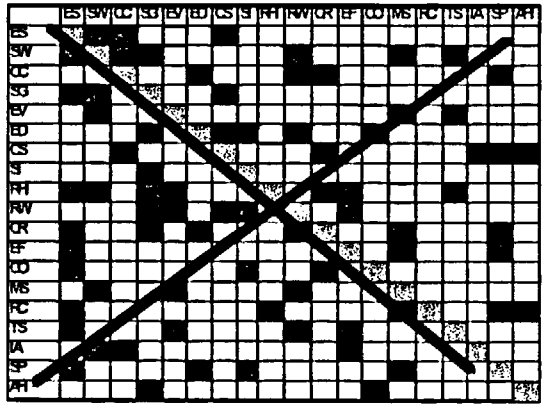
"TRACKER" PROGRAM

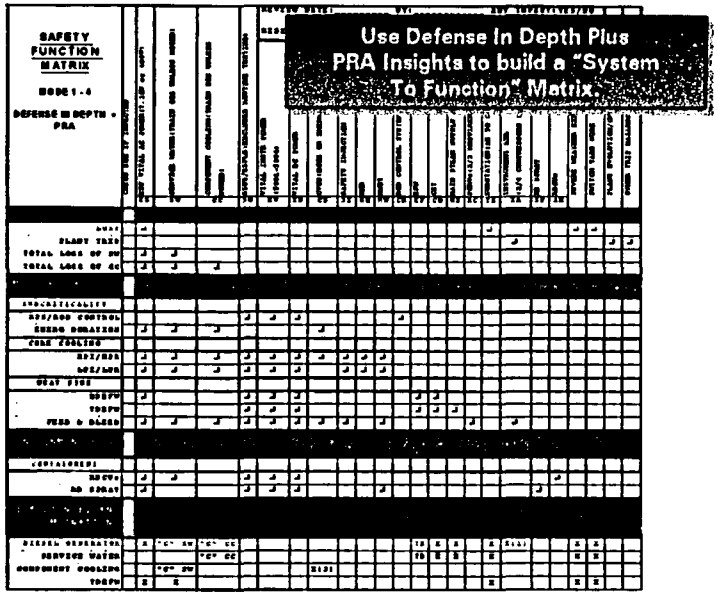
TYPICAL RISK MATRIX

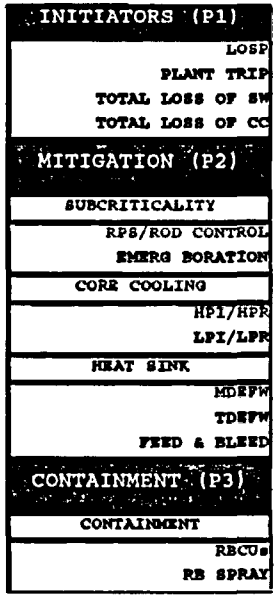




BUILD A BETTER MATRIX!







LEFT COLUMN
RISK FACTORS

- Uses the NRC philosophy (TI 2515) of controlling work that could simultaneously impact 2/3 Risk Factors (Initiators, Mitigating Systems, or Containment).
- Uses safety functions that are familiar to operators and parallels our EOPs.
- Blends PRA insights with traditional safety barriers.
- Using the top row as a guide, you can determine what functions on the left are impacted..

ES	ESF VITAL AC POW
SW	SERVICE WATER(TR
CC	COMPONENT COOLING(TRAIN OOS UNLESS NOTED
SG	SSPS/ESFLS(EXCLUDES ROUTINE TESTING)
EV	VITAL INSTR POWER
ED	VITAL DC POWER (6901-6904)
CS	CVCS(ECCS OR EMERG BORATION EQUIP)
SI	SAFETY INJECTION
RH	RHR
RW	RWST
CR	ROD CONTROL SYSTEM
EF	EFW
CO	CST
MS	MAIN STEAM SUPPLY TO TDEFW
RC	PORVs(2/3 REQUIRED)
TS	SUBSTATION(1E TO OFFSITE RELATED)
IA	INSTRUMENT AIR
SP	RB SPRAY
AH	RBCUs
	SEVERE WEATHER EXPECTED
	SWITCH YD WORK(SAP-703)
	PLANT EVOLUTION/CRITICAL TESTING(3)
	OTHER TRIP HAZARDS

TOP ROW (Rotated)

- Use as a guide to determine impact on Risk Factors.
- Risk Significant Systems from the M-Rule included.
- Also includes Severe Weather, Switch Yard work, BOP, etc.

INITIATORS (P1)
LOSP
PLANT TRIP
TOTAL LOSS OF SW
TOTAL LOSS OF CC
MITIGATION (P2)
SUBCRITICALITY
RPS/ROD CONTROL
EMERG BORATION
CORE COOLING
HPI/HPR
LPI/LPR
HEAT SINK
MDEFW
TDEFW
FEED & BLEED
CONTAINMENT (P3)
CONTAINMENT
RBCUs
RB SPRAY

CURRENT USE

- Operations Rep in the Sched. & Planning group reviews the proposed work at the POW to determine if any conflicts exist.
- Operations Rep turns-over matrix with the daily tagouts to the SS/SE.
- SS/SE are responsible for the daily matrix, and evaluation of changing plant status..

INITIATORS (P1)
LOSP
PLANT TRIP
TOTAL LOSS OF SW
TOTAL LOSS OF CC
MITIGATION (P2)
SUBCRITICALITY
RPS/ROD CONTROL
EMERG BORATION
CORE COOLING
HPI/HPR
LPI/LPR
HEAT SINK
MDEFW
TDEFW
FEED & BLEED
CONTAINMENT (P3)
CONTAINMENT
RBCUs
RB SPRAY

EVALUATION CRITERIA

- MODERATE RISK LEVEL
  - Any Safety Function (Yellow) degraded, or
  - Any pre-defined Risk Significant combinations (Ex. DG and Substation work)
  - Requires OPS management review in accordance with OAP-102.1, Conduct of Operations Scheduling Unit..

INITIATORS (P1)
LOSP
PLANT TRIP
TOTAL LOSS OF SW
TOTAL LOSS OF CC
MITIGATION (P2)
SUBCRITICALITY
RPS/ROD CONTROL
EMERG BORATION
CORE COOLING
HPI/HPR
LPI/LPR
HEAT SINK
MDEFW
TDEFW
FEED & BLEED
CONTAINMENT (P3)
CONTAINMENT
RBCUs
RB SPRAY

EVALUATION CRITERIA

- ELEVATED RISK LEVEL
  - Two or more of the primary Risk Factors (RED) simultaneously degraded.
  - Requires Plant Manager approval.
  - Work scope, parts availability, resources should be double checked.
  - Compensatory actions may be required..

MATRIX QUESTIONS

THE "TRACKER"

A TOOL TO ASSIST THE MRule ENGR IN MONITORING THE CUMULATIVE EFFECTS OF UNAVAILABILITY

CUMULATIVE RISK ESTIMATOR - High Impacts

18 MONTH DATA		CCW		ES		ED	
DATE	CUMULATIVE CDF INCREASE	TRA Hrs Unav.(30)	TRB Hrs Unav.(30)	TRA Hrs Unav.(18)	TRB Hrs Unav.(18)	TRA Hrs Unav.(24)	TRB Hrs Unav.(24)
7/93							
8/93							
9/93							
10/93							
11/93							
12/93							
1/94							
2/94							
3/94							
4/94							
5/94							
6/94							
7/94							
8/94							
9/94							

CUMULATIVE RISK ESTIMATOR - High Impacts

18 MONTH DATA		CCW		ES		ED	
DATE	CUMULATIVE CDF INCREASE	TRA Hrs Unav.(30)	TRB Hrs Unav.(30)	TRA Hrs Unav.(18)	TRB Hrs Unav.(18)	TRA Hrs Unav.(24)	TRB Hrs Unav.(24)
7/93		0	5	2	3	0	0
8/93							
9/93							
10/93							
11/93							
12/93							
1/94							
2/94							
3/94							
4/94							
5/94							
6/94							
7/94							
8/94							
9/94							

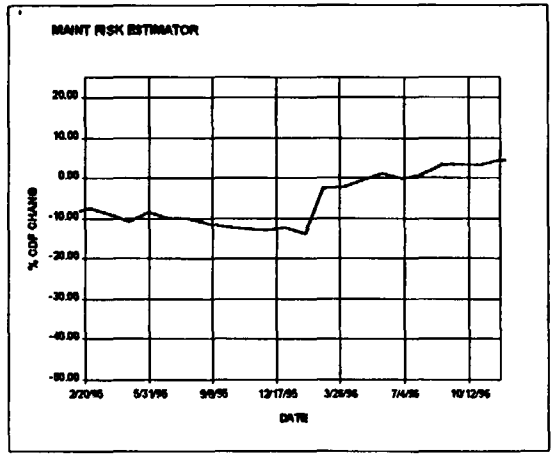
TEST AND MAINTENANCE UNAVAILABILITY HISTORY IS ENTERED EACH MONTH

CUMULATIVE RISK ESTIMATOR - High Impacts

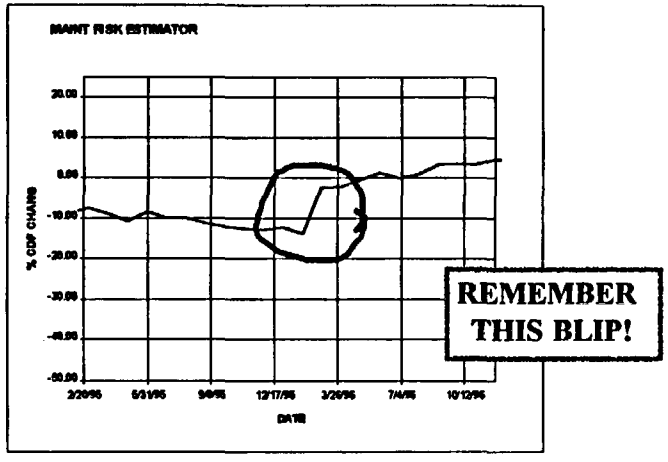
18 MONTH DATA		CCW		ES		ED	
DATE	CUMULATIVE CDF INCREASE	TR A Hrs Unav.(30)	TR B Hrs Unav.(30)	TR A Hrs Unav.(18)	TR B Hrs Unav.(18)	TR A Hrs Unav.(24)	TR B Hrs Unav.(24)
7/93	2%	0	5	2	3	0	0
8/93							
9/93							
10/93							
11/93							
12/93							
1/94							
2/94							
3/94							
4/94							
5/94							
6/94							
7/94							
8/94							
9/94							

A CUMULATIVE CDF CHANGE IS APPROXIMATED TO REFLECT THE CHANGE IN RISK, BASED ON THE PREVIOUS 18 MONTHS OF UNAVAILABILITY.

CHANGE IN RISK VERSUS TIME



CHANGE IN RISK VERSUS TIME



DOES IT WORK? REAL EXAMPLE

- RHR HEAT EXCHANGERS WORKED ONLINE WITH PRIOR NRC APPROVAL, EARLY IN 1996
- MODERATE RISK LEVEL PER MATRIX
  - ASSOC. MGR OPS INVOLVEMENT
  - HEIGHTENED AWARENESS
  - EXTENSIVE SCHEDULING AND PRE-PLANNING
- WORK THAT COULD HAVE EFFECTED OFFSITE POWER WAS INTERCEPTED, AND RE-SCHEDULED BY OPS DUE TO THE MATRIX.
- REMEMBER THE "BLIP" ON THE "TRACKER" PROGRAM.
- THESE TOOLS WORK TOGETHER TO PROVIDE EFFECTIVE RISK MANAGEMENT..

QUESTIONS??

THE END

Use Defense In Depth Plus PRA Insights to build a "System To Function" Matrix.

REVIEW [illegible] BY: _____ ANY IMPACT:YES/NO

RISK [illegible]

SAFETY FUNCTION MATRIX

MODE 1 - 4

DEFENSE IN DEPTH + PRA

	CHECK BOX IF IMPACTED	ESF VITAL AC POWER (7.2KV or 480V) ES	SERVICE WATER (TRAIN OOS UNLESS NOTED) SW	COMPONENT COOLING (TRAIN OOS UNLESS NOTED) CC	SSPS/ESFLS (EXCLUDES ROUTINE TESTING) SG	VITAL INSTR POWER (5901-5904) IV	VITAL DC POWER ED	CVCS (ECCS OR EMERG) CS	SAFETY INJECTION SI	RHR RH	RHRST RW	ROD CONTROL SYSTEM CR	EFW EF	CST CO	MAIN STEAM SUPPLY MS	PORVs (2/3 REQUIRED) RC	SUBSTATION (1E TO G) TS	INSTRUMENT AIR (2/4 COMPRESSORS O) IA	RB SPRAY SP	RBCUs AH	SEVERE WEATHER EXP	SWITCH YARD WORK	PLANT EVOLUTION/CR	OTHER TRIP HAZARDS
INITIATORS (P1)																								
LOSP		✓															✓				✓	✓		
PLANT TRIP																		✓					✓	✓
TOTAL LOSS OF SW		✓	✓																					
TOTAL LOSS OF CC		✓	✓	✓																				
MITIGATION (P2)																								
SUBCRITICALITY																								
RPS/ROD CONTROL					✓	✓	✓					✓												
EMERG BORATION		✓	✓	✓				✓																
CORE COOLING																								
HPI/HPR		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													
LPI/LPR		✓	✓	✓	✓	✓	✓		✓	✓	✓													
HEAT SINK																								
MDEFW		✓			✓	✓	✓						✓	✓										
TDEFW					✓	✓	✓						✓	✓	✓									
FEED & BLEED		✓	✓	✓	✓	✓	✓	✓	✓		✓					✓		✓						
CONTAINMENT (P3)																								
CONTAINMENT																								
RBCUs		✓	✓		✓	✓	✓													✓				
RB SPRAY		✓			✓	✓	✓				✓								✓					
RISK SIGNIFICANT COMBINATIONS																								
DIESEL GENERATOR		X	"C" SW	"C" CC									TD	X	X		X	X(1)			X	X		
SERVICE WATER				"C" CC									TD	X	X		X				X	X		
COMPONENT COOLING			"C" SW					X(3)																
TDEFW		X	X														X				X	X		