SALP REPORT - MCGUIRE NUCLEAR STATION

50-369/94-01 and 50-370/94-01

I. BACKGROUND

The SALP Board convened on February 24, 1994 to assess the nuclear safety performance of McGuire Nuclear Station, Units 1 and 2, for the period August 2, 1992 through February 5, 1994. The Board was conducted pursuant to NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance." Board members were Bruce S. Mallett, (Chairperson) Deputy Director, Division of Radiation Safety and Safeguards (DRSS), RII; Jon R. Johnson, Deputy Director, Division of Reactor Projects (DRP), RII; Albert F. Gibson, Director, Division of Reactor Safety (DRS), RII; and Gus C. Lainas, Assistant Director for RII Reactors, Office of Nuclear Reactor Regulation (NRR).

II. PERFORMANCE ANALYSIS - PLANT OPERATIONS

Plant operational performance was good with some deficiencies in the ability to control challenges to safety systems. The plant experienced significant challenges by several plant trips, several unplanned plant shutdowns, and one plant startup that had to be delayed. These transients were caused primarily by steam generator tube leaks (three on Unit 1) and other equipment deficiencies in the primary and secondary plant systems. Longstanding feedwater regulating valve control problems continued early in the assessment.

Control room operator performance was good with weaknesses identified in command and control. Operators safely handled three steam generator tube leaks on Unit 1. Command and control performance during response to some events was poor. This was demonstrated in the August 31, 1993, Unit 2 steam generator drain line leak and containment pressurization as well as during the December 27, 1993 loss of offsite power, safety injection, and steam generator dryout. Response actions were complicated by inadequate communications and directions between members of the operating crew and the support staff.

Operator performance on examinations significantly improved from the last assessment period due to attention to preparation. Shift Operator and station staff performance in notifications and reporting events was deficient indicating weaknesses in periodic training, and on-shift duty assignments. Notification weaknesses pointed out by NRC examiners early in the assessment period had not been fully corrected resulting in problems during actual events.

Plant operational focus on safety has been good. The station staff's sensitivity to shutdown risk continued from the last assessment period. Operations management placed emphasis on safety as evidenced by assigning one Senior Reactor Operator to be responsible for mid-loop operations. A thorough followup investigation following a reactor coolant system siphoning event (involving an open steam generator manway

during reduced inventory conditions) demonstrated the ability to use lessons learned to improve safety.

Plant operational direction and interface with station work priorities was good, but did not provide necessary control in some instances. A modification to an unreliable diesel generator fuel oil level gage was postponed resulting in the inventory dropping below the minimum technical specification level. A reactor coolant system (letdown line) isolation valve had undergone temporary leak repair during a refueling outage and station management was not fully aware that a permanent repair had not been planned. The valve was found leaking again during plant restart. Temporary repairs allowed restart but later proved ineffective and a subsequent plant shutdown and cooldown was required to conduct weld repair. A water hammer event on the letdown line occurred due to ineffective operations controls. Station operations management initiated improvements by starting daily planning meetings, and by compiling and discussing a "major problem list" and a "plant work-arounds list" with the plant engineering staff.

The plant operations and operations support staff continued to initiate steps to improve performance in self-identified areas. The Emergency Operating Procedures upgrade program had progressed well in improving procedures. Although, equipment configuration control problems continued to occur, performance improved and station management placed greater attention to tracking and trending these events and effecting lessons learned with their staff.

Tracking and monitoring performance of plant operations improved at the end of the assessment period; however, this had not resulted in significant improvements in the follow-through or implementation of corrective actions by the end of the assessment period. Early performance was characterized by lack of clear schedules to fix problems. At the end of this assessment period, station operations management met with the engineering staff to reach "consensus" and began to establish "top" priority plant problems.

The Operations area is rated Category 2.

III. PERFORMANCE ANALYSIS - MAINTENANCE

Challenges in the area of maintenance evident during the previous assessment period continued and adversely affected plant performance. Failure to follow procedures, inadequate procedures and ineffective oversight of maintenance activities were indicative of weak management controls. Ineffective corrective actions contributed to recurrent problems.

Numerous power reductions, forced manual shutdowns and automatic trips were caused by equipment failures. Most of these failures were caused by wear or aging of components in balance-of-plant systems and were indicative of the need for improved predictive and preventive

maintenance of these systems. Lack of periodic maintenance and testing for the turbine runback system contributed to the loss of offsite power event. Other failures were repetitive indicating the need for more effective root cause analysis and corrective action.

Management control of maintenance activities was weak as evidenced by deficiencies in procedural control and oversight of work. Many maintenance problems were caused by failure to follow procedures or by inadequate procedures. Examples of ineffective procedural controls included a main steam isolation valve that failed to close because of deficiencies in a valve maintenance procedure, a steam leak inside containment through a misassembled steam drain valve due to deficiencies in the valve maintenance procedure, and an inadvertent start of an auxiliary feedwater pump because a jumper was connected to a terminal different from the one required by procedure. A Work Request to repair a leaking pipe cap failed to include known information about damaged pipe threads, which significantly complicated the above mentioned steam leak. Oversight of maintenance activities was also weak. For example, management authorized repair of the above steam leak without full knowledge of the repair method to be used or the safety significance of the repair. In another example, oversight of a roofing contractor was not sufficient to prevent a fire on the roof of the fuel handling building. These weaknesses in procedural control and oversight are similar to deficiencies in work control that were apparent during the previous assessment period.

Performance in the areas of problem identification and corrective action was weak. Failure to identify and correct problems with feedwater regulator valves throughout the first half of the assessment period resulted in power reductions and trips; failure to identify a steam generator tube crack during eddy current testing in April 1993 resulted in a plant shutdown to repair the leaking tube in August 1993; and, improper inspection of a defective steam generator tube plug weld resulted in a subsequent shutdown to repair the leaking weld. The licensee was good in using Significant Event Investigation Teams to determine causes and recommend corrective actions for two significant events. In some cases, the teams' reviews were not considered thorough and did not identify some factors contributing to the events.

The licensee was sensitive to the need for improving plant reliability and often augmented corrective maintenance with design changes to improve future performance. Several sections of carbon steel piping were replaced with stainless steel to improve resistance to erosion/corrosion; forced air cooling was installed in all rod control cabinets to reduce the failure rate of electronic circuits; and, main steam power operated relief valve cycle time was improved by installing check valves in the air supply lines to the valve actuators. Effective use of thermography techniques for predictive maintenance continued from the previous assessment period and an enhanced predictive maintenance program was implemented for the emergency diesel generators. The frequency of safety system failures declined over the period indicating good attention to effective maintenance of these systems.

Technical programs for predicting piping degradation due to erosion and corrosion and for freeze protection were effective. The inservice inspection program was not fully effective as indicated by the previously discussed steam generator tube problems. Deficiencies were also evident in implementation of the foreign material exclusion program. Foreign objects and debris were found inside fluid systems on several occasions.

The Maintenance area is rated Category 3.

IV. PERFORMANCE ANALYSIS - ENGINEERING

Management continued to be proactive in identifying areas where engineering resources should be focused and initiated actions to do so. As an example, the licensee initiated a reorganization of the engineering divisions at the General Office and the plant site in the latter part of the assessment period. The assignment of a systems engineer to the diesel generators showed excellent foresight in directing resources, which contributed to better diesel generator availability.

Performance in support of plant operations, including activities associated with modifications during outages and temporary modifications, was good with a focus on safety. Proactive efforts in recognizing shutdown risks and continued improvements in precautionary measures during reduced coolant inventory and mid-loop operation were effective. The licensee effectively utilized tracking and trending in the predictive maintenance program for early detection and engineering correction of certain equipment problems. The licensee continued to make effective progress in completing the design basis documentation review.

Engineering provided a good effort in implementing modifications. There were weaknesses in the planning and tracking of modifications that resulted in an accumulated backlog. Management recognized the need to reprioritize work, however some modifications were deferred, which affected plant operations. Deferment of the unreliable diesel fuel oil level gauge modification, coupled with insufficient compensatory measures, resulted in low inventory for an extended period of time.

There were instances of inadequate engineering technical support. Engineering controls over vendor information did not assure that recommendations were readily available for reference and evaluated in a timely manner. The program for engineering updates of control room drawings vital to operations was ineffective in some instances. Some drawings were not revised in a timely manner to reflect modifications and all interim changes were not clearly identified. Late in the assessment period, the lack of effective design control over switchyard protective relay coordination modifications allowed a less reliable design to be implemented.

Engineering response to technical issues, especially steam generator (SG) tube degradation, was comprehensive and effective. The extensive tube inspection efforts, that continued to go well beyond Technical Specifications requirements, demonstrated a methodical and conservative approach to issues.

Support for licensing activities was good. The communications between the licensee and the NRC were good. The licensee promptly supported requests for meetings, took the initiative to establish meetings on special topics, worked constructively and promptly with the NRC and readily apprised the NRC of upcoming submittals.

The Engineering area is rated Category 2.

V. PERFORMANCE ANALYSIS - PLANT SUPPORT

The radiological controls program continued to exhibit strong performance. The licensee continued to use the ALARA program to reduce doses during both outage and non-outage periods. There was a small increase in the dose per reactor unit for 1993 (231 person-rem through October 1993) versus 1992 (209 person-rem). This small increase was reflective of effective dose control in view of the significant dose intensive work performed on steam generators during this assessment period. The shutdown chemistry, hot spot reduction programs, dose tracking by group and use of video equipment in job planning have continued to effectively maintain overall dose to site workers at a low value. The licensee has been active in maintaining the contaminated floor space and equipment to a minimum. Good performance was exhibited in general control of radiation areas. During the latter part of the assessment period, there were instances of inadequate control of keys and not properly utilizing radiation work permits for entrance into an area that was controlled as an extreme high radiation area. Audits were well planned, contained substantive findings and the corrective actions were timely.

The radiological effluents and radwaste programs were effective in reducing the amount of radioactivity released in gaseous and liquid effluents. Releases were well below regulatory limits. The licensee had a good effluent monitoring program with initiatives, in addition to regulatory requirements, to improve system reliability such as replacement of analog with digital monitors and calibration of some monitors with primary rather than secondary standards. There were some deficiencies in the licensee's system for responding to emergency notifications of transportation events that continued throughout the assessment period.

Performance of the emergency preparedness organization during exercises was good. The licensee had a strong commitment to drilling staff in emergency response well in excess of regulatory requirements. The response staff was aggressive in recognizing key changes in the scenario and in mitigation activities. The licensee significantly improved

message content accuracy and clarity in notifications to offsite agencies during the 1993 exercise to address a problem identified during the 1992 exercise. In both exercises, problems continued with communicating the release duration in messages to offsite agencies. Response to actual events also exhibited some deficiencies in the licensee's program. In some instances, the operators were not aware of emergency action initiators in the emergency action level system. Lack of clear organizational responsibilities led to command and control problems and caused delays in reporting to the NRC. Integration of corporate staff into the site emergency response program has challenged the training programs, and several new emergency response members did not meet annual training requirements. Throughout the assessment period, problems in the control of procedural changes resulted in untimely submission of emergency plan changes to the NRC.

The security staff was aggressive in tracking and trending problems, which lead to excellent availability of equipment and minimal use of compensatory measures. Program audits were thorough and corrective actions were prompt and complete. Early in the assessment period, the licensee discovered poor package search procedural adherence, which resulted in an unauthorized entry of a weapon into the protected area. The licensee exhibited excellent identification of root cause and effected prompt and thorough corrective actions. During the assessment period, the licensee also identified a major deficiency in the control of safeguards information in an automated data processing system linking the site to the corporate office.

Fire protection equipment was well maintained. Fire Brigade staffing and drills were effective. Several deficiencies were noted in the fire protection program when an actual fire developed on the spent fuel handling building due to inattention to procedures.

In general, housekeeping was good with some areas needing attention to visible leakage and surfaces needing painting for ease of decontamination. The licensee continued to pursue an area upgrade program. In these areas, housekeeping was excellent. In some other areas in the auxiliary building, housekeeping had poor attention as evidenced by scaffolding and materials left in areas after work was completed and by visible boron leakage on the Residual Heat Removal pumps.

The Plant Support area is rated Category 2.