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EXECUTIVE SUMMARY

Watts Bar Nuclear Plant, Unit 1
NRC Inspection Report 50-390/98-05

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 1-week period of inspection by inspectors from Region II.

Overall, the inspection team concluded that the licensee had a comprehensive Maintenance Rule program, and the program was being effectively implemented. Three violations were identified: one for inadequate scoping of structures, systems, and components (SSC) functions under the Rule; one for inadequate performance criteria; and one for inadequate monitoring under the Rule. Otherwise, the team found only minor deficiencies in program implementation, which were immediately addressed by the licensee.

Operations

- Licensed operators, in general, understood their specific duties and responsibilities for implementing the Maintenance Rule (Section O4.1).

- The understanding of licensed operators and planners of the use of the risk assessment tools for removal of equipment from service was good (Section O4.1 and M1.5).

Maintenance

- In general, SSCs were included within the scope of the Rule. A violation was identified for failure to scope the risk significant functions for three SSCs under the Rule, and for failure to scope the shutdown functions for three additional SSCs under the Rule (Section M1.1 and M1.2).

- The licensee had considered safety in establishing goals and monitoring for systems and components in a(1) status (Section M1.6).

- Industry wide operating experience was used (Section M1.6 and M1.7).

- In general, review of SSCs in a(2) status determined that performance criteria were adequately established commensurate with safety (Section M1.7).

- Monitoring of SSC performance was satisfactory. However, a violation was identified for failure to monitor unavailability properly for several risk significant SSCs (Section M1.7).

- Plans for performing (a)(3) periodic evaluations were adequate. It was noted that SPP 6.6 did not include all of the guidance in NUMARC 93-01 concerning periodic evaluations (Section M1.3).

- The System Health Reports were a positive indicator of the licensee's implementation of the self-assessment process (Section M1.7 and M7.1).

- The approach to balancing reliability and unavailability was adequate (Section M1.4).

- The structures program met the requirements of the Rule (Section M1.7).

- In general, walkdown of SSCs determined that they were being appropriately maintained. Minor deficiencies observed by the team were immediately addressed by the licensee (Section M2.1).

- Self-assessments of the Maintenance Rule program were thorough. In general, corrective actions sampled by the team were appropriately implemented. However, corrective actions for one finding concerning scoping of the shutdown functions for SSCs did not identify all deficient conditions (Section M7.1).

Engineering

- The licensee's approach to Maintenance Rule risk-ranking was adequate with only minor documentation errors. The current method of considering SSC availability and reliability specifically delineated in the probabilistic risk assessment (PRA) when establishing performance criteria was adequate. However, some of the PRA assumptions associated with SSC availability were not adequately considered. A violation was identified for failure to establish adequate performance criteria for unavailability for three risk significant SSCs. Also, the scoping of non-Mode 1 functions was not comprehensive (Section M1.2).

- Review of expert panel activities concluded that the panel was established in accordance with NUMARC guidance (Section M1.2).

- In general, the approach, under paragraph (a)(3) of the Rule, to assessing the risk-impact to maintenance activities was good. The process for ensuring critical safety functions were available during planned outages was good. There were weaknesses in the on-line maintenance risk assessment tools. Most of the weaknesses identified were immediately rectified (Section M1.5).

- In general, systems engineers' technical knowledge of their systems and the requirements of the Maintenance Rule was good (Section E4.1).

Report Details

Summary of Plant Status

Unit 1 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). The inspection was performed by a team of inspectors that included a team leader and four Region II based inspectors. An operations engineer from NRR observed the process to ensure inspection uniformity. Three residents from Region II participated primarily for training purposes. The licensee provided an overview presentation of their program to the team on the first day of the inspection. The overview handout is included as an attachment to this report.

I. OPERATIONS

04 Operator Knowledge and Performance

04.1 Operator Knowledge of Maintenance Rule

a. Inspection Scope (62706)

During the onsite portion of the inspection, the team interviewed two senior reactor operators involved in onshift work coordination duties. The purpose of the interviews was 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

The duties and responsibilities of the personnel interviewed were defined in SPP-7.1. These duties centered upon complying with the equipment risk matrix, reducing the duration of unanalyzed out of service equipment configurations, and contacting applicable support personnel when unanalyzed or risk significant situations were encountered. Personnel interviewed generally understood the purpose of the Maintenance Rule and their duties for Maintenance Rule implementation.

c. Conclusions

Licensed operators, in general, understood their specific duties and responsibilities for implementing the Maintenance Rule. Licensed operators' understanding of the use of the risk assessment tools for removal of equipment from service was good.

II. MAINTENANCE

M1 Conduct of Maintenance

M1.1 Scope of SSCs Included Within the Rule

a. Inspection Scope (62706)

Prior to the onsite inspection, the team reviewed the updated final safety analysis report (UFSAR), licensee event reports, the emergency operating procedures (EOPs), previous NRC inspection reports, and other information provided by the licensee. The team selected an independent sample of SSCs that the team believed should be included within the scope of the Rule, but 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 SSCs that should be included in the scope of the Rule in accordance with 10 CFR 50.65 (b).

b. Observations and Findings

The licensee appointed an expert panel to perform several Maintenance Rule implementation functions including establishing the scope of the Maintenance Rule. The panel reviewed 220 systems and structures of which 154 were determined to be in the scope of the Rule.

The team reviewed the licensee's Maintenance Rule data base in an effort to verify that all required SSCs were included within the scope of the Maintenance Rule. The team's review was performed to assure the scoping process included:

- All safety-related SSCs that are relied upon to remain functional during and following design basis events and ensure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, and the capability to prevent or mitigate the consequences of

accidents that could result in potential offsite exposure comparable to the 10 CFR Part 100 guidelines

- Non-safety SSCs that are relied upon to mitigate accidents or transients

- Non-safety SSCs which are used in the plant EOPs

- Non-safety SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function

- Non-safety SSCs whose failure could cause a reactor trip or actuation of a safety-related system.

The following Maintenance Rule scoping issues were identified by the team during the inspection:

- The licensee's methodology for scoping SSCs did not consider the non-safety related, EOP functions of SSCs classified as safety related. The licensee scoped, risk ranked, and established performance criteria for the safety related function of SSCs classified as safety related. However, the performance criteria for safety related SSCs sampled by the team did not encompass the non-safety related, risk significant functions of those SSCs:

  TI-119 delineated which SSCs were risk significant and which functions associated with these SSCs were risk significant. The team identified that the functions of providing main feedwater recovery following a trip or transient, and aligning emergency raw cooling water (ERCW) cooling to centrifugal charging pump 1A-A (a backup cooling method to the component cooling system) were not included as risk significant functions under the applicable SSC in TI-119. Both functions met two (risk reduction worth (RRW) and percent of core damage frequency (CDF) contribution) of the three risk significant importance measures. The main feedwater system had been scoped non-risk significant as a trip initiator with plant level performance criteria established. This performance criteria would not appropriately identify reliability or availability problems with the standby feedwater sub-system, which was the major failure contributor in the fault tree for feedwater recovery in the PRA model. ERCW and centrifugal charging were scoped within the Maintenance Rule with reliability and availability performance criteria. However, this performance

criteria was not considered applicable to the backup ERCW cooling to the 1A-A centrifugal charging pump. Also, there was no preventive maintenance or monitoring program ensuring ERCW cooling to the centrifugal charging pump could be accomplished. Upon identification by the team, the licensee stated that some form of verification of function would be incorporated into the augmented inservice testing program for this line. Due to the team's questions, on May 21, 1998, the expert panel specifically considered these functions for inclusion within the scope of the Maintenance Rule. The expert panel concluded that these functions were outside the scope of the Rule, since they were non-safety related, EOP actions being performed by safety related systems versus non-safety related, EOP actions being performed by non-safety related systems. This conclusion was not in accordance with 10 CFR 50.65.

- The demineralized water system had been scoped within the Maintenance Rule as a reactor trip initiator with plant level performance criteria. The function of providing makeup to the condensate storage tank (CST) was not scoped. Due to the team's questions, the expert panel reviewed this issue in a meeting on May 21, 1998. The expert panel dispositioned this function as not within Maintenance Rule scope because the SSC was not classified as a "significant contributor" to an EOP function in a prior review performed by an operations representative on the expert panel (as noted in the expert panel meeting minutes dated May 21, 1998). The rational for the "not a significant contributor" was that if power was available to this system, there would be multiple other methods to provide makeup to the CST.

  The two CST makeup methods prescribed by the EOPs, using the demineralized water system and the defacto method (eliminating the CST as a suction source of auxiliary feedwater (AFW) suction swapover to the ERCW system), were modeled in the PRA model consistent with their use in the EOPs. The ERCW, as a suction source, was modeled in the PRA as part of the three top events of the AFW system. Whereas, the demineralized water system make up to the CST was modeled in the mechanical support system event tree as a top event.

  Within the PRA model the demineralized water makeup to the CST function was risk significant due to the percent CDF contribution importance measure. This function was present in #84 and #92 of

the top 100 core damage sequences. NUMARC 93-01 allows SSCs to be scoped out of the Rule based on the SSC not providing a significant contribution to mitigate the consequences of an accident. Filling of the CST using the demineralized water system does not qualify under this exception.

- The licensee had not properly scoped SSCs for non-Mode 1 conditions. This was indicated by not including functions and performance criteria for pressurizer level as applicable to Mode 5 and 6, not including reactor pressure vessel level as applicable to Mode 5 and 6 and, not including the residual heat removal suction relief valves, as part of the reactor coolant system over pressure protection for Modes 4, 5 and 6. Also, the team questioned whether steam generator level indication should be classified as risk significant in Modes 4 and 5. The licensee initiated problem evaluation report WBPER980600 on this matter.

The expert panel's exclusion of risk significant functions from the scope of the Maintenance Rule, and failure to properly scope SSCs for non-mode 1 conditions were identified as two examples of Violation 50-390/98-05-01, Failure to Include all SSCs Within the Scope of the Maintenance Rule.

c. Conclusions

In general, required SSCs were included within the scope of the Rule. A Violation was identified for failure to scope the risk significant functions for three SSCs under the Rule, and for failure to scope the shutdown functions for three additional SSCs under the Rule.

M1.2 Safety or Risk Determination

a. Inspection Scope (62706)

Paragraph (a)(1) of the Maintenance Rule requires that performance monitoring and goals be commensurate with safety. Implementation of the Maintenance Rule using the guidance contained in NUMARC 93-01 requires that safety be taken into account when setting performance criteria and monitoring under (a)(2) of the Maintenance Rule. This safety consideration would then be used to determine if SSC functions are monitored at the train, system, or plant level. Also NUMARC 93-01 recommends that risk-significant SSC performance criteria be set to assure that the availability and reliability assumptions used in the

risk-determining analysis (i.e., PRA) are maintained. The team reviewed the licensee's methods for incorporating PRA insights into the decisions used to determine SSC risk significance and performance criteria. The team reviewed the licensee's administrative document designating the risk significant SSCs and their associated functions on a sampling basis to determine whether risk significant functions indicated by the PRA model were delineated as such in the administrative document. On a sampling basis the team reviewed whether shutdown functions had been incorporated into SSC performance criteria.

b. Observations and Findings

b.1 Risk-ranking

The licensee used quantitative importance measures (risk achievement worth (RAW), RRW, and percent contribution to CDF) derived from a Level 1 PRA model for determining which SSCs would be considered risk significant. The threshold for these importance measures was consistent with NUMARC 93-01. The risk ranking was performed using the base case PRA model, and with the Maintenance Rule performance criteria substituted for select basic events. Both results were used in considering the risk ranking. Truncation limits were imposed on the PRA model used to ascertain the importance measures in order to limit the size and complexity of the results to a manageable level. The truncation levels were acceptable. The PRA model used was from Pickard, Lowe and Garrick entitled RISKMAN, and was incorporated in Revision 2 of the Individual Plant Examination (IPE). The baseline CDF was 4.4E-5.

TI-119 delineated which SSCs were risk significant and which functions associated with those SSCs were risk significant. In TI-119 three SSCs - 480 VAC shutdown board room 2B ventilation, 480 VAC transformer room ventilation and emergency boration were downgraded to non-risk significant with adequate justification from the expert panel prior to the team's arrival on site. However, TI-119 indicated that the anticipated transient without scram mitigation system actuation circuitry (AMSAC) was non-risk significant. One of the importance measures, percent CDF contribution, indicated AMSAC was risk significant. No expert panel meeting minutes could be located specifically addressing the basis for downgrading AMSAC. After questioning by the team, the expert panel adequately documented their decision in a meeting on May 21, 1998. In addition, one of the risk significant functions associated with the containment spray system was not listed in attachment 18 of TI-119. The function was to provide

makeup to the refueling water storage tank from the containment sump via the test line. The licensee subsequently added the function to the applicable attachment in a revision to TI-119 prior to the team's exit.

b.2 Performance Criteria

During the inspection the team noted that the licensee employed liberal use of unplanned capacity loss (UCL) events as a surrogate for unavailability performance criteria for risk significant SSCs. A UCL event is defined by the licensee as a 20 percent reduction in power. The team questioned this practice, which resulted in the identification of several instances where this practice could lead to failure to capture unavailability for these SSCs. The specifics were as follows:

- The licensee had established an unavailability performance criterion of ≤ 1 UCL event in a twenty four month rolling period for the atmospheric dump valves, the passive cold leg accumulators, and the 120VAC vital power. Review of technical specifications (TS) and other system technical data determined that excessive amounts of unavailability could be accumulated for these SSCs without the initiation of a UCL event.

- The expert panel had designated ≤ 2 function failures in a 24 month rolling period for the main feedwater isolation function. Interview results indicated that the expert panel based their decision on what Sequoyah used. However, Watts Bar had not experienced any isolation problems. Also, the PRA model always assumed that this function would be accomplished and that the sensitivity analysis associated with reliability could not be adjusted to accommodate for this performance criteria.

After questioning by the team, the expert panel reconsidered the use of ≤ 1 UCLs for SSCs, and modified the performance criteria for the SSCs discussed above along with a number of other SSCs. Also, the functional failure performance criteria for the main feedwater isolation function was changed to ≤ 1. The decisions were documented in expert panel meeting minutes of May 21, 1998. TI-119 was revised with the new performance criteria prior to the team's exit. These examples of inadequate performance criteria are identified as Violation 50-390/98-05-02, Failure to Establish Adequate Performance Criteria for SSCs Under the Maintenance Rule.

In some instances the performance criteria selected by the expert panel for reliability and availability for risk-significant SSCs was less conservative than was used in the base case of the PRA risk ranking model. The licensee performed sensitivity studies by modifying applicable basic event probabilities with the proposed performance criteria via a Bayesian update. The sensitivity analysis for availability resulted in a CDF increase to 4.82E-5 or about an 8% increase. The reliability sensitivity analysis resulted in a CDF increase to 6.17E-5 or about a 39% increase. A very conservative composite reliability and availability sensitivity analysis resulted in a CDF increase to 6.8E-5 or about a 55% increase. Based on this analysis the team concluded that the performance criteria was established commensurate with safety.

The team's review of the scoping of SSCs for shutdown conditions identified several deficiencies in that area. A detailed discussion of these deficiencies is provided in Section M1.1 of this report.

b.3 Expert Panel

The team reviewed the licensee's expert panel charter delineated in SPP 6.6. The panel had been established consistent 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 panel.

c. Conclusions

The licensee's approach to Maintenance Rule risk-ranking was adequate with only minor documentation errors. The current method of considering SSC availability and reliability specifically delineated in the PRA when establishing performance criteria was adequate. However, some of the PRA assumptions associated with SSC availability were not adequately considered. A violation was identified for failure to establish adequate performance criteria for unavailability for three risk significant SSCs. Also, the scoping of non-Mode 1 functions was not comprehensive. Review of expert panel activities concluded that the panel was established in accordance with NUMARC guidance.

M1.3 Periodic Assessment

a. Inspection Scope (62706)

Paragraph (a)(3) of the Rule requires that performance and condition monitoring activities and associated goals and preventive maintenance activities be evaluated taking into account, where practical, industry-wide operating experience. This assessment is required to be performed at least one time during each refueling cycle, not to exceed 24 months between evaluations. The team reviewed the procedure the licensee had established to ensure this assessment would be completed as required. In addition, the team discussed the requirements with the Maintenance Rule coordinator who is responsible for this activity.

b. Observations and Findings

The licensee has not yet performed a periodic assessment. They plan to issue the assessment before July 10, 1998. Procedurally, the periodic assessment was addressed in licensee Procedure SPP-6.6. The team noted that SPP 6.6 did not address all the guidance in NUMARC 93-01 concerning periodic assessment.

c. Conclusions

Plans for performing (a)(3) periodic evaluations were adequate. It was noted that SPP 6.6 did not include all of the guidance in NUMARC 93-01 concerning periodic evaluations.

M1.4 Balancing Reliability and Unavailability

a. Inspection Scope (62706)

Paragraph a(3) of the Rule requires that adjustments be made where necessary to assure that the objective of preventing failures through the performance of preventive maintenance is appropriately balanced against the objective of minimizing unavailability due to monitoring or preventive maintenance. The team met with the Maintenance Rule coordinator, system engineers, and representatives 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 guidance and requirements for balancing reliability and unavailability were discussed in the licensee's procedures SPP-6.6 and TI-119.

The team reviewed the licensee's process for balancing a function's reliability and unavailability. The system engineers were required to perform a balancing reviews on a monthly basis, and during the periodic evaluation. The licensee's approach consisted of monitoring SSC performance against the established SSC performance criteria. The process considered a function balanced if the performance criteria were met. This method is in accordance with the guidance in NUMARC 93-01.

c. Conclusions

The approach to balancing reliability and unavailability was adequate.

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

a. Inspection Scope (62706)

Paragraph (a)(3) of the Maintenance Rule states that the total impact on plant safety 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 on-line maintenance process with a work week manager in the planning department. The team reviewed the licensee's administrative procedure for outage management and discussed the utilization of the Outage Risk Assessment Management computer program with a knowledgeable individual within the outage planning organization.

b. Observations and Findings

The procedures applicable to on-line maintenance were SPP-7.1 and TI-124. The licensee performed on-line maintenance on a 12 week rolling schedule. The SSCs included within a work week for consideration for removal from service were evaluated within the level 1 PRA model to determine the increased risk. The weeks were normalized so as to reduce

the anticipated risk for any work week by re-arranging the SSCs available for out of service consideration. Given the SSCs that were out of service, a risk ranking was assigned as:

High - Red = CDF ≥ 3E-4
Medium - Orange = 5E-5 ≥ CDF≤ 3E-4
Low - Yellow = CDF≤ 5E-5

SSCs associated with mitigating the consequences of a radiological release which were not contained within a level 1 PRA were incorporated into the matrix through expert panel determinations. Select equipment out of service combinations were assigned medium or low risk rankings. Depending upon the risk ranking, increasing levels of management involvement and approval were necessary.

The risk ranking for certain out of service equipment conditions could be derived from a matrix contained in TI-124. The matrix contained guidance to contact the PRA engineering group if an unanalyzed risk condition occurred. The matrix had been incorporated into a computerized software package entitled Sentinel. Sentinel also incorporated TS requirements, the radiological release SSC considerations, and the results of previous evaluations of unanalyzed conditions. Sentinel was used by the work week manager to ensure the TI-124 matrix was met. Sentinel determined what work went to a particular SSC through functional equipment groups (FEGs), which were groupings of individual components by tagging boundary. A FEG was assigned to any corrective or preventive maintenance activity which would then be evaluated by Sentinel as to whether it belonged in that particular work week. A limitation of this process was the inability to tie scaffolding work to a particular FEG Consequently, the assembly or dis-assembly of scaffolding over a Maintenance Rule SSC could not be highlighted to the work week manager by Sentinel.

There were weaknesses associated with the matrix. These included not considering the availability of the standby feedwater pump, when taking the turbine driven AFW pump out of service; not considering the availability of the ERCW backup centrifugal charging pump 1A-A cooling, when taking centrifugal charging pump 1B-B out of service, and not identifying 120 VAC vital instrument power as not to be removed from service, due to its high risk significance. The matrix did not identify the doors assumed closed in the internal flooding analysis. The licensee revised the matrix rectifying these weaknesses prior to the exit.

The 12 week rolling schedule included consideration for surveillance testing except for quarterly ERCW pump testing. The risk ramifications of this testing had not been quantified and other work activities were permitted to be done while the testing was in progress. This was a weakness in the on-line maintenance risk assessment process.

The licensee implemented a different process for shutdown conditions which was based upon NUMARC 91-06. This approach considered the need to maintain critical safety functions such as reactivity control, electrical power, inventory control, containment integrity, and decay heat removal. The licensee used a computerized software package entitled Outage Risk Assessment Management to ascertain whether these critical safety functions were intact, degraded, or unavailable due to maintenance activities. This allowed outage planners to reschedule maintenance activities ensuring the availability of the critical safety functions. The licensee implemented these requirements via SPP-7.2.

c. Conclusions

Licensed operators' and planners' understanding of the use of the risk assessment tools for removal of equipment from service was good. In general, the approach, under paragraph (a)(3) of the Rule, to assessing the risk-impact to maintenance activities was good. The process for ensuring critical safety functions were available during planned outages was good. There were weaknesses in the on-line maintenance risk assessment tools. Most of the weaknesses identified were immediately rectified.

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

a. Inspection Scope (62706)

Paragraph (a)(1) of the Rule requires, 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 requires goals to be established commensurate with safety and industry-wide operating experience be taken into account, where practical. Also, when the performance or condition of the SSC does not meet established goals, appropriate corrective action shall be taken.

The team reviewed the systems and components listed below for 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 evaluated the use of industry-wide operating experience, monitoring of SSCs against goals, and corrective action taken when SSCs failed to meet goal(s), or when a SSC experienced a maintenance preventable functional failure (MPFF).

The team reviewed program documents and records for the systems or components the licensee had placed in the (a)(1) category in order to evaluate this area. The team also discussed the program with the Maintenance Rule coordinator, system engineers, and other licensee personnel.

b. Observations and Findings

b.1 Air Conditioning Chilled Water

On November 3, 1996, Shutdown Board Room Chiller 0-CHR-31-0049/2-B ("B" train) tripped during startup. Oil had migrated from the oil reservoir to the evaporator. The chiller tripped due to low oil pressure due to low level in the oil reservoir. The licensee started Shutdown Board Room Chiller 0-CHR-31-0036/2-A ("A" train) chiller and repaired the "B" train chiller. On November 21, 1996, the "A" train chiller tripped during startup. The chiller tripped due to low oil pressure, due to a dirty oil filter. The licensee started the "B" train chiller and replaced the oil filter on the "A" train chiller. On February 7, 1997, the "A" train chiller failed to start, due to pitted contacts on the 3SBB relay. The licensee started the "B" train chiller and repaired the "A" train chiller. On February 8, 1997, the "A" train chiller tripped during startup due to temperature control valve 1-TCV-067-0158-A failing to open. The licensee started the "B" train chiller and repaired 1-TCV-067-0158-A. On July 27, 1997, the "A" train chiller failed during startup, due to incorrect spring tension on the contact fingers for 3SBB relay. On September 9, 1997 the "B" train chiller tripped during startup, due to low oil pressure due to a dirty oil filter. The licensee started the "A" train chiller and replaced the "B" train oil filter. On January 15, 1998, the "A" train chiller tripped during startup due to low oil pressure due to a dirty oil filter. The licensee started the "B" train chiller and replaced the "A" train oil filter. On March 30, 1998, the "A" train chiller tripped during operation, due to 1-TCV-067-0158-A failing to modulate flow properly.

On March 23, 1998, the licensee realized that the "A" train chiller had experienced four functional failures and the "B" chiller had experienced two functional failures, all in the past 17 months, therefore both chiller trains had exceeded the performance criteria of one functional failure in 24 months. Subsequently the licensee identified two additional functional failures of the "A" train chiller. The licensee issued PER WBPER980333, to address the equipment failures, and PER WBPER980289 to address timeliness of identification and evaluation of exceeding the functional failure performance criteria. By May 6, 1998, the licensee had declared both the "A" and "B" train shutdown board room chillers (a)(1) and established goals and monitoring for returning the chillers to (a)(2).

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 1996 to the beginning of the inspection. No additional failures were identified by this review.

b.2 Radiation Monitoring

The radiation monitoring system had been classified as (a)(1) on May 24, 1996, due to inadequate data. Watts Bar had only recently completed initial startup and operational data was considered insufficient. Additionally, the licensee had been unable to utilize the data for the radiation monitoring system at Sequoyah because of differences in the two sites. The system was reclassified as (a)(2) on June 12, 1997 after the required data was obtained and reviewed. At that time the licensee determined that the established performance criteria had been satisfied for the review period with the exception of three radiation monitors. Those radiation monitors (0-LPR-090-101, Auxiliary Building Vent Monitor; 1-LPR-090-404, Condenser Vacuum Exhaust Monitor; and 1-LPR-090-400, Shield Building Stack Monitor) remained classified as (a)(1) due to excessive problems with reliability. The remaining portions of the system had not experienced reliability problems and were classified as (a)(2). The team verified that the licensee had implemented goal setting and monitoring as required by paragraph (a)(1) of the Rule for the radiation monitoring system.

c. Conclusions

The licensee had considered safety in establishing goals and monitoring for systems and components in a(1) status. Industry wide operating experience was used.

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

a. Inspection Scope (62706)

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

The team reviewed selected SCCs listed below for which the licensee had established performance criteria and was trending performance to verify that appropriate preventative maintenance was being performed, such that the SSCs remain capable of performing their intended function. The team evaluated the use of industry-wide operating experience, trending of SSCs against performance criteria, and corrective action 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 Maintenance Rule coordinator, system engineers, maintenance supervisors, and other licensee personnel. In addition, the team reviewed specific program areas based on review of operator logs and equipment out of service logs.

b. Observations and Findings

b.1 Structures

The licensee completed comprehensive structural walkdown inspections in the process of turning over SSCs from modification status to operations status just prior to plant licensing in November 1995. The licensee considered those walkdown inspections to constitute their first structural inspection. Subsequently, the licensee scheduled 30 walkdown inspection segments to cover all structures scoped under the Rule, to be conducted over a five year period. To date, the licensee had completed

seven of the 30 segments. They are in the process of inspecting four, with the remaining 19 scheduled to be completed by July 2000.

The team reviewed Procedure TI-119 to evaluate the adequacy of the acceptance criteria and performance criteria for evaluation of concrete and structural steel.

The team conducted a walkdown inspection of the following structures in order to observe the condition of the concrete and steel structures: reactor shield building exterior and roof, reactor auxiliary building roof and 676 and 692 elevations, control building roof, intake pumping station, refueling water storage tank, turbine building roof, Unit 1 cooling tower, and the primary water storage tank. The team inspected the intake channel slopes for settlement, slope stability and slope protection. The team compared their observations with calculation WCC1-1859.

b.2 Generator Cooling

Review of the generator cooling system determined that appropriate performance criteria had been established, and monitoring was being accomplished against those criteria. Review of the problems associated with the system indicated that appropriate corrective actions had been taken for failures. Operating experience was being used in system monitoring.

b.3 Auxiliary Feedwater

The licensee had classified the AFW system, as a safety-related, standby, and risk significant system. Review of the AFW system determined that appropriate performance criteria had been established and monitoring was being accomplished against those criteria with the exception of unavailability during surveillance testing. Review of the problems associated with the system determined that appropriate corrective actions had been taken for failures. Operating experience was being used in system monitoring. Monitoring of unavailability is discussed in detail in Section M1.7.b.8 of this report.

b.4 Heater Drains and Vents

The licensee had classified the heater drains and vents system, as a non-safety related, normal operating, and non-risk significant system. A review determined that appropriate performance criteria had been

established and monitoring was being accomplished against those criteria. Review of the problems associated with this system determined 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.5 Ice Condensers

The ice condenser system was classified as a safety-related risk significant standby system. The risk significant functions included: 1) distribute steam flow through the ice bed..., 2) provide ice at the proper boron concentration..., and 3) absorb thermal energy released in the event of LOCA or HELB to limit peak pressure and temperature inside containment. The performance criteria included both reliability and unavailability. The unavailability criteria was unique in that the use of a time limit was not practical. As a result, unavailability was essentially zero, and the licensee performed condition monitoring based on TS requirements. TS required: 1) the ice bed was to remain operable, 2) the ice bed temperature was to remain below 27 degrees F, and 3) the ice bed doors were to remain operable. Therefore, the licensee determined that the performance criteria for unavailability for Mode 1 - 4 was that the ice bed remained operable, the ice bed temperature remained below 27 degrees F, and ice bed doors remained operable. The licensee performed condition monitoring by a weekly walkdown inspection of the ice condenser system to verify it met the performance criteria. The team concluded that the licensee's performance criteria for unavailability was acceptable since condition monitoring was being used.

Review of the ice condenser system determined that appropriate performance criteria had been established, and monitoring was being accomplished against those criteria. Review of the problems associated with the system indicated that appropriate corrective actions had been taken for component failures. There were no functional failures with the ice condenser system. Operating experience was being used in system monitoring. The system's quarterly status (health) reports for the Maintenance Rule indicated the system was in good condition.

b.6 480V Transformer Yard Power

The 480V transformer yard power system was classified as a normal operating, non-safety-related, and non-risk significant system. Review of the system determined that appropriate performance criteria had been

established and monitoring was being accomplished against those criteria. Review of the problems associated with the system determined that appropriate corrective actions had been implemented. Operating experience was being used in system monitoring. No deficiencies or functional failures were noted concerning this system.

b.7 125VDC Vital Power

The 125VDC power system was classified as a normal operating, safety-related, risk significant system. The performance criteria included both reliability and unavailability. It was scoped as a portion of the total 125 VDC system. It included the batteries, chargers, and the distribution centers. Review of the 125VDC vital power system determined that appropriate performance criteria had been established, and monitoring was being accomplished against those criteria. Review of the problems associated with the system indicated that appropriate corrective action had been taken for deficiencies. There were no functional failures with the system. However, the fifth battery, "125V vital battery V", an on-line, installed spare used for testing, was not available for service due to the supporting heating ventilation and air conditioning (HVAC) system being out of service. Vital battery V is not required for service until July 1998, when the discharge surveillance tests for the other batteries (I through IV) will be performed. The licensee was in the process of implementing corrective action for the HVAC system that supports battery V. The 2ND QTR FY98 System Status (Health) Report discussed and was tracking the HVAC concern. The status report identified the system as being adequate until the HVAC is repaired for battery V. Operating experience was being used in system monitoring for the 125VDC power system. No additional concerns were noted during the review of this system.

b.8 Monitoring of Unavailability

During the review of unavailability data for the AFW system the team identified that no unavailability time had been counted for periods when the system had been removed from service for purposes of surveillance testing. The team further determined that testing of the AFW system at the train level was required and performed at quarterly intervals. The team noted that these quarterly surveillances would render the affected train under test unavailable to perform its automatic function without human action, and would require several steps to restore the systems functionality if needed. These surveillance tests included, but were not limited to the following: 1-SI-3-910, 1-SI-3-914, and 1-SI-3-915.

Additionally, on March 12, 1998 licensed operators declared the B train of ERCW and the B train of the emergency diesel generators (EDGs) inoperable to perform Surveillance Test 0-SI-67-901-B, which directed quarterly American Society of Mechanical Engineers testing of the B train ERCW pumps. As indicated on the TS/LCO tracking sheet 1-98-252, the equipment remained inoperable from 1444 to 1526, 42 minutes. On March 13, 1998, the same equipment was declared inoperable to perform Surveillance Test 0-SI-67-902-B on a different ERCW pump in the B train. As indicated on TS/LCO tracking sheet 1-98-256, the equipment remained inoperable from 1444 to 1524, 40 minutes. The team verified through interview with the applicable system engineer that neither the 42 or 40 minutes were logged against the ERCW train as unavailable for Maintenance Rule monitoring.

Further investigation determined that the licensee's program failed to count periods of unavailability for risk significant systems, while SSCs were removed from service for functional surveillance testing if an operator was available and procedure guidance was provided for restoration (reference SSP-6.6, Section 3.5.1.C). Discussion with the licensee concerning this issue resulted in the identification of over twenty additional cases where surveillance testing unavailability was not counted against the applicable SSC.

As stated in NUMARC 93-01 to the maximum extent possible, both availability and reliability should be used to provide the maximum assurance that performance is being monitored. The definitions as found in Appendix B of NUMARC 93-01 are provided to promote consistent interpretation of the Maintenance Rule. The term unavailability is defined as "an SSC that is required to be available for automatic operation must be available and respond without human action." Failure to count surveillance testing unavailability is identified as Violation 50-390/98-05-03, Failure to Adequately Monitor SSCs Under the Maintenance Rule.

c. Conclusions

For (a)(2) SSCs, the team concluded that performance criteria were properly established; industry-wide operating experience was considered, where practical; appropriate trending was performed; corrective action was taken when SSCs failed to meet performance criteria or when an SSC experienced a functional failure; and operating data were being properly captured. Monitoring of SSC performance was satisfactory. However, a

violation was identified for failure to monitor unavailability properly for several risk significant SSCs. The System Health Reports were a positive indicator of the licensee's implementation of the self-assessment process. The structures program met the requirements of the Rule and the structural assessment program was ongoing.

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 the following systems and plant areas, and observed the material condition of these SSCs.

- Radiation Monitoring System
- Auxiliary Feedwater System
- Heater Drains and Vents System
- 125VDC Vital Power
- Ice Condenser
- Generator Cooling System
- Air Conditioning Chilled Water System
- Reactor Shield Building
- Reactor Auxiliary Building
- Control Building
- Intake Pumping Station
- Refueling Water Storage Tank
- Turbine Building
- Unit 1 Cooling Tower
- Primary Water Storage Tank

b. Observations and Findings

The team performed material condition walkdowns on selected portions of each system that related to the areas inspected. Housekeeping in the general areas around system and components was acceptable. Piping and components were painted, and very few indications of corrosion or water leaks were evident. The team observed the inside of selected panels and cabinets and no loose debris, damage, or degraded equipment was noted. Minor deficiencies observed by the team were immediately addressed by the licensee.

c. Conclusions

In general, walkdown of SSCs determined that they were being appropriately maintained. Minor deficiencies observed by the team were immediately addressed by the licensee.

M7 Quality Assurance in Maintenance Activities

M7.1 Licensee Self Assessment

a. Inspection Scope (62706)

The team reviewed the following assessments and audits of the licensee's implementation of the Maintenance Rule:

- "AUDIT SSA9611 - BROWNS FERRY (BFN), SEQUOYAH (SQN), AND WATTS BAR (WBN) - MAINTENANCE RULE PROGRAM" dated July 3, 1996
- Self Assessment SA-19, "MAINTENANCE RULE PROGRAM IMPLEMENTATION", September 5, 1997
- Self Assessment SA-E&M-98-013, "MAINTENANCE Rule", May 15, 1998

In addition the team reviewed selected System Health Reports.

b. Observations and Findings

Audit SSA9611, conducted September 9 - October 11, 1996, identified three findings, none relating to Watts Bar. Self Assessment SA-19, conducted June 14-18, 1997, identified two findings related to preparation of a matrix comparing Maintenance Rule performance and failure to review EOPs for proper scoping. Self Assessment SA-E&M-98-013, conducted March 9-13, 1998, identified six findings relating to: (1) outstanding scoping issues; (2) performance criteria not established for all SSCs; (3) performance criteria and monitoring inadequacies; (4) identification of failure to meet performance criteria and corrective actions were not timely; (5) failure to identify functional failures or SCRAMs; and (6) weakness in goals and monitoring for system 88 glycol valves.

During the self-assessment in March of 1998 the licensee identified that SSC shutdown condition functions had not been adequately considered. The team identified that the corrective actions to this self-assessment

finding were insufficient to identify and correct all the deficient conditions (see Sections M1.1 and M1.2 for details).

The System Health Reports were a positive indicator of the licensee's implementation of the self-assessment process.

Overall, the licensee's audits and self-assessments of the Maintenance Rule program were thorough, with appropriate corrective actions taken or planned.

c. Conclusions

Self-assessments of the Maintenance Rule program were thorough. In general, corrective actions sampled by the team were appropriately implemented. However, corrective actions for one finding concerning scoping of the shutdown functions for SSCs did not identify all deficient conditions. The System Health Reports were a positive indicator of the licensee's implementation of the self-assessment process.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) IFI 50-50-390/97-09-05: Maintenance Rule Application to Level Switch Failure. This issue had been identified during the review of a manual reactor trip, which occurred on October 19, 1997, as a result of automatic isolation of feedwater heaters, while making preparations to connect the generator to the grid. The team reviewed the licensee's evaluation of the event and concluded that the HDS level switch failures had been adequately evaluated in accordance with the Maintenance Rule. The team concluded that the licensee had adequately addressed the original concern. This item is closed.

III. ENGINEERING

E2 Engineering Support of Facilities and Equipment

E2.1 Review of 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/or 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/or 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 paragraphs M1.6 and M1.7 to assess their understanding of the Maintenance Rule and associated responsibilities.

b. Observations and Findings

System engineers were knowledgeable of their systems and proactive in corrective actions. Additionally, they understood specific requirements of the Maintenance Rule and how to apply the Rule to their systems. The fact that there existed an effective integration of assigned systems engineers in the process for implementation of the Rule was viewed as a contributing factor to the program effectiveness noted during this inspection.

c. Conclusions

In general, systems engineers' technical knowledge of their systems and the requirements of the Maintenance Rule was good.

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 at the conclusion of the inspection on May 22, 1998, and during a subsequent teleconference on June 19, 1998. The licensee acknowledged the findings presented.

The licensee took exception to proposed enforcement concerning the issue regarding failure to capture surveillance testing unavailability due to operator actions. The licensee provided the following information in support of their exception:

- The licensee recognized how NRC could interpret NUMARC 93-01 that operator actions could not be used to relieve recording of unavailability. The licensee did not view their procedure as an exception to NUMARC and should have made their interpretation clear in regulatory space.

- The purpose of monitoring unavailability is to determine effects on goals, and the licensee sets in goals in consideration of their current methodology.

- The licensee's method appears to be consistent with the industry. Use of INPO methodology has been accepted in other NRC activities.

- Watts Bar method has been reviewed and accepted by the NRC at other TVA plants. The licensee viewed that acceptance as validation of their process.

- The licensee has discussed this issue with NEI, who recognized the need to clarify guidance.

- The licensee requests this item be carried as unresolved pending industry resolution.

- The number of unavailability hours involved is small. Based on safety significance the new enforcement policy would show this issue not to result in a violation.

PARTIAL LIST OF PERSONS CONTACTED

LICENSEE:

G. Boles, Corporate Maintenance
M. Cooper, Corporate Maintenance
L. Hartley, Maintenance Rule Coordinator
D. Kehoe, Nuclear Assurance
W. Lagergren, Plant Manager
L. McCormick, Components Engineering Supervisor
P. Pace, Site Licensing Manager
R. Wiggall, System Engineering Manager

NRC:

P. Balmain, Operations Engineer, NRR
B. Bearden, Reactor Inspector, RII
H. Christensen, Reactor Projects Branch Chief, RII
R. Gibbs, Inspection Team Leader, RII
M. Giles, Resident Inspector, Catawba, RII
W. Kleinsorge, Senior Reactor Inspector, RII
B. Mallett, Deputy Director Division of Reactor Safety, RII
M. Miller, Reactor Inspector, RII
D. Rich, Resident Inspector, Watts Bar, RII
W. Rogers, Senior Reactor Analyst, RII
R. Telson, Resident Inspector, Sequoyah, RII

LIST OF INSPECTION PROCEDURES USED

IP 62002	Inspection of Structures, Passive Components, and Civil Engineering Features at Nuclear Power Plants
IP 62706	Maintenance Rule
IP 92902:	Followup - Maintenance

LIST OF ITEMS OPENED, CLOSED, OR DISCUSSED

Opened

50-390/98-05-01	VIO	Failure to Include all SSCs Within the Scope of the Maintenance Rule (Section M1.1).
50-390/98-05-02	VIO	Failure to Establish Adequate Performance Criteria for SSCs Under the Maintenance Rule (Section M1.2).
50-390/98-05-03	VIO	Failure to Adequately Monitor SSCs Under the Maintenance Rule (Section M1.7).

Closed

50-390/97-09-05	IFI	Maintenance Rule Application to Level Switch Failure (Section M8.1)

LIST OF PROCEDURES REVIEWED

"AUDIT SSA9611 - BROWNS FERRY (BFN), SEQUOYAH (SQN), AND WATTS BAR (WBN) - MAINTENANCE RULE PROGRAM" dated July 3, 1996.

Calculation WCC1-1859, "Maintenance Rule Examinations", Revision 1, dated May 15, 1998.

Department Procedure NAPD-3, "Managing the Operating Experience Program," Revision 0.

Department Procedure SEP-9.5.8, "Probabilistic Safety Assessment (PSA) Program," Revision 0.

NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants", Revision 2.

NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management", Revision 0.

Self Assessment SA-19, "MAINTENANCE RULE PROGRAM IMPLEMENTATION", September 5, 1997.

Self-Assessment SA-E&M-98-013, "MAINTENANCE Rule", May 15, 1998.

Standard Programs and Processes Procedure SPP-6.6, "Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting - 10CFR50.65," Revision 1.

Standard Programs and Processes Procedure SPP-7.1, "Work Control Process," Revision 0.

Standard Programs and Processes Procedure SPP-7.2, "Outage Management", Revision 1.

Surveillance Instruction 1-SI-90-5, "92 Day Channel Operational Test of the General Atomic Containment Purge Air Exhaust Radiation Monitor Loop 1-LPR-90-130," Revision 2.

Surveillance Instruction 1-SI-90-6, "18 Month Channel Calibration (Source Cal) of the General Atomic Containment Purge Air Exhaust Radiation Monitor Loop 1-LPR-90-130," Revision 1.

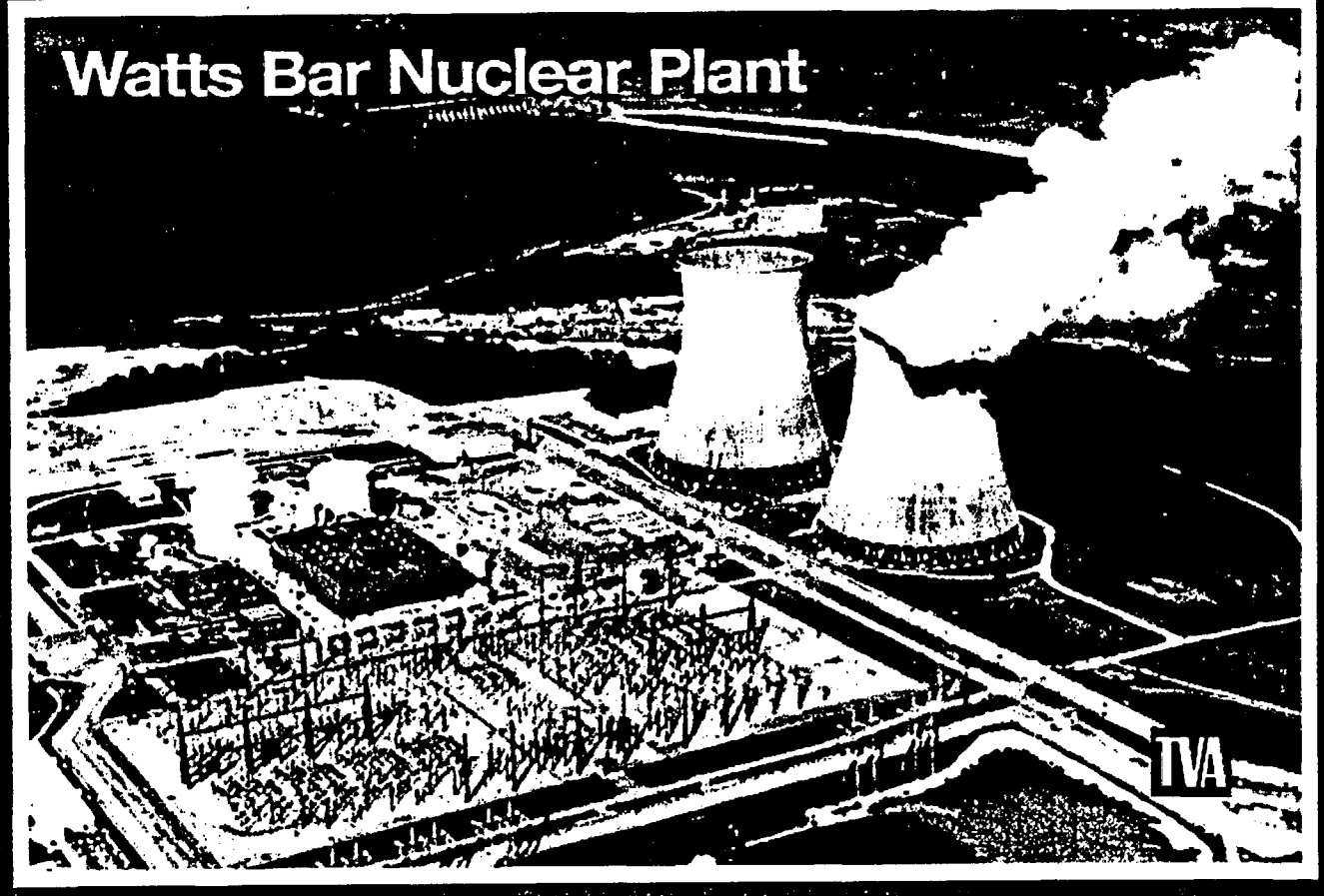
Surveillance Instruction 1-SI-3-910, "Turbine Driven Auxiliary Feedwater Pump Suction Check Valve Testing During Operation," Revision 1.

Surveillance Instruction 1-SI-3-914, "Motor Driven Auxiliary Feedwater Pump 1A-A Suction Check Valve Testing During Operation," Revision 1.

Surveillance Instruction 1-SI-3-915, "Motor Driven Auxiliary Feedwater Pump 1B-B Suction Check Valve Testing During Operation," Revision 1.

Technical Instruction TI-119, "Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting - 10CFR50.65," Revision 4.

Technical Instruction TI-124, "Equipment to Plant Risk Matrix," Revision 0.

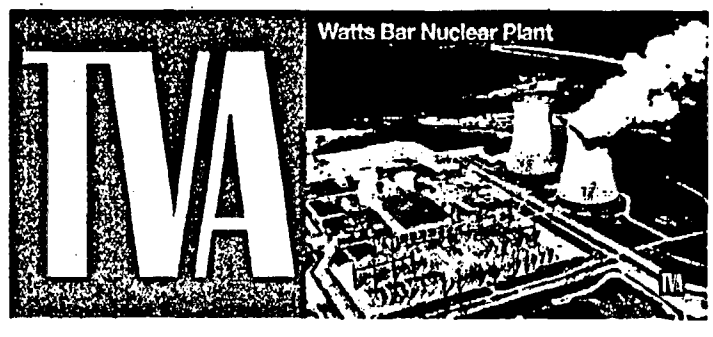


MAINTENANCE RULE PRESENTATION
MAY 18, 1998

ENCLOSURE 2

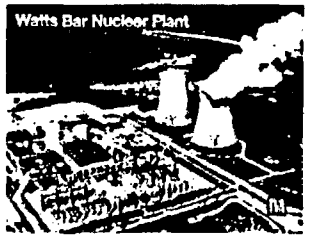
WELCOME

Rick Purcell
Site Vice President

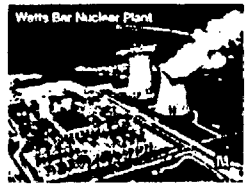


MISSION STATEMENT

To Develop an Effective Maintenance Program That Satisfies the Requirements of 10CFR50.65 Through the Integration of Appropriate Site Processes With a Focus on Improving Equipment Reliability. It Shall Be Commensurate With Safety While Reducing Overall Plant Costs.



INTRODUCTION



Richter Wiggall

Systems Engineering Manager

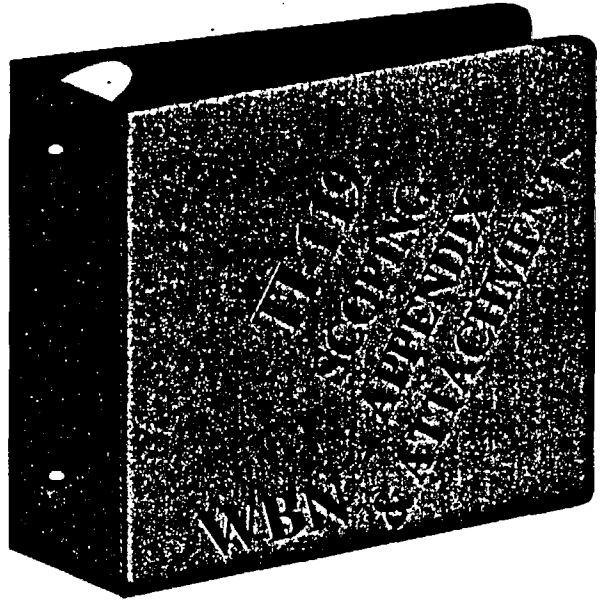
- Responsible for Maintenance Rule Program
- Chair the Expert Panel
- Directs System Engineers involvement in Maintenance Rule Program
- Previously a Member of the DELPHI Panel

AGENDA

- TVA Nuclear (TVAN) Monitoring Program Concept
- TVAN Program for on-Line Risk Management
- TVAN Implementation Process
- WBN Program Elements
- WBN Program Bases
- Expert Panel
- Performance Criteria
- 9 Point Improvement Criteria for (a)(1) Systems
- Structural Program
- Assess Impact of Maintenance on Plant Safety
- Training
- Summary

TVAN MONITORING PROGRAM CONCEPT

ONE PROCEDURE FOR ALL SITES

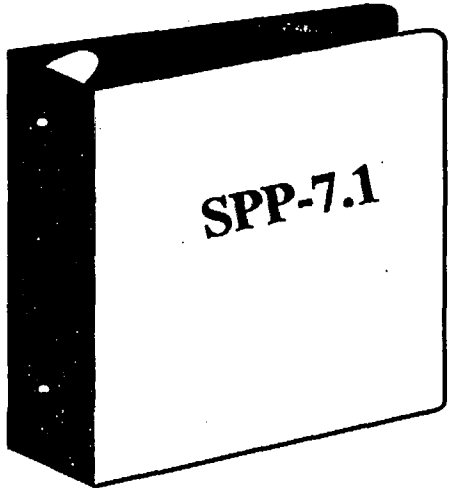


UNIQUE APPENDIX & ATTACHMENTS FOR EACH SITE

KEY ELEMENTS

- SPP-6.6
  - Incorporates NUMARC 93-01 for Program Elements & Guidance
  - Provides plant level performance criteria
  - Guidance on failure classification
  - Criteria for movement between (a)(1) and (a)(2) classifications
  - Includes Expert Panel Charter
  - Facilitated by Corporate Maintenance Rule Specialist
  - Replaced TVA Program Manual

TVAN PROGRAM FOR ON-LINE RISK MANAGEMENT



ONE PROCEDURE FOR ALL SITES

SITE SPECIFIC IMPLEMENTATION TI

KEY ELEMENTS

- SPP-7.1
  - Establishes 12 week rolling schedule based on Functional Equipment Group (FEG) work windows
  - PSA was used to align the FEGs into combinations of systems and components that may be simultaneously worked on-line
  - Requires that a risk assessment methodology be used for on-line activities before implementation of a work window
  - Risk assessment guidelines utilize the results of the site probabilistic safety analysis and are described in TI-124 'Equipment to Plant Risk Matrix'

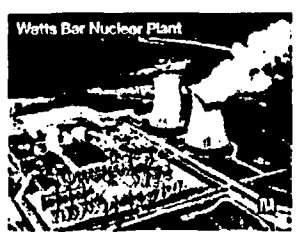
TVAN IMPLEMENTATION PROCESS

- Industry involvement

- TVAN working group (SQN, BFN, WBN, Corporate)
  - Consistency of approach to issues
  - Uniform dissemination of lessons learned
  - Process standardization
  - Participation in internal/external assessments

WBN PROGRAM ELEMENTS

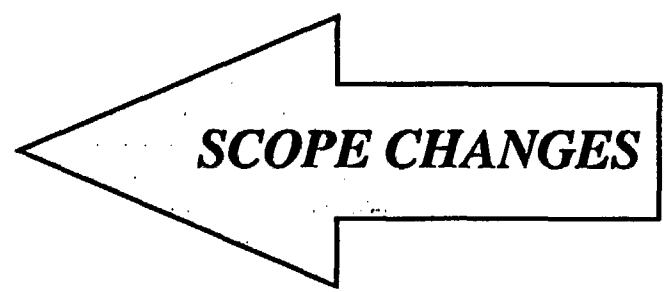
Landy McCormick
Components Engineering Manager



WBN PROGRAM ELEMENTS

10 CFR 50.65 (b) SCOPING

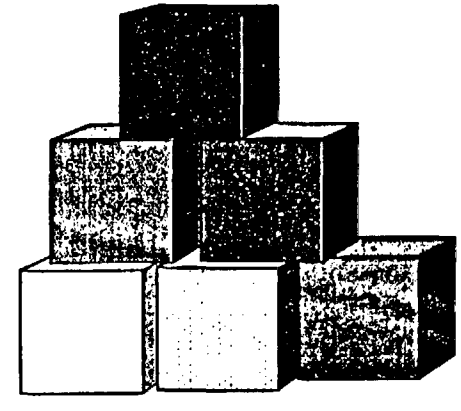
- SPP 6.6, Section 3.0
- Utilized NUMARC 93-01 Guidance
- Scoping based on 10 CFR 50.65(b) criteria provided in TI-119, Appendix B-1
- Program Is Dynamic :
  - Design Changes
  - Operating Experience
  - Plant Procedure Revisions
  - Industry Lessons Learned (Internal TVAN & external)



WBN PROGRAM ELEMENTS

RISK SIGNIFICANCE

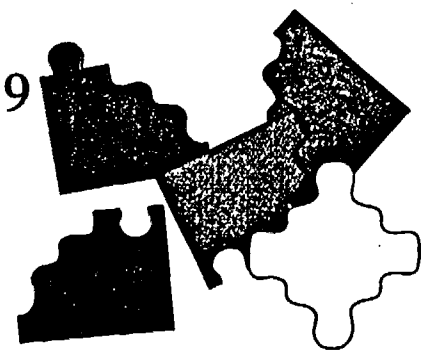
- Accomplished in accordance with NUMARC 93-01
- WBN TI-119, Appendix B-1 provides listing - primarily at system/function level
- Evaluated as the PSA Model changes over time
- Inputs for risk determination include
  - DELPHI Panel (1994)
  - PSA Levels 1 and 2
  - IPEEE
  - ORAM
  - Expert Panel



WBN PROGRAM ELEMENTS

PERFORMANCE CRITERIA

- Plant level criteria defined in SPP-6.6
  - Unplanned SCRAMS
  - Unplanned engineered safety feature (ESF) actuations
  - Unplanned capacity loss
- Specific performance criteria defined in TI-119
  - Unavailability
  - Unreliability
  - Condition

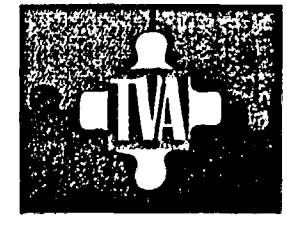


- Criteria has been adjusted as additional site specific data was accumulated
- Criteria commensurate with risk

WBN PROGRAM ELEMENTS

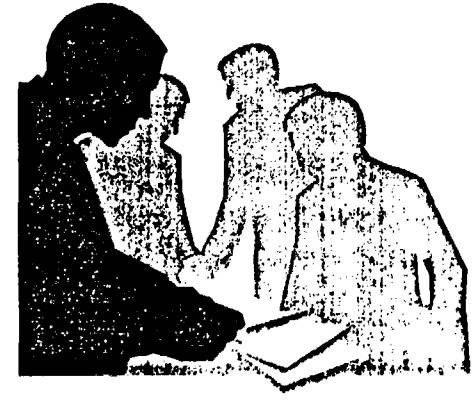
MONITORING

- Initially used special process for new plant allowed by NUMARC 93-01
  - Credit for prestart test results
  - Used approximately 6 months of site data with balance from SQN for specific monitoring
  - Initially placed SSCs in (a)(1) when sufficient basis for (a)(2) did not exist
- Subsequently WBN has transitioned to reliance on WBN's site performance data



WBN PROGRAM LESSONS LEARNED

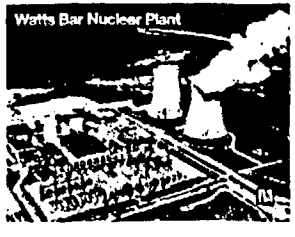
- Internal assessments
- Participated in NRC inspections at SQN & BFN
- Other industry experience



THE WATTS BAR PROGRAM

Loren Hartley

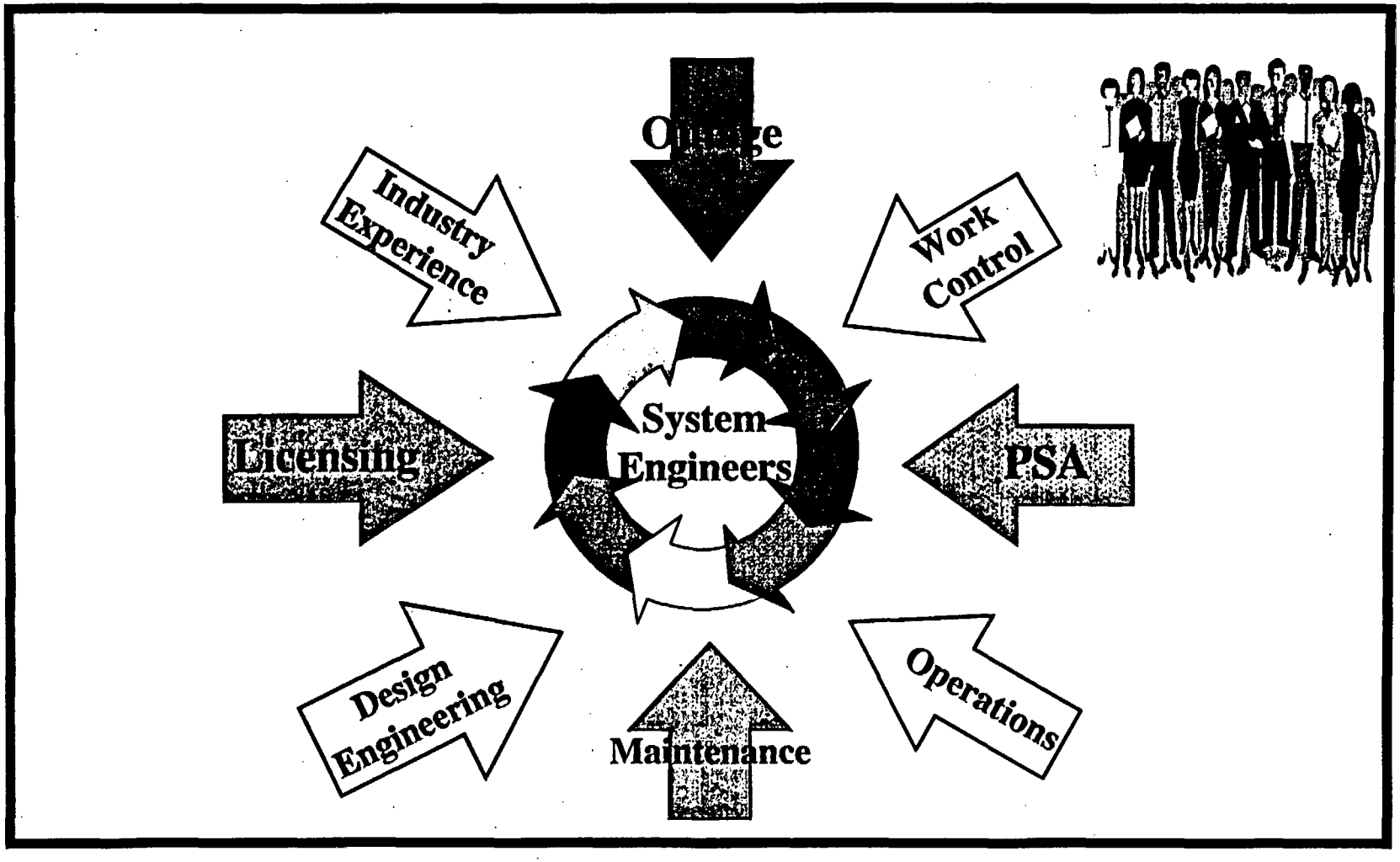
Maintenance Rule Coordinator



WBN PROGRAM BASES

- Meets 10CFR50.65 requirements
- Follows the Guidance of Regulatory Guide 1.160, Revision 2 "Maintenance Program Implementation"
- Follows the Guidance of NUMARC 93-01 (includes new plant considerations)
- Structures consistent with NEI 96-03

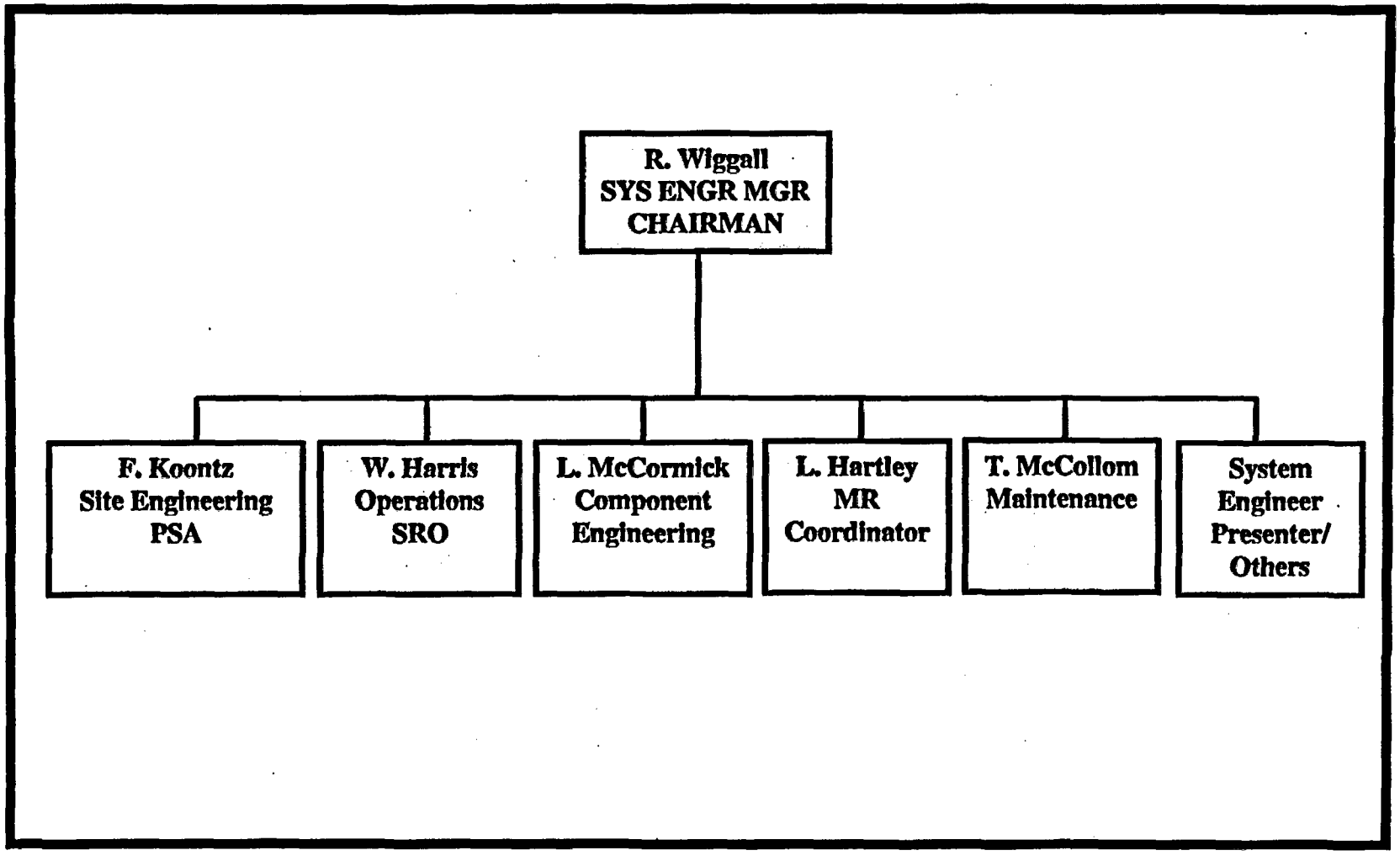
INVOLVEMENT AT WATTS BAR



RELATED PROCEDURES

- SPP-3.1 Corrective Action
- NADP-3 Operating Experience
- SSP-12.16 Emergency Operating Procedures
- SPP-7.2 Outage Management
- SSP-9.03 Design Change Control
- WBN-CI-008 Structural Walkdown
- SEP-9.5.8 PSA Program

EXPERT PANEL



EXPERT PANEL RESPONSIBILITIES

- Advise Site Senior Management Concerning SSCs Performance Relative to 50.65
- Review Changes to Scoping & Risk Significance
- Review Adequacy of Performance Criteria (As Required)
- Approve Movement of SSCs Between (a)(2) and (a)(1)
- Review Balancing Between Unavailability & Unreliability
- Review Goals Established for (a)(1) Systems
- Review Periodic Assessments

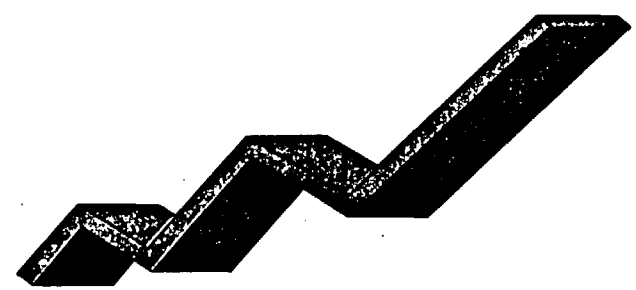
TOOLS TO IMPLEMENT 10CFR50.65

- NOMS (LCOs, Ops Logs, Hold Orders)
  - Nuclear Operations Management System
- EMPAC (Work Orders)
  - Enterprise Maintenance Planning and Control
  - Corrective Maintenance & Scheduled Maintenance and Tests
- TROI (PERs Data)
  - Tracking and Reporting of Open Items
- Plant Process Computer
- Maintenance Rule Database
- System Status (Health) Report
- WBN MR Information Line - Dial 7856
- ORAM/SENTINEL aid in risk monitoring

(a)(2) PLANT LEVEL PERFORMANCE CRITERIA

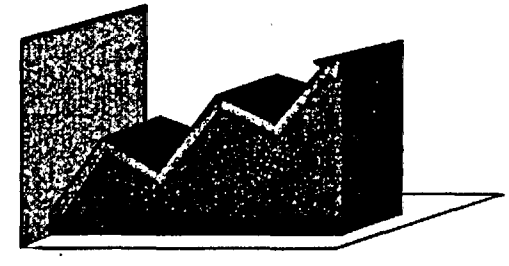
PLANT LEVEL PERFORMANCE CRITERIA

- SCRAMs - no more than 2 per system or no more than 4 total (last 24 months)
- Unplanned capacity losses (UCL) - no more than 6.0% total or no more than 3.0% or 3 UCL events per system (last 24 months)
- Unplanned engineered safety system (ESF) actuations - no more than 2 per system or no more than 4 total (last 24 months)



50.65(a)(1)

- Documented with Level A Problem Evaluation Report (PER)
  - Requires root cause analysis
  - Requires review of the cause and corrective action plan by senior management
- Current (a)(1) Systems
  - 031 Air Conditioning and Chilled Water
  - 088 Containment Isolation
  - 090 Radiation Monitoring



(a)(1) 9 POINT PERFORMANCE PLAN

- SSC function identification
- Performance monitoring criteria exceeded
- Direct cause
- Analyze balance between unavailability & reliability
- Corrective actions
- Industry experience sources
- Interim performance monitoring indicators
- Performance goals required to return to (a)(2)
- Monitoring duration while in (a)(1)

STRUCTURAL PROGRAM

- TI-119 Attachment 38
  - Scope
  - Performance criteria
  - Monitoring and trending requirements
- WBN-CI-008 Instruction for Examination of Structures for Maintenance Rule
  - Inspection guidelines and checklists
- Calculation WCG-1-1859
  - Documentation of Examinations

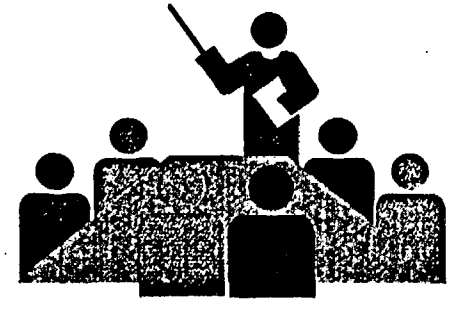
(a)(3) ASSESS IMPACT OF MAINTENANCE ON PLANT SAFETY

- Work Control SPP-7.1/TI-124
- Work week managers
- Manage pre-analyzed 12 week schedule
- Integrated with surveillance program
- Outage Management SPP-7.2
- ORAM/SENTINEL
- Risk impact is communicated through the Plan of Day (POD)

MAINTENANCE RULE TRAINING

FOCUS AREAS

- Engineering (includes systems, structural & PSA)
- Operations
- Scheduling/Work Control
- Maintenance
- Expert Panel



SUMMARY

- Program Implements 10CFR50.65 requirements
  - Includes Industry Guidance Documents
  - Active Participation in Industry Initiatives
- Developed Procedures
  - Integrated With Existing Programs
- Provided Training
- Implemented Program 7/10/96
- Active Involvement in the Lessons Learned process
- Continue with Program Enhancements as Experience Dictates