SALP REPORT - CRYSTAL RIVER UNIT 3

50-302/94-02

I. BACKGROUND

The SALP Board convened on March 10, 1994, to assess the nuclear safety performance of Crystal River Unit 3 for the period of August 23, 1992, through February 19, 1994. The Board was conducted per NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance." Board members were Jon R. Johnson (Board Chairperson, Acting Director, Division of Reactor Projects, NRC Region II (RII); Albert F. Gibson, Director, Division of Reactor Safety, NRC RII; J. Philip Stohr, Director, Division of Radiation Safety and Safeguards, 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

Overall plant operational performance during this assessment period has been very good. The station operations staff, as well as the supporting personnel, have demonstrated good teamwork with a good focus on operational safety and plant improvements. There were very few transients and no plant trips caused by personnel error.

Improved support for plant operations was indicated by several actions. Implementation of the shift manager program has resulted in allowing the shift supervisor to concentrate on operational issues while being relieved of maintenance planning and scheduling. Operators were provided with hand-held computers which has resulted in better plant parameter trending and immediate feedback on any out-of-normal readings. In addition, an operations manager personally monitored licensed operator performance during the first day of simulator training, giving prompt feedback to operating crews.

Enhancements to alarm response procedures were made, reflecting good lessons learned from previous audits and inspections. As examples, alarm response procedures were completely reformatted and expanded to provide more response details. Administrative controls for reduced reactor coolant inventory were conservative, and hurricane preparation checklists were upgraded in response to Hurricane Andrew lessons learned.

Plant equipment enhancements resulted in improved plant operational safety performance. Retubing part of the main condenser has improved secondary chemistry, and installation of a backup 230 KV transformer has improved the reliability of offsite power to safety system loads.

Weaknesses were noted in performance of routine operator equipment lineups. Several valve and electrical component mispositioning events indicate a need for improved independent verification or quality

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assurance checks. The licensee's management has recognized these deficiencies in performance and has met with and discussed these performance problems with station staff. There were fewer operational errors during the latter part of the assessment period, as shown by Operations Department trending, but additional improvement is needed. Coordination and communications between the control room and field activities has improved.

Two significant performance deficiencies in the latter part of the assessment period indicated a need to improve management oversight and quality verification programs. Inadequate management oversight and verification of the Emergency Operating Procedures (EOPs) Development Program resulted in lack of clear acceptance criteria and responsibilities for documenting deviations from procedure development guidance. Significant shortcomings were seen in the 10 CFR 50.59 safety evaluations associated with the EOPs. These evaluations lacked specific details and were considered insufficient to demonstrate that there was no unreviewed safety question. Furthermore, locally posted procedures for manual operation of a decay heat removal valve were inadequate and led to an over-cooling transient. Replacement procedures were still inadequate until pointed out during a subsequent NRC inspection, indicating ineffective quality verification performance.

The Operations Department has established a well-functioning six-shift operating organization and operations support staff. The operations technical assistant job has been reformatted from a 24-hour shift to three eight-hour shifts to match those of the operators and the newly assigned shift manager. Although overall administration of licensed operating shifts was good, weak areas were noted when operator medical status changed, and when documenting details of remedial training.

Plant operations management has taken several steps to improve day-to-day as well as long-term performance. This has been demonstrated by a strong management oversight and focus on safety during review of plans for on-line maintenance of safety systems. In addition, more comprehensive performance elements and standards have been drafted for operations shift supervisors to improve communication of plant management expectations.

The Plant Operations area is rated **Category 2**.

III. MAINTENANCE

Performance in the area of maintenance and surveillance of plant structures, systems and components remained good. Strengths included the process for controlling maintenance work, self-assessments, and implementation of in-service inspection, in-service testing and erosion/corrosion programs. A challenge in the area of equipment performance continued from the previous SALP period. Poor maintenance and surveillance work practices were also a challenge.

The Computerized Maintenance Activity Control System was a strength.

This system provided a process for efficiently identifying, prioritizing, planning, scheduling, and documenting maintenance and testing activities. Access to the system through computer terminals was available to all plant employees for requesting maintenance or accessing data. The system was used to effectively manage the backlog of open maintenance work requests.

Effective self-assessments assisted management in strengthening maintenance performance. The Maintenance Department conducted a comprehensive three-phase assessment of work controls, planning, scheduling and the conduct of maintenance. Program improvements were made based upon the results of this assessment. An audit of mid-cycle outage maintenance activities by the Site Quality Programs Staff identified performance problems and provided recommendations for improvement. Steps were taken to improve performance in areas where problems were found.

Effective in-service inspection, in-service testing and erosion/corrosion programs were implemented. Effective in-service inspection and testing were the result of good procedures implemented by qualified personnel. The program for predicting piping degradation due to erosion/corrosion was improved to meet the latest industry standards and practices.

Some improvement in equipment performance was evident, but equipment failures remained a challenge. The performance of safety-related equipment was good, as evidenced by good availability of these systems and an improving trend for unplanned safety system actuations; however, preventable equipment failures adversely affected plant performance. For example, deficiencies in preventive maintenance contributed to two reactor trips and degradation of an emergency feedwater pump governor. In addition, offsite power was degraded on two occasions due to water intrusion through damaged cable jackets in the switchyard. Adequate corrective action in response to the first intrusion could have prevented the second occurrence. In addition, approximately twenty power reductions were required to repair leaking condenser tubes. The licensee initiated actions to improve performance in these areas, including strengthening the preventive maintenance program and retubing condenser waterboxes.

Poor work practices during some maintenance and surveillance activities resulted in degradation of plant systems. For example, use of an incorrect procedure for battery maintenance in the switchyard resulted in loss of power to an engineered safeguards bus, improper rigging of a tank caused several hundred gallons of a sodium hydroxide solution to be spilled in the turbine building, and one train of control room ventilation was inoperable because a damper was erroneously left in the closed position following maintenance. In addition, several examples of failure to follow procedures occurred during the fifth containment tendon surveillance test.

The maintenance area is rated **Category 2.**

IV. ENGINEERING

Overall, performance in this area was superior and Engineering made significant positive contributions to Crystal River Unit 3 performance. Engineering performance during the latter part of the period continued to improve. Strengths during this period included the performance of the system engineers, self-identification and effective resolution of earlier design deficiencies, and strong management support for engineering activities. The quality of licensing submittals was identified as a challenge.

The system engineer program has improved significantly since the last SALP evaluation, as has the Nuclear Plant Technical Support Group performance. The System Engineers have taken ownership of the plant systems, providing excellent support to operations and maintenance. The use of the System Engineers as System Outage Managers, responsible for planning and coordinating outage activities on their assigned systems, has proven to be very effective. System Engineers have become an integral part of the work control process. Several instances of aggressive in-depth involvement in root cause determinations during the period were noteworthy. These included the role of the feedwater pump governor in a late 1992 plant trip, assessment of reactor building concrete spalling, and identification, evaluation and corrective actions associated with chloride stress corrosion on a core flood tank fill line. The engineering staff issued several excellent reports on plant systems status and problems, a notable improvement since the last evaluation period.

One significant lapse during this period involved the failure to perform an independent evaluation and engineering assessment of degraded bonnet studs on a spent fuel system valve because of perceived pressure to satisfy scheduling goals.

Engineering was successful in self-identification of and effective corrective action for old design deficiencies, some existing since original construction. This enhanced capability is attributed to the strong Configuration Management and Electrical Calculation Enhancement Programs (ECEP), more comprehensive field walkdowns by engineering personnel and a generally heightened sensitivity to identifying such deficiencies. Examples of old design deficiencies identified during this period included inadequate boric acid pump overload protection devices, low control device input voltage for two of four High Pressure Injection (HPI) valves which might have resulted in failure to function under some DBA conditions, possible inability of an HPI valve to operate under degraded voltage conditions, a failure to include sufficient instrument error in the operating limits of the core flood tank, and a control circuit for a letdown isolation valve which did not meet the electrical isolation criteria. Once identified, these deficiencies were effectively assessed and corrected and, where appropriate, the licensee took steps to preclude similar future deficiencies.

Continued strong management support for engineering activities was evident during this period. The Configuration Management Program and expansion of the ECEP, coupled with several significant upgrades (calculational models, BEST transformer, new batteries), resulted in major improvements to the electrical distribution system. Successful completion and issuance of the totally new Improved Technical Specifications, the first in the nation, were largely due to the licensee's continued management support of this long and complex project and its proactive role as the lead Babcock and Wilcox plant. In response to findings of an earlier inspection, the licensee developed and is implementing enhanced electrical cable separation criteria which will contribute to improve safety. Finally, the licensee showed good engineering initiative in removing and examining several steam generator tubes during the last outage and identifying pitting-type degradation.

A significant challenge identified in this evaluation area, which continued from previous SALP periods, involved the quality of licensing submittals. While most licensing submittals were acceptable, some positions and proposed actions did not provide adequate technical justification or sufficient information for the staff to make the required safety and no-significant-hazards determinations. Licensing issues sometimes required excessively prolonged and repetitive interactions to make them acceptable for closure. Examples of such issues which were active during this evaluation period included Intermediate Building high-energy line break, steam generator tube pitting-type degradation acceptance criteria, individual plant examination for external events (IPEEE), and seismic adequacy of equipment.

The Engineering area is rated **Category 1**.

V. PLANT SUPPORT

This functional area addresses all activities related to the plant support functions, including radiological controls, chemistry, emergency preparedness, security, fire protection, and housekeeping.

The overall radiological controls area was effectively implemented during the assessment period. The ALARA program and associated initiatives (e.g., mockups, temporary shielding, and chemical decontamination) were effective in controlling exposures for both high dose tasks as well as routine operations. Collective doses were 424 man-rem and 61.7 man-rem for 1992 and 1993, respectively, and were commensurate with the work performed. In addition, the increased use of engineering controls and decreased respirator usage limited total effective dose equivalent with no corresponding increase in internal exposures or personnel contamination events. The radiological controls staff was knowledgeable and professional, and the newly implemented training initiatives, such as the computer-based general employee training, were considered a strength to the program. During the period, the area of audits continued to be a program strength with additional improvements achieved in the depth and quality of the overall selfassessment program. This program resulted in licensee identification of multiple examples of failure to follow radiation protection procedures as well as some continued problems with the ability to control radioactive material outside the radiologically controlled areas. The licensee's efforts in identifying and correcting these deficiencies were generally considered positive.

In the radiological effluents and radioactive waste areas, licensee initiatives resulted in a reduction of radioactive effluent releases as well as solid radioactive waste volumes in 1993. The environmental monitoring program was well executed, and the acquired data correlated well with effluent monitoring data (less than one percent of Technical Specification limits). Primary and secondary chemistry parameters were maintained well below Technical Specification limits with good fuel performance during the period. The quality of measurements was maintained during the period with independent measurements and cross-checks, conducted to assess the quality of radiological measurements, comparing well with the known values.

The emergency preparedness program continued to be effectively implemented. Training programs continued to be strong, as demonstrated by successful emergency response organization responses during the 1992 and 1994 exercises. During the 1994 exercise, weaknesses identified during the previous exercise were appropriately corrected; however, a new weakness was identified as the timely accountability of onsite personnel was not adequately demonstrated. The licensee's classification and response to several actual events (all at the Notification of Unusual Event level) during the period were considered a strength. Coordination with and support of State and local response organizations was good. The audits and exercise critiques in this area were thorough and probing, and corrective actions were effected in a timely manner. Emergency response facilities and equipment were well maintained; however, the program for assuring the operability of the Technical Support Center emergency ventilation system was found to be deficient.

The physical security program continued to be effectively implemented. Management support for the program was strong, as evidenced by upgrades in detection equipment and training. The low turnover rate in security personnel and a strong training program resulted in a knowledgeable staff who performed well during drills and exercises as well as their routine duties. There was good adherence to security procedures. Audits of the program were comprehensive and resulted in program improvements. Overall, maintenance and testing of security systems were considered excellent; however, continuing problems with vital area doors were experienced throughout the period. Licensee actions on resolving the human error and mechanical failures related to the door problems were progressing appropriately at the end of the period. Late in the assessment period, the Operational Safeguards Readiness Evaluation identified several areas for security program improvement.

The fire protection program was properly maintained during the assessment period. Fire brigade staffing consistently met regulatory requirements, and supporting equipment, controls and fire barriers were maintained operable.

Overall, housekeeping practices were adequate during the period. A material upgrade program was implemented in various areas of the Auxiliary Building during the period. This refinishing project was considered a positive initiative to improve overall housekeeping as well as the maintenance of decontaminated surfaces.

The Plant Support area was rated **Category 1.**