SALP REPORT - ST LUCIE NUCLEAR PLANT

50-335/93-26 AND 50-389/93-26

I. BACKGROUND

The SALP Board convened on January 20, 1994, to assess the nuclear safety performance of St. Lucie Units 1 and 2 for the period May 3, 1992, through January 1, 1994. The Board was conducted per NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance." Board members were J. Philip Stohr (Board Chairperson), Director, Division of Radiation Safety and Safeguards, NRC Region II (RII); Ellis W. Merschoff, Director, Division of Reactor Projects, NRC RII; Johns P. Jaudon, Deputy Director, Division of Reactor Safety, NRC RII; and Herbert N. Berkow, Director, Project Directorate II-2, NRC Office of Nuclear Reactor Regulation. This assessment was reviewed and approved by Stewart D. Ebneter, Regional Administrator, NRC RII.

II. PLANT OPERATIONS

This functional area addresses the control and execution of activities directly related to operating the plant. It includes activities such as plant startup, power operation, plant shutdown, and response to transients. It also includes initial and requalification training programs for licensed operators.

Overall performance in the Operations area has remained superior during this assessment period. Management oversight and involvement have been very effective in assuring safe facility operation. Management expectations are clear and have been effectively conveyed to the operating staff. Conservative operational safety decisions were made to shut down a unit to repair degrading equipment before it failed or became unable to adequately perform its function. Examples include a reactor coolant pump lubrication oil leak, a pressurizer safety valve leak, and increasing reactor coolant pump vibration. Also, a unit shutdown was extended to facilitate the repair of leaking valves in the reactor coolant gas vent system. A unit startup was delayed to evaluate system operability when a safety-related electrical conduit was discovered to be not attached to a seismic support.

Operator performance during this period has been excellent. Operators are well trained and qualified, alert to plant conditions, and well supported by management, engineering, maintenance, and plant support organizations. Operator response to transients, abnormal conditions, and equipment malfunctions was excellent. Of the seven manual and two automatic reactor trips, none were caused by operator error. Timely and proper response by operators prevented or minimized transients during various malfunctions, including: the failure of a main turbine to trip automatically following a reactor trip, failure of cooling water to a main generator hydrogen cooler, and dropped reactor control element assemblies during plant operation. Additionally, operators were alert in detecting emerging equipment degradation and initiating timely

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repairs, including: an emergency diesel generator fuel oil storage tank leak, a reactor coolant pump oil system leak, and a reactor coolant system leak.

Operators typically displayed exceptional attention to detail and control of plant configuration. They performed numerous reactor startups and shutdowns with no significant errors. However, there were three instances of operator inattention, occurring early in the period, which underscore the need for constant vigilance. Specifically, operators inappropriately removed an emergency diesel generator from service for maintenance when an opposite train source of reactor coolant system emergency boration was already out of service, an operator error while cooling a quench tank resulted in a ruptured quench tank rupture disk, and an operator error during a unit cooldown resulted in a safety injection tank discharging into the reactor coolant system.

Control of outages was excellent, including operator performance during reduced reactor coolant system inventory conditions, operator knowledge of refueling procedures, and detailed underwater inspections of reactor components and fuel using an underwater submarine video camera and radiation detector. Plant conditions and system alignments for conducting maintenance and installing modifications were well controlled during scheduled refueling outages and several unscheduled maintenance outages.

Quality assurance was superior. Audits were complete, clear, and contained significant findings. Corrective actions for events and findings were effective and response to industry events was appropriate. Company Nuclear Review Board reviews and the Nuclear Safety Speakout Program for employee concerns were also effective.

The Operations area is rated Category 1.

III. Maintenance

This functional area addresses activities associated with diagnostic, predictive, preventive, and corrective maintenance of plant structures, systems, and components and with the overall physical condition of the plant. It also encompasses all surveillance testing and other tests associated with equipment and system operability.

Overall performance in this area continued to be superior during this assessment period. Several organizational changes, implemented during this evaluation period, maintained the overall effectiveness of the Maintenance Department. Full implementation of the "component engineers" concept in maintenance shops enhanced accountability and "ownership" of specific components. Transfer of planners from a separate organization to the maintenance shop crews gave the cognizant line managers full control of all necessary functions. This resulted in better availability of parts and better contingency plans. Also, management developed and implemented a number of organizational and programmatic changes which were effective in improving control over

contract maintenance activities since the last SALP period. The Preventive Maintenance Program focused on several specific maintenance problems and produced good results. Specifically, the Leak Reduction Program significantly reduced the number of leaks throughout the plant; the Check Valve Inspection Program resulted in a computerized data base, detailed inspection procedures, and plant modifications in response to trends discovered by the Program; the Small Diameter Valve Improvement Program resulted in identification and replacement of problem valves with standardized, qualified valves; and the Rotating Equipment Reliability Program addressed improvements in original motor alignment, pump bearing installation, and mechanical seal and bearing lubrication.

St. Lucie's aggressive Predictive Maintenance Program, which includes monitoring and trending of numerous major pieces of plant equipment using vibration analysis, oil analysis, and thermography as tools, detected several incipient, potential problems. This permitted orderly shutdown of the plant for repairs and averted equipment failures. Three examples included a degraded thrust bearing in the 1B main feed pump , a cracked shaft in the 2A1 reactor main coolant pump, and a dislodged strainer in the 2B component cooling water pump. The Failure Analysis Group, which monitors multiple equipment failures and tracks the issues to resolution, provided an effective feedback loop to Maintenance Department supervisors.

The Maintenance organization was staffed with qualified, competent, and well-trained individuals. System Supervisors had significant technical expertise and took the lead in addressing maintenance problems with design changes, as demonstrated in the successful effort to resolve a long-standing problem of dropping control rods. Aggressive, in-depth probing into the root cause of multiple capacitor failures in inverters led to the discovery of a mounting problem which the licensee then corrected, working jointly with the vendor. The Electrical Department developed an innovative methodology for rewinding large Class 1E motors by local vendors, thereby shortening repair time and minimizing equipment unavailability.

Maintenance exhibited generally excellent coordination with the Operations and Engineering organizations. This was evident during a forced outage caused by the unlatched rod event on Unit 1, as well as the search for, and subsequent repair of, a pin-hole leak in the refueling water tank.

In order to improve the adequacy of and adherence to work control procedures, the licensee implemented a number of effective improvements during this period including: changing to an automated work control process; introduction of quality control holdpoints in the Passport program which generates work requests, work orders, and control documents; and post-maintenance test procedure improvements. Notwithstanding the effectiveness of these improvements, there were still several lapses during the period attributable to inadequate procedure quality and/or adherence such as the failure to reattach a

seismic support following maintenance; failure of a bearing due to improper reassembly of a gearbox oiler; and inadvertent wetting down of an emergency diesel generator while hosing down the room.

Surveillance activities continued to be a strength during this period. Surveillances were timely and of professional quality. The philosophy of scheduling surveillance activities repetitively on the same day of the week and same week of the month gave the program structure and predictability. Other activities were worked around scheduled surveillances.

The licensee had a good self-assessment program in the Maintenance area. Corporate Quality Assurance conducted bi-annual audits of the Maintenance Department and the Department conducted several of its own audits each year. The audits conducted during this period appear to be technically sound and comprehensive.

The Maintenance area is rated Category 1.

IV. ENGINEERING

The functional area of Engineering addresses the adequacy of technical and engineering support for all regulated plant activities and interfaces. Design control and modifications are encompassed, as is engineering support for operations, maintenance, outages, testing, and licensing-related activities.

The design change process functioned well during this period. Modifications were technically adequate and sufficiently documented. Plant and engineering priorities were effectively correlated, and the backlog of design change requested actions was significantly reduced. The documentation of changes made under the provisions of 10CFR50.59 improved, although there was one issue resulting from a lack of sensitivity to the need to perform such reviews for temporary modifications.

The engineering support for operations, maintenance, and radiation control activities was effective. Although this support resides in several distinct groups (e.g., Maintenance Department, Technical Support, and Engineering), the cooperation among these groups and the resulting synergism produced a consistently superior level of support for both routine events and emergent issues. Consolidation of engineering management at the site and the physical proximity of the various engineering managers and supervisors onsite appear to have improved the effectiveness of the organization.

Examples of good engineering support were: technical assistance for reactor startup and physics testing, modification of the emergency diesel generator radiator fans to reduce vibration, and an innovative program to deal with identified leaks. Also, maintenance problems were addressed with design changes, as discussed in the Maintenance section.

Technical leadership and innovation were demonstrated in determining effective methods to address equipment-related issues. An example of this was: The modification to the main turbine trip to allow on-line testing and operability verification.

There was, however, an example where engineering support was inadequate. In this instance, a contractor provided the licensee with inadequate instructions to perform American Society of Mechanical Engineers Code repairs of pressurizer instrument nozzle cracks. Despite extensive review by the licensee's engineering and technical support organizations, this error was not detected until an NRC inspector identified it. This happened early in the assessment period, and the licensee conducted an effective review of procedures and practices to preclude recurrence.

Licensing submittals were generally of superior quality. They seldom required clarification and were always timely. The licensee was also effective in communicating the facts for events and the bases for licensing requests to the NRC staff.

The Engineering area is rated Category 1.

V. PLANT SUPPORT

The Plant Support functional area addresses all activities related to radiological controls, chemistry, emergency preparedness, security, fire protection, and housekeeping.

In the radiological controls area, external and internal exposure were well controlled during the period. Collective dose goals were established and adjusted consistent with the changing workload. During 1992, collective dose was limited to 246 person-rem, and during 1993, it was limited to 460 person-rem. Although both years included dose for one refueling outage, 1993 also reflected significant dose associated with an unscheduled outage. Overall, doses were consistent with the work performed. The respiratory protection program was a strength. Engineering controls were instituted along with the respirator reduction effort to effectively limit total effective dose. Radiological work was appropriately controlled with close adherence to radiation work permits by knowledgeable workers. During the period, there was effective control of contamination and a reduction of existing contaminated areas. This effort was supported by a good housekeeping program. Personnel contamination events were maintained at less than annual goals. Management support for training and professional qualification was evidenced by the number of radiation control technicians pursuing and achieving national certification. The ALARA program was effective with several initiatives this period, including the use of robotics for high dose rate applications and the use of new nozzle dams to save exposure. Audits in this area were adequate.

The program to control radiological effluents was effectively implemented this period. Radiation and process monitors were well

maintained. Good agreement was noted between licensee analytical results, independent cross-checks, and confirmatory measurement samples. A well-run environmental monitoring program confirmed the low level of radiological effluents, which caused virtually no dose to offsite environs. The comparison of results for independent environmental samples showed good confirmation. Primary and secondary chemistry programs were effectively implemented. The training program in this area helped to maintain a high skill level among chemistry technicians. The licensee's audit program in this area was effective in identifying weaknesses when they existed and in recommending corrective actions.

Performance in the area of emergency preparedness continued to be strong this period, but there were several issues that arose which required resolution. For example, the overall performance of the emergency response organization during the annual exercise was good; however, the Emergency Operations Facility was not activated in a timely manner. An issue also arose concerning the need to update the State with emergency information periodically during the exercise. Notwithstanding the aforementioned issue, the licensee maintained an excellent working relationship with offsite agencies. The emergency response facilities and equipment were excellent and well maintained. Prompt and effective support was provided for the Turkey Point plant following Hurricane Andrew, and St. Lucie has significantly upgraded their own preparedness as a result of the lessons learned. The audits in this area and the exercise critique were considered adequate.

The physical security program continued to be well implemented during this period. Security personnel were well qualified and trained. There was close adherence to security plans and procedures. The personnel access control program was well managed during the period. The licensee's access authorization program was effective. In this area, the licensee was proactive with regard to the extent of testing and agency record checks, and the staff was well qualified. Safeguards information was appropriately controlled and, in general, plan changes were appropriate and timely. Audits in the overall security area were thorough, complete and effective. Corrective actions to findings were thorough and timely. Security systems (i.e., barriers, alarms, cameras, etc.) were well maintained with excellent testing and repair support.

The fire protection program continued to be effectively implemented during this period. Personnel responded well to drills, tests, and an actual fire. A strong training program helped to maintain a high level of proficiency in this area. Equipment was well maintained, and control over flammable material storage was excellent.

The overall physical condition of the plant was excellent during the period, reflecting management's attention to the continuing upkeep and housekeeping.

The Plant Support area is rated Category 1.