U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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EXECUTIVE SUMMARY

LaSalle County Nuclear Generating Station, Units 1 and 2
NRC Inspection Reports 50-373/98002(DRS); 50-374/98002(DRS)

This inspection included a review of the licensee's implementation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The report covers a two-day site visit, a four-day in-office inspection, and a one-week on-site inspection by regional and Office of Nuclear Reactor Regulation inspectors and a contractor from the Idaho National Engineering & Environmental Laboratory.

The team concluded that the maintenance rule program at LaSalle County Station had been implemented well.

Operations

- Operators' knowledge was consistent with their responsibilities for implementation of the maintenance rule. There was no indication that the program detracted from the operators' ability to safely operate the plant. The maintenance helped the operators monitor and limit the risk associated with taking equipment out of service. (Section 04.1)

Maintenance

- Scoping of structures, systems, and components (SSCs) and functions were considered acceptable. (Section M1.1)

- The approach to establishing the safety significance ranking for SSCs and functions within the maintenance rule scope was acceptable. The expert panel's safety determinations effectively compensated for the limitations of the probabilistic safety assessment applications. (Section M1.2)

- The procedure for performing periodic assessments met the requirements of the maintenance rule and the intent of the Nuclear Management Resource Council implementing guidance. The first periodic assessment required by the maintenance rule had not been completed at the time of the inspection. (Section M1.3)

- The process to balance availability and reliability appeared acceptable. However, due to the extended shutdown condition of the plant and numerous systems, specific operating history did not provide sufficient information to fully evaluate the extent of the process. (Section M1.4)

- Processes for assessing plant risk resulting from taking equipment out of service during at-power and shutdown conditions were well-designed but untested. (Section M1.5)

- *Performance criteria were appropriately established to measure system performance.* Established goals were acceptable and generally conservative. No examples of inappropriate performance criteria or goals were identified. (Section M1.6)

- The structure monitoring program was consistent with current industry guidance and practice. Baseline inspections were in progress but not completed. The structures inspected were in good condition. (Section M1.6)

- The industry operating experience review program was well-organized and properly linked to the maintenance rule program. System engineers were clearly using industry experience information and generally understood the need to incorporate it into the maintenance rule program. (Section M1.7)

- The maintenance rule was properly implemented for the systems the team examined and the material condition of those systems was acceptable. (Sections M2.1 and 2.2)

Quality Assurance

- During implementation of the maintenance rule program, the licensee performed audits and an assessment of maintenance rule activities. These audits and assessment provided valid findings and recommendations for areas associated with maintenance rule implementation. The recent audit of the program was extremely thorough and considered a strength. Corrective actions sampled by the team were appropriately implemented. (Section M7.1)

Engineering

- System engineers interviewed by the team were experienced and knowledgeable about their systems. System engineers were generally familiar with the maintenance rule program and were positive regarding implementation. (Section E4.1)

Report Details

Summary of Plant Status

Units 1 and 2 were both shut down prior to the inspection and remained in that condition during the inspection.

Introduction

This inspection included a review of the licensee's implementation of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The report covers a two-day site visit, a four day in-office inspection, and a one week on-site inspection by regional and Office of Nuclear Reactor Regulation inspectors, and a contractor from the Idaho National Engineering and Environmental Laboratory.

I. Operations

O4 Operator Knowledge and Performance

O4.1 Operator Knowledge of Maintenance Rule

a. Inspection Scope (62706)

During the inspection of the implementation of 10 CFR 50.65, the inspectors interviewed four operators: a senior reactor operator, an equipment operator, and an equipment attendant 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 inspectors determined that the operators had a general working knowledge of the maintenance rule and their role in its implementation. Each had received training on at least two occasions. The operators stated that their duties included the timely removal and restoration of equipment and recording the equipment out of service times.

During a recent LaSalle self-assessment, it was determined that the operators were weak in the use of the software for industry operating experience. The corrective action included a commitment to provide training for the operators just before startup.

The operators indicated that the maintenance rule was integrated with their day-to-day activities, and that the program did not impose additional administrative burdens that distracted them from their responsibility to safely operate the plant. The operators noted that the maintenance rule aided their decision-making process as to equipment that could be safely taken out of service.

c. Conclusions

Operators' knowledge was consistent with their responsibilities for implementation of the maintenance rule. There was no indication that the program detracted from the operators' ability to safely operate the plant. The program helped the operators monitor and limit the risk associated with taking equipment out of service.

II. Maintenance

M1 Conduct of Maintenance (62706)

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

a. Inspection Scope

The team reviewed scoping documentation to determine if the appropriate SSCs and functions were included within the maintenance rule program in accordance with 10 CFR 50.65(b). The team used NRC Inspection Procedure 62706, Nuclear Management Resource Council 93-01, Regulatory Guide 1.160, the LaSalle Station Final Safety Analysis Report, Emergency Operating Procedures, and other information as references. The team selected an independent sample of SSCs and functions that could have been included within the scope of the rule, but were not. The team used this sample to evaluate scoping decisions.

b. Observations and Findings

The scope of the LaSalle maintenance rule program included both safety-related and non-safety-related SSCs and functions. LAP-400-17, "Maintenance Rule," Revision 2, dated December 15, 1997, focused on SSC function rather than individual system components and required some modification of system boundaries for maintenance rule purposes. In scoping, LaSalle used an exclusionary process of considering all SSCs to be in scope unless specifically excluded by the expert panel using the formal scoping process.

The inspectors reviewed the licensee's methodology for determining whether SSCs and functions were in scope. The determination of which SSCs and functions were within the maintenance rule was performed at a system functional level. The plant was divided into various systems each with a unique identifier. Since each system performed one or more functions, the systems were divided into the functions and each system and function was evaluated by the expert panel against the scoping criteria. Both safety-related and non-safety-related systems and functions that could directly impact plant operation were evaluated.

The inspectors reviewed the listings of in-scope and non-scoped plant SSCs and functions. No SSCs or functions were identified that were improperly evaluated as not being within maintenance rule scope.

c. Conclusions

The inspectors concluded that SSCs and functions were correctly scoped into the maintenance rule program.

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

a. Inspection Scope

Paragraph (a)(1) of the maintenance rule required that goals be commensurate with safety. Implementation of the rule using the guidance contained in Nuclear Management Resource Council 93-01 also required that safety be taken into account when setting performance criteria and monitoring under (a)(2) of the rule. This safety consideration would then be used to determine if the SSCs and functions should be monitored at the plant, system, or train level. The team reviewed the methods that the licensee established for making these required safety determinations. The team also reviewed the safety determinations that were made for systems that were examined in detail during the inspection.

b.1 Observations and Findings on the Expert Panel

The team reviewed the licensee's process and procedures for establishing an expert panel and determined that the expert panel was established in accordance with the guidance provided in Nuclear Management Resources Council 93-01.

The initial expert panel determined risk significance, set performance criteria, and performed scoping of SSCs and functions but the panel was disbanded and was not reconstituted until September 1997. The present expert panel composition, their qualifications, and their experience were considered good. Panel composition included personnel from maintenance engineering, system engineering, probabilistic risk assessment, work control (scheduling) and operations. Present expert panel meeting notes were adequate; however, the team noted that no meeting notes were documented prior to October 7, 1997.

Overall, the team noted that there was good implementation of the program by the expert panel and the maintenance rule coordinator. In addition, the team noted that the maintenance rule coordinator provided good direction and leadership to both the expert panel and to the system engineers to ensure proper implementation of the maintenance rule program.

The present panel received training on and demonstrated a good understanding of the use of probabilistic risk assessment, and were familiar with Nuclear Management Resource Council 93-01. The team noted that the panel used their experience in conjunction with the probabilistic risk assessment to assess SSC and function safety significance. The panel was experienced in the review and evaluation of industry operating experience. The expert panel's responsibilities and processes were described in the station's maintenance rule procedure, LAP-400-17, and included review and approval of scoping decisions, goal-setting action plans, performance criteria selection, and the dispositions to reclassify SSCs and functions from (a)(2) to (a)(1) and (a)(1) to (a)(2). The team noted that the scoping system function boundaries were well defined. Moreover, all team members' questions regarding proper scoping of SSCs and functions, performance criteria, and risk significance were answered before the end of the inspection.

c.1 Conclusions on the Expert Panel

The expert panel was a well-balanced group of qualified, experienced personnel. The maintenance rule coordinator provided good direction and leadership to the expert panel and system engineers. The team determined that there was good implementation of the maintenance rule. The present expert panel, supported by good procedures, was considered a strength.

b.2 Observations and Findings on Risk Determinations

b.2.1 Analytical Risk Determining Methodology

Probabilistic risk assessment input to the maintenance rule is an important aspect of the licensee's overall program. During the inspection, the team reviewed the LaSalle Individual Plant Examination, Individual Plant Examination of External Events, and the update to the individual plant examination, and interviewed the corporate probabilistic risk assessment representative. Because the NRC had developed a very detailed probabilistic risk assessment of the LaSalle plant as part of the Risk Methods Integration and Evaluation Program, the licensee chose to use these models and results as its individual plant examination and individual plant examination of external events. The individual plant examination was a small event tree and large fault tree model, developed using the SETS computer code. The NRC Safety Evaluation Report of the individual plant examination submittal indicated that the individual plant examination met the intent of Generic Letter 88-20. The licensee also had updated the individual plant examination in March 1996. That update covered plant design and procedural changes up through May 1994. The update also included collection of plant specific data for the period mid 1987 through mid 1994. It was noted that the licensee planned to issue another updated individual plant examination in April 1998.

The licensee's process for establishing the safety significance of SSCs and functions within the scope of the maintenance rule was documented in station procedure LAP-400-17, Revision 2, "Maintenance Rule." This document was reviewed and found to adequately describe the process of determining safety significance. For SSCs and functions modeled in the licensee's individual plant examination, three importance measures were evaluated (core damage frequency contribution, risk achievement worth, and risk reduction worth), as recommended in Nuclear Management Resource Council 93-01. If a basic event's importance measure met one or more of the cutoff criteria, then the SSC associated with that basic event was judged to have high safety significance. The truncation level used in determining the importance measures was approximately 1E-11/year, which is low enough to ensure accurate estimates of importances.

b.2.2 Adequacy of Expert Panel Evaluations

For SSCs and functions not modeled in the individual plant examination, the expert panel used a Delphi approach, similar to that described in Nuclear Management Resource Council 93-01. This approach considered how important each SSC was with respect to four accident response functions and six normal operation functions. Results for each function were weighted and summed to obtain a single importance number. The expert panel chose a cutoff criterion of 320, based on inspection of a graph of ordered Delphi results versus SSCs and functions and a review of SSCs and functions just above and below the cutoff criterion.

The Expert Panel did not downgrade from high to low safety significance any SSCs or functions that met either the individual plant examination importance measure criteria or the Delphi criterion.

The team noted that the expert panel did not document the risk evaluations of SSCs and functions prior to October 7, 1997. Consequently, the process used in determining SSC safety significance could not be readily reconstructed. Meeting minutes after October 7, 1997, described the panel's activities and bases for decisions.

c.2 Conclusions on Risk Determinations

The licensee's approach to determining the safety significance of SSCs and functions within the scope of the maintenance rule was judged to be adequate.

M1.3 (a)(3) Periodic Evaluations

a. Inspection Scope

Paragraph (a)(3) of the maintenance rule requires that performance and condition monitoring activities, 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 procedural guidelines for these evaluations.

b. Observations and Findings

The licensee's maintenance rule procedure provided adequate guidance for preparing periodic assessments, which met the requirements of 10 CFR 50.65(a)(3) and the intent of Nuclear Management Resource Council 93-01. The licensee's procedure, LAP-400-17, "Maintenance Rule," Revision 2, required that periodic assessments be performed once per refueling cycle, not to exceed two years. The procedure required that maintenance rule assessment of activities include comparing actual performance of systems to the performance criteria and goals, evaluating the effectiveness of corrective actions and reviewing the establishment of goals for (a)(1) systems. The first periodic assessment had not been completed at the time of the inspection and will be reviewed as an Inspection Follow-up Item (IFI) (50-373/98002-01a (DRS); 50-374/98002-01a (DRS)). The licensee stated that the periodic assessment would be completed by June 10, 1998.

c. Conclusions

The procedure for performing periodic assessments met the requirements of the maintenance rule and the intent of the Nuclear Management Resource Council implementing guidance. The first periodic assessment required by the maintenance rule had not been completed at the time of the inspection.

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

a. Inspection Scope

Paragraph (a)(3) of the maintenance rule requires 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 reviewed the plans to ensure this evaluation was performed as required by the maintenance rule.

b. Observations and Findings

The licensee's procedure, LAP 400-17, provided guidelines to balance reliability and availability. The procedure directed that balancing reliability and availability consisted of monitoring SSC function performance against the established performance criteria. The procedure required that the balance be reevaluated if either criterion is exceeded. If the performance criteria were met, then the criteria were considered balanced. However, due to the extended shutdown condition of the plant, numerous systems specific operating history did not provide sufficient information to fully evaluate the extent of the process. The licensee has made some adjustments to performance criteria on a limited number of systems. A review of the balancing of reliability and availability is an IFI (50-373/98002-01b(DRS); 50-374/98002-01b(DRS)).

c. Conclusions

The process to balance availability and reliability appeared acceptable. However, due to the extended shutdown condition of the plant and numerous systems, specific operating history did not provide sufficient information to fully evaluate the extent of the process.

M1.5 (a)(3) On-line Maintenance Risk Assessments

a. Inspection Scope

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 process with a Probabilistic Safety Assessment Engineer, Scheduling Technician, Plant Outage Coordinator, and a Shift Outage Coordinator.

b. Observations and Findings

The licensee's procedure for managing the risk from equipment out of service while the plant was at power (modes 1 or 2) was documented in station procedure LAP-100-55, Revision 0. A 12-week planned schedule was used by the licensee to plan work and control risk. Each of the work windows within the 12-week schedule had been pre-analyzed using the Operational Safety Predictor computer code. Risk results were converted to a color code, with green corresponding to a core damage frequency increase of less than a factor of three, yellow corresponding to a core damage frequency multiplier of three to 20, orange corresponding to a core damage frequency multiplier of 20 to 35, and red corresponding to a core damage frequency multiplier greater than 35. All work windows had green or yellow risk colors except for one. The one work window that had an orange color had been flagged such that the two systems contributing the most to risk would not be taken out of service concurrently during the work window. In addition, a final risk evaluation using the Operational Safety Predictor code was required to be performed the week before actual work took place. When emergent work occurred, the procedure required the Shift Manager or Work Control Center Senior Reactor Operator to evaluate the risk of such additional component outages.

Because both units had been shut down for the past year or more, the licensee's actual performance in the area of on-line risk evaluation could not be observed and evaluated. This is an IFI (50-373/98002-02(DRS); 50-374/98002-02(DRS)). The follow-up will evaluate the licensee's actual performance in the area of on-line risk evaluation and management after one or both of the LaSalle units have started up and been operating for an extended period.

The licensee's procedure for managing the risk from equipment out of service while the plant was shut down (Modes 3, 4 or 5) was documented in LAP-100-47, Revision 2. The procedure was based on the concept of protected paths to prevent or mitigate the following seven events: loss of decay heat removal, loss of fuel pool cooling, loss of reactor coolant system inventory, loss of fuel pool/reactor cavity inventory, loss of ac or dc power, loss of reactivity control, and loss of containment integrity. This procedure followed standard industry guidance provided by the Nuclear Management Resources Council. In addition, the work planners used the Electric Power Research Institute's Outage Risk Assessment and Management computer code to also assess shutdown risk and plot out daily risk levels for each of the seven events. For emergent work, the

Shift Manager was responsible for determining the new risk level. The licensee stated that they did not normally plan work that would result in an orange risk level.

c. Conclusions

The team concluded that the licensee's processes for assessing plant risk resulting from taking equipment out of service during at-power and shutdown conditions were adequate. The team viewed the licensee's procedure for assessing plant risk resulting from equipment out of service for on-line maintenance to be good but untested because of the plant's extended shutdown. The licensee's procedure and performance for assessing plant risk while the plant was shut down were also good.

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

a. Inspection Scope

The team reviewed program documents in order to evaluate the process established to set goals and monitor under (a)(1) and to verify that preventive maintenance was effective under (a)(2) of the maintenance rule. The team also discussed the program with appropriate plant personnel and reviewed the following systems in depth:

(a)(1) systems	(a)(2) systems
Reactor Building Closed Cooling Water	High Pressure Core Spray
Feedwater	Generator Aux Equipment Cooling
Reactor Core Isolation Cooling	Average Power Range Monitor
Auxiliary Power	
Local Power Range Monitor	
Intermediate Range Monitor	
Source Range Monitor	

The team reviewed each of these systems to verify that goals or performance criteria were established commensurate with safety, that industry wide operating experience was taken into consideration, where practical, that appropriate monitoring and trending were being performed, and that corrective actions were taken when an SSC failed to meet its goal or performance criteria or experienced a maintenance preventible functional failure.

The team reviewed the LaSalle structure monitoring program and documentation to determine if structures at LaSalle were being monitored in accordance with the maintenance rule and in accordance with industry and NRC guidance. A review of the performance criteria and monitoring established for structures within scope was performed. Structures evaluated by the team included buildings, enclosures, storage tanks, earthen structures, and passive components and materials housed in these structures. In addition, the team assessed how structures within scope were monitored for degradation.

b. Observations and Findings

The parameters monitored under the established performance criteria were appropriate for the systems and were commensurate with the system importance to safety. The number of allowed failures reflected in reliability performance criteria had been demonstrated to be consistent with probabilistic risk assessment assumptions and commensurate with safety. In addition, the number of allowed unavailability hours established for availability performance criteria had also been demonstrated to be consistent with probabilistic risk assessment assumptions and commensurate with safety. Both availability and reliability performance criteria had been established for most safety significant systems. Appropriate justification was provided for those safety significant systems which did not have both types of performance criteria. No problems were identified by the inspectors.

b.1 Reliability and Unavailability Performance Criteria

The team reviewed the unavailability and reliability performance criteria for high safety significance SSCs and functions and standby, low safety significance SSCs and functions. In general, the unavailability performance criteria were not based on the updated individual plant examination values and were significantly higher. The licensee performed a sensitivity analysis to determine the impact on core damage frequency of these unavailability performance criteria. The result was a 221% increase in the core damage frequency. For a baseline core damage frequency of 1.0E-5/year, the Electric Power Research Institute Probabilistic Safety Assessment Applications Guide indicates that such a permanent increase in core damage frequency lies in the region labeled as "further evaluation required." The licensee supplied arguments indicating why the 221% increase is a conservative overestimate, and how the individual plant examination update process and maintenance rule periodic assessment would ensure that such a core damage increase would not eventually be reached.

For reliability performance criteria, the licensee used the Electric Power Research Institute methodology outlined in Technical Bulletins 96-11-01, "Monitoring Reliability for the Maintenance Rule" (November 1996) and 97-3-01, "Monitoring Reliability for the Maintenance Rule – Failures to Run," (March 1997). The licensee also used a five percent confidence level with that methodology to determine allowable functional failures. The licensee's approach, therefore, was considered to be appropriate. No reliability performance criteria were set higher than the results from this approach.

b.2 Plant Level Performance Criteria for Low Safety Significance Normally Operating SSCs

Plant level performance criteria were established for low safety significance normally operating SSCs and functions using the guidelines contained in Nuclear Management Resource Council 93-01. The team did not identify any concerns with respect to the plant level criteria.

b.3 Goals Established for (a)(1) SSCs

The team examined the goals and corrective action plans for 32 functions classified as (a)(1). No inappropriate goals or inadequate corrective action plans were identified. The established goals for systems classified as (a)(1) were generally the same as the performance criteria, augmented by condition monitoring goals targeted on the specific problem.

b.4 Structures and Structure Monitoring

The LaSalle structural monitoring program was delineated in part "B" of LAP 400-17, Revision 2, "Maintenance Rule," and Nuclear Engineering Procedure (NEP) 17-03, "Structures Monitoring." These documents provided a listing of structures, and provided inspection acceptance criteria and qualifications for personnel performing the inspections. The program was consistent with current industry practice and met the guidelines in Regulatory Guide 1.160, Revision 2.

The team reviewed the results of the licensee's maintenance rule structural baseline inspections. The baseline inspections were partially complete; 23 of the scheduled 74 inspections had been completed. The current inspection schedule was for all structural baseline inspections to be completed in 1998. The structural baseline inspection results reviewed by the team were adequate and well documented. Discrepancies were identified, documented, photographed, evaluated, and appropriate corrective action initiated.

The team performed a walkdown inspection of selected structures. No structural deficiencies that had not been identified during the licensee's baseline inspection were identified during the team's walkdown inspection. Several cracks in the turbine building basement walls and floors showed evidence of groundwater intrusion that had been repaired. The team observed active groundwater intrusion into the de-icing system pipe pit. At this location, water appeared to be entering through the wall and running down an electrical conduit toward a motor operated valve. There appeared to be corrosion at the connection between the rigid conduit and the flexible conduit to the motor operator. The licensee initiated a problem identification form to investigate and affect necessary repairs.

c. Conclusions

Performance criteria were appropriately established to gauge system and function performance; no inappropriate performance criteria were identified. Established goals were acceptable; no inappropriate goals were identified. The structure monitoring program was consistent with current industry guidance and practice. Baseline inspections were in progress but not completed. The structures inspected were in good condition.

M1.7 Use of Industry-wide Operating Experience

a. Inspection Scope

Paragraph (a)(1) of the maintenance rule states that goals shall be established commensurate with safety and, where practical, take into account industry-wide operating experience. Paragraph (a)(3) of the maintenance rule states that performance and condition monitoring activities and associated goals and preventive maintenance activities shall be evaluated at least every refueling cycle. The evaluation shall be conducted taking into account industry operating experience. The team reviewed the program to integrate industry operating experience into the maintenance rule monitoring program. A system engineer, the Maintenance Rule Coordinator, and the LaSalle Industry Operating Experience (OPEX) Coordinator were interviewed to determine the extent of knowledge of industry operating experience information as applicable to maintenance rule processes.

b. Observations and Findings on Use of Industry-wide Operating Experience

The team reviewed Nuclear Station Work Procedure (NSWP)-A-06, Revision 0, "Operating Experience (OPEX)," and noted that it was a detailed procedure for accumulating, evaluating, and acting on industry operating experience. The team noted that LaSalle also had an administrative procedure LAP-850-6, Revision 8, "Processing of Operating Experience (OPEX) Information." LaSalle procedures required this procedure to be revised. However, this was not done prior to the Nuclear Station Work Procedure being implemented. This information was provided to the Resident Inspector and will be addressed in a future inspection.

The team also noted that the program was properly linked to the maintenance rule program in section 6.3.4 (Reviewer's Guidelines) of the implementation procedure NSWP-A-06. Discussions with system engineers indicated that they actively participated in industry users' groups, communicated frequently with system engineers at other plants, and routinely received industry operating experience information related to their systems from the LaSalle Industry Operating Experience Coordinator. It was evident that information from industry operating experience was incorporated into (a)(1) goals and (a)(2) performance criteria. System engineers had computer access to industry operating experience from a wide range of sources.

c. Conclusions for Use of Industry-wide Operating Experience

The industry operating experience review program was well-organized and properly linked to the maintenance rule program. System engineers were clearly using industry experience information and generally understood the need to incorporate it into the maintenance rule program. There was ample documentation showing consideration of industry operating experience in maintenance rule activities.

M2 Maintenance and Material Condition of Facilities and Equipment (61706, 71707)

M2.1 General System Review

a. Inspection Scope

The team conducted a detailed examination of seven systems from a maintenance rule perspective to assess the effectiveness of the program when it was applied to individual systems.

b.1 Observations and Findings for the Reactor Core Isolation Cooling System

The reactor core isolation cooling system was considered a high safety significance, standby system with performance criteria to monitor reliability and availability. The system was being monitored under (a)(1) of the maintenance rule as a result of failure to meet the availability criterion of 97.5 percent. The present system availability was approximately 92 percent. The failure to meet the availability occurred after the reactor core isolation cooling system rupture discs failed. The event was caused by the overtorquing of the rupture disc assembly. This was identified as a maintenance preventable functional failure. The goals and proposed corrective actions were appropriate to return the system to (a)(2).

b.2 Observations and Findings for the Auxiliary Power System

The auxiliary power system was considered a high safety significance system with performance criteria to monitor reliability and availability. Auxiliary power was being monitored under (a)(1) of the maintenance rule because the system exceeded the reliability criterion of less than or equal to one feed breaker failure. Of particular note was the failure of the unit 1 standby auxiliary transformer General Electric Magneblast feed breaker during a surveillance test. The vendor determined that the failure was due to lack of lubrication, combined with the presence of old residual grease on the lower pin bushings. The licensee determined that the previous maintenance procedure did not address this portion of the breaker and therefore, a lack of appropriate maintenance led to the failure of the breaker. The lack of lubrication was significant because issues regarding lack of lubrication of ABB/ITE HK breakers had been previously identified by the licensee and the NRC at LaSalle. The licensee stated that the previous General Electric Magneblast procedure had been shown to the vendor but that the vendor did not note any problems with lack of lubrication on the breaker lower pin bushings. At that time the licensee concluded that the procedure (LES-GM-106) was adequate. This procedure has since been revised to include instructions on the proper lubrication of the lower pin bushings. The team reviewed the proposed goals and corrective actions and considered them appropriate to return the system to (a)(2).

b.3 Observations and Findings for the Generator Auxiliary Equipment Cooling System

The Generator Auxiliary Equipment Cooling system was considered a low safety significance system with plant lever performance criteria. The Generator Auxiliary Equipment Cooling system was being monitored under (a)(2) of the maintenance rule. System performance was good and no concerns were identified.

b.4 Observations and Findings for the Neutron Monitoring System

The Neutron Monitoring system consisted of the following subsystems, Local Power Range Monitoring, Average Power Range Monitor, Intermediate Range Monitor, and the Source Range Monitor. Each subsystem was identified and evaluated separately for scoping purposes; each subsystem was considered to be independent for purposes of the maintenance rule.

The Local Power Range Monitor was considered high safety significance due to inputs to the Average Power Range Monitor. The local power range monitor system was considered in scope and placed in category (a)(1) during the initial evaluation of functions by the expert panel. However, individual channels were not considered high safety significance due to the high number of detectors and the determination that the loss of individual channels had no effect on the critical average power range monitor and rod block monitor functions. Individual nonfunctioning channels were bypassed, allowing the associated average power range monitor or rod block monitor to function normally. The local power range monitor had performance criteria to monitor reliability and unavailability. The local power range monitor was being monitored under (a)(1) due to the high number of channel failures (exceeded the availability criteria) and a lack of surveillance data due to the extended shutdown condition of the plant. The licensee has performed numerous modifications to the system and expected performance to improve. The licensee planned to leave the local power range monitor system in (a)(1) until the performance meets the goals that have been set.

The Average Power Range Monitoring system was considered as high safety significance due to the reactor scram and rod block functions performed by the system. The average power range monitor was considered in scope and was placed in (a)(2) during the initial evaluation of functions by the expert panel. The system had not experienced any functional failures during the licensee's review period. The licensee has extended the review period backwards two years from the date of last system operation (Unit 1 - 9/22/94 and Unit 2 - 9/20/94). Normal surveillances were not being conducted by the licensee and were not expected to be conducted until reactor operations resumed.

The Intermediate Range Monitoring system was considered as high safety significance due to the reactor scram and rod block functions performed by the system. The intermediate range monitor was considered in scope and placed in (a)(1) due to the high number of channel failures on both units. The licensee will leave the intermediate range monitors in (a)(1) until the performance meets the goals that have been set. Due to the extended outage, the licensee has extended the review period for both units. Normal surveillances were not being conducted by the licensee and were not expected to be conducted until reactor operations resumed. The goals established by the expert panel appeared appropriate to return the system to (a)(2).

The Source Range Monitoring system was considered low safety significance but was considered in scope and placed in (a)(1) due to the high number of channel failures on both units. The licensee will leave the source range monitors in (a)(1) until the performance meets the goals that have been set. Due to the extended outage, the licensee has extended the review period for both units. Normal surveillances were not being conducted by the licensee and were not expected to be conducted until reactor operations resumed.

b.5 Observations and Findings for the Feedwater System

The feedwater system was a non-safety-related, high safety significance system and was being monitored under category (a)(1). The system was placed in (a)(1) status as a result of continuing failures of the feedwater containment isolation valves to pass the containment local leak rate test. Performance goals were established, however, the system remained in (a)(1) status since the extended plant shutdown prevented achievement of the goals. The goals appeared appropriate to move the system to (a)(2) after an acceptable period of operation.

b.6 Observations and Findings for the High Pressure Core Spray System

The high pressure core spray system was scoped into the maintenance rule program as a safety-related, high safety significance, standby system in category (a)(2). Adequate reliability and availability performance criteria were established. The team's review of available documentation from the last four years found no evidence of functional failures in the system; reliability and unavailability hours were well within the performance criteria. No concerns with the high pressure core spray system were identified.

b.7 Observations and Findings for the Reactor Building Closed Cooling Water System

The reactor building closed cooling water system was a low safety significance system placed in category (a)(1) during initial scoping as a result of failures that occurred prior to maintenance rule implementation. Goals, monitoring, and corrective actions had been appropriately established for placing the system in (a)(2). However, since the plant has been in an extended shutdown during most of the time since maintenance rule implementation, none of the goals have been achieved.

c. Conclusions for General System Review

The inspectors concluded that the licensee had properly classified each SSC as category (a)(1) or (a)(2). The corrective actions, both in progress and planned, for SSCs and functions in (a)(1) appeared adequate. The inspectors did not identify, in the

SSCs and functions reviewed, any functional failures not previously identified by the system engineers. Functions for the systems reviewed were properly scoped under the maintenance rule.

M2.2 Material Condition

a. Inspection Scope

In the course of verifying the implementation of the maintenance rule, the team performed walkdowns using Inspection Procedure 71707, Plant Operations, to examine the material condition of the systems listed in Section M1.6.

b. Observations and Findings

With some exceptions, the systems were free of corrosion, oil leaks, water leaks, trash, and based upon external condition, appeared to be well maintained. Because the plant had been shut down for an extended period of time, an accurate assessment of equipment condition could not be made.

c. Conclusions

The material condition of the systems examined appeared acceptable.

M7 Quality Assurance in Maintenance Activities (40500)

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

a. Inspection Scope

The team reviewed the following self-assessment and Quality Assurance audit reports of the licensee's implementation of the maintenance rule:

- Site Quality Verification Audit # 01-96-04, "Maintenance Rule" (Performed April 29 through May 10, 1996 - issued June 5, 1996) - one finding, one unresolved item, and 18 recommendations.

- LaSalle County Station Maintenance Rule Implementation Assessment (Performed October 28 through November 1, 1996 - issued November 1, 1996) - 37 recommendations.

- Quality and Safety Assessment Audit QAA 01-97-09 (Performed October 27 through October 31, 1997) and supplemental input from outside experts dated November 6, 1997 - seven findings, sixteen recommendations, and four strengths.

The team held discussions with audit and assessment members of the licensee's staff and outside experts concerning activities associated with the above audits and assessment, including how findings and recommendations were received and handled through closure.

b. Observations and Findings

The team reviewed the audits and assessment reports listed above during the on-site week. Based on this review, during the various stages of implementation, the team concluded that the licensee was well aware of problems with their implementation of the maintenance rule. In fact, many of the issues identified in the audits were also noted during previous NRC maintenance rule inspections. Further, the team noted that the licensee had performed implementation audits of the maintenance rule and continued to assess the program prior to and throughout the implementation effort. The findings, unresolved item, and recommendations identified during the initial audit and assessment were part of the follow-up activities associated with the last Quality Assurance Assessment Audit. These audits and assessment were performed by licensee audit members, technical staff members from LaSalle, staff from other sites and corporate offices, and outside experts. These audits and assessment highlighted the need to improve their maintenance rule program. The detail and quality of audits and assessment reports improved as more reviews were completed and the staff maintenance rule knowledge improved. The most recent audit was extremely thorough and considered by the team to be a strength.

During this inspection, the team sampled several audit findings and recommendations to ensure that identified items were appropriately handled to closure. No major omissions were identified. The team noted that during the initial audit and assessment there was no programmatic process to close out each of the recommendations. Since that time, the process has been formalized and appropriately documented. The audit, assessment findings, and recommendations sampled by the team had been appropriately addressed. Collectively, the two audits and one assessment identified eight findings, one unresolved item, 71 recommendations, and four strengths.

c. Conclusions

During maintenance rule program implementation, the licensee performed audits and an assessment of maintenance rule activities. These audits and assessment provided valid findings and recommendations of areas associated with maintenance rule implementation. The recent audit of the maintenance rule program was extremely thorough and considered a strength. Corrective actions sampled by the team were appropriately implemented.

III. Engineering

E4. Engineering Staff Knowledge and Performance (62706)

E4.1 Engineer's Knowledge of the Maintenance Rule

a. Inspection Scope (62706)

The team interviewed engineers and managers to assess their understanding of probabilistic risk assessment, the maintenance rule, and associated responsibilities.

b. Observations and Findings

The team interviewed the system engineers assigned responsibility for SSCs and functions selected for vertical slice inspection, and walked down systems with them. The system engineers were experienced and knowledgeable about their systems, maintenance rule training, and Nuclear Management Resource Council 93-01. Training in probabilistic risk assessment was provided. The system engineers demonstrated an excellent understanding of the maintenance rule. System engineers were positive about maintenance rule implementation and understood how the program interfaced with their systems. System engineers were also familiar with their systems' performance criteria and the bases for the availability and reliability criteria.

The system engineers' responsibilities included review of action requests and problem identification forms for identification of functional failures. The team noted that the system engineers did a good job in identifying and documenting functional failures. The team identified no additional functional failures during the vertical slice of the individual systems. However, the capability of the engineers to perform these assessments had not been demonstrated during routine operation because of the plant's extended shutdown. To properly evaluate the effectiveness of the process for evaluating events and problems for functional failures, the program should be reviewed after one or both units have been returned to service for a reasonable period of time. This review is an IFI (50-373/98002-03(DRS); 50-374/98002-03(DRS)). The team noted that the computer-based maintenance rule tracking system, designed by the Station Maintenance Rule Coordinator and used by the system engineers, was an excellent, user-friendly, and accurate tool. System engineers' responsibilities also included recommending corrective actions and establishing goals for systems monitored under (a)(1). The team noted that two system engineers did not readily know what the availability status was for their system. That information was later provided to the team. It should be noted; however, that the systems were not required to be operable due to the extended outages for both units at LaSalle.

c. Conclusions

The system engineers were experienced and knowledgeable about their systems. The system engineers demonstrated an excellent understanding of the maintenance rule and were knowledgeable in the performance criteria for their systems. System and were knowledgeable in the performance criteria for their systems. System engineering knowledge and positive approach to implementation of the maintenance rule were considered a strength.

V. Management Meetings

X1 Exit Meeting Summary

The team discussed the progress of the inspection with licensee representatives on a daily basis and presented the inspection results to members of licensee management at the conclusion of the inspection on January 16, 1998. The licensee acknowledged the findings presented. The team asked the licensee whether any materials examined during the inspection should be considered proprietary; none was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Arnould, Rapid Response Team
J. Bailey, Restart
P. Barnes, Regulatory Assurance
G. Campbell, Site Engineering
E. Carroll, Regulatory Assurance
R. Chrzanowski, Quality and Safety Assessments
F. Dacimo, Plant General Manager
P. Donahue, System Engineering
D. Enright, Operations Manager
J. Gieseker, Outage Manager
A. Gupana, Quality Control
R. Janacek, Corporate - Nuclear Fuels Services
A. Javorik, Corporate - Component Maintenance
P. Johnson, Consultant
D. Kapinus, System Engineering
R. Linthicum, Consultant
A. Magnafici, Restart Test
R. Morgan, Work Control
R. Palmieri, System Engineering
G. Poletto, Site Engineering Manager
G. Putt, Work Control Manager
D. Sager, Vice President - Generation Support
C. Schroeder, Regulatory Services
W. Shafer, Consultant
M. Sharma, Station Maintenance Rule Coordinator
C. Sibley, Corporate - Component Maintenance
S. Smith, Plant Manager
S. Smalley, System Engineering
W. Subalusky, Site Vice President
M. Strait, Corporate - Component Maintenance
D. Szumski, System Engineering
K. Taber, System Engineering

NRC

M. Huber, Senior Resident Inspector
J. Hanson, Resident Inspector
R. Clark, Resident Inspector

LIST OF INSPECTION PROCEDURES USED

IP 62706:	Maintenance Rule
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 71707:	Plant Operations

LIST OF ITEMS OPENED

50-373/98002-01a(DRS); 50-374/98002-01a(DRS)	IFI	Periodic Assessment
50-373/98002-01b(DRS); 50-374/98002-01b(DRS)	IFI	Reliability/Availability Balance
50-373/98002-02(DRS); 50-374/98002-02(DRS)	IFI	On-line Risk Evaluation Process
50-373/98002-03(DRS); 50-374/98002-03(DRS)	IFI	Functional Failure Analyses

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DRS	Division of Reactor Safety
IFI	Inspection Follow-up Item
NRC	Nuclear Regulatory Commission
SSC	Structure, System, or Component

PARTIAL LIST OF DOCUMENTS REVIEWED

LaSalle County Station Individual Plant Examination and Individual Plant Examination of External Events, April 28, 1994.

LaSalle County Station Probabilistic Risk Assessment (PRA), March 1996.

LaSalle County Nuclear Power Station, Units 1 and 2, Individual Plant Examination, Staff Evaluation Report, March 14, 1996.

LAP-400-17, "Maintenance Rule," Revision 2, December 15, 1997.

L-001439, "Maintenance Rule/PSA Linkage Calculation," Revision 1, January 8, 1998.

Memorandum from M. A. Melnicoff to C. L. Sibley, "ComEd Guidelines for the Establishment of a PSA Basis for Setting Maintenance Rule Reliability Performance Criteria Per 10CFR50.65 Requirements," Revision 1, September 16, 1997.

LAP-100-55, "On-line Maintenance," Revision 0, December 9, 1997.

LAP-100-47, "Shutdown Risk Management," Revision 2, September 24, 1997.