SALP REPORT - VERMONT YANKEE NUCLEAR POWER STATION

50-271/92-99

I. BACKGROUND

The SALP Board convened on January 27, 1994 to assess the nuclear safety performance of the Vermont Yankee Nuclear Power Station for the period August 2, 1992 through January 15, 1994. The Board was conducted pursuant to NRC Management Directive (MD) 8.6 (see NRC Administrative Letter 93-20). Board members were Richard W. Cooper, (Board Chairman), Director, Division of Reactor Projects, Region I (RI); James T. Wiggins, Acting Director, Division of Reactor Safety, NRC RI; Charles W. Hehl, Director, Division of Radiation Safety and Safeguards, NRC RI; and, Richard J. Barrett, Chief, Containment Systems and Severe Accident Branch, NRC Office of Nuclear Reactor Regulation. The Board developed this assessment for the approval of the Region I Administrator.

The performance ratings and the functional areas used below are described in NRC MD 8.6, "Systematic Assessment of Licensee Performance (SALP)."

II. PERFORMANCE ANALYSIS - OPERATIONS

The operations area was rated Category 1 in the previous SALP period. Strengths included sustained superior and professional performance by control room operators; management involvement and oversight in daily activities; and effective planning, scheduling, and implementation of outage activities. Areas for improvement included deficiencies with Emergency Operating Procedures, and communications weaknesses.

During the present SALP period, licensed operators continued to exhibit strong command in the control room and a professional decorum that resulted in excellent response to off-normal events and the safe conduct of routine plant activities. A noteworthy example of operator performance was the rapid and highly effective response to multiple lightning strikes and severe storms that challenged operators because the events rendered some control room alarms and panel indications inoperable. Operators maintained the plant in a safe condition while closely coordinating with other plant departments to effect equipment inspections and prompt repairs. Another example was the conduct of the post-refueling-outage reactor startup, which was professional and team oriented.

To strengthen interdepartmental communications and coordination, daily plant manager meetings were instituted along with shift briefings near the end of the period. Management's commitment to improve in this area is noteworthy, and inspection observations near the end of the assessment period indicated that these initiatives were effective in improving interdepartmental communications.

Management's strong commitment to training was exemplified by the improvements to operator training accomplished in this period. Training department directives were revised to improve standards and expectations. The training change request system, implemented this period, was effective in identifying and correcting program weaknesses. Most of the previous weaknesses in Emergency Operating Procedures were resolved effectively, resulting in highly trained, qualified, and effective plant operators.

Performance during the Fall 1993 refueling outage was good, with one significant exception involving fuel handling. System configurations were effectively controlled to minimize shutdown risk through Outage Safety Committee review of activities and implementation of the formalized Outage Guidelines. Before restart from the refueling outage, the Plant Operations Review Committee comprehensively assessed plant status, thereby contributing to the error-free startup. However, operator errors, ineffective training on refueling bridge modifications, and a significant weakness in management oversight of fuel movement resulted in two fuel handling events that necessitated work stoppages, root cause evaluations, and extensive corrective action by Vermont Yankee. Vermont Yankee should ensure that other repetitive and relatively routine activities that have been previously performed without problems, like fuel movement, are performed with appropriate rigor and oversight.

Management attention is needed to improve operational decisionmaking and minimize operator distractions. In some instances, Vermont Yankee's nonconservative reading and implementation of Technical Specifications (TS) led to operations with degraded safety equipment. For example, Vermont Yankee did not comply with the TS action statement after experiencing slow control rod insertion times during surveillance testing. Incorrectly concluding that no action was required by the TS resulted in continued reactor power operation without investigation of the cause for these test deficiencies. In another instance, the licensee removed the redundancy of secondary containment standby gas treatment systems during the Fall 1993 refueling outage to perform maintenance on one of the associated train's emergency diesel generators without initially considering the plant in a limiting condition for operation (LCO). Misreading this TS resulted in a decrease in the defense-in-depth to mitigate fuel handling events that is provided through the TS. In addition, Operations Department management's high threshold for correcting certain deficient conditions resulted in distractions to the operators that had the potential to draw their attention from more-safety-significant issues. Examples included: drywell temperatures routinely above the normal value specified on operator logsheets that were not actively investigated or assessed for operational impact; repeatedly bypassing the turbine loading bay fire detection system and entering a TS LCO because of an oversensitive design; and operating with the condenser off-gas high radiation monitors in an alarm condition for the entire operating cycle, thereby masking potential valid increases in condenser off-gas radiation levels.

In summary, Vermont Yankee's performance in the operations area during this SALP period was characterized by continued strong operator performance, a strong commitment to training, and generally good planning and conduct of a refueling outage with the notable exception of fuel handling. However, management attention is needed to address weaknesses

in interpretations of TSs because of their potential effect on the availability of safety systems, and the approach to correction and assessment of longstanding deficiencies of low safety significance that potentially represent distractions to the operators and that may mask more significant problems. In addition, management should ensure that repetitive, relatively routine activities are conducted with rigor and management oversight commensurate with their safety significance.

Operations was rated Category 2.

III. PERFORMANCE ANALYSIS - MAINTENANCE

The maintenance area was rated Category 1 in the previous SALP period. The assessment found that the licensee's maintenance and surveillance programs effectively contributed to safety and produced, with few exceptions, high equipment reliability and availability. The material condition of the plant was very good. The skill, experience, and training of the maintenance staff were a noted strength. The surveillance program was well controlled and continued to confirm the operability of safety-related equipment that was tested. Weaknesses existed in the predictive maintenance program.

During this SALP period, management attention to performance and control of activities continued to produce results that were, in general, good. In particular, the controls placed by plant management on maintenance of equipment performed while in TS allowed outage times were effective in assuring those activities were conducted safely and efficiently, with the exception of the controls implemented during emergency diesel generator maintenance performed during fuel handling operations. The administrative procedure that governs at-power maintenance was robust with respect to managing that activity. Also, the licensee effectively controlled troubleshooting activities.

The material condition of the plant continued to be very good, and no plant trips occurred as a result of maintenance activities. Maintenance craft personnel continued to demonstrate excellent qualifications and skill. The licensee effectively managed the backlog of outstanding maintenance requests and promptly addressed conditions that were significant to safety.

There were several instances during this period of ineffective work controls or procedures that resulted in maintenance-related problems. In one instance, the absence of specific procedural controls on bolt torquing caused problems with an emergency diesel generator (EDG) turbocharger after a diesel overhaul. In addition, in several instances, the plant's design basis was compromised as a result of maintenance activities. These latter problems involved work performed by contractors that had not been adequately scoped or evaluated to determine the effects of that work on the plant in areas somewhat removed from the physical location of the work.

In the surveillance area, testing was, in general well controlled. The testing performed contributed to the safe operation of the facility. However, weaknesses were identified in the establishment of baselines and alert ranges associated with some inservice testing (IST) activities. The licensee subsequently took positive action to correct those IST problems. Surveillance procedures for visual examination of fire barriers lacked appropriate acceptance criteria; this delayed the licensee's identification of significant problems with those barriers. Also, as described in the engineering area, there were important weaknesses in the performance of root cause assessments of discrepant surveillance test results and in trending of surveillance test results. Further, there were significant weaknesses in the scope of testing performed on safety-related systems for which there are no specific surveillance requirements articulated in TSs; the most noteworthy example of this weakness was associated with testing of the Alternate Cooling System.

In summary, although the licensee's overall performance resulted in safe plant operations, problems found during the period indicated that the level of performance declined. Although the material condition of the plant remained very good, some problems were noted in the control of work and in the technical adequacy of procedures. Weaknesses were identified in establishing the scope, baselines, acceptance criteria and trending of results for certain testing. Excellent staff skill and qualifications were demonstrated. Work backlogs and emergent work were well managed.

Maintenance was rated **Category 2**.

IV. PERFORMANCE ANALYSIS - ENGINEERING

The engineering and technical support area was rated Category 2 in the previous SALP period, with strengths in the areas of planning and scheduling, root cause analyses, and corrective actions to identified engineering issues. The training and qualifications of the staff were judged to be excellent, along with the quality of communications among plant and corporate engineering groups. Weaknesses were found in the safety assessment process, in technical support for event reporting and in the licensee's approach to testing motor-operated valves.

Strong engineering management attention and participation continued during this present SALP period for those issues that the licensee determined were important. That participation and attention resulted in the development and implementation of effective engineering solutions. Emergent work during Refueling Outage XVII was well managed, assuring that necessary work was completed even though that work caused a modest delay in the restart schedule. Communications between corporate and plant engineering organizations remained good during this period.

The engineering work that supported modifications and that supported technical resolution of emergent issues was of high quality. Design change activities were effectively conducted and

controlled. The licensee began to more effectively use insight from operating experience in the development of major modifications and design changes to produce a more effective product and to make better decisions regarding prioritization of those engineering activities. Engineering support to the operating organization was timely, and of high quality. Safety evaluations that supported engineering activities in the field and those that supported licensing work were usually of good quality. Examples of this good performance included activities associated with the reactor water level instrumentation modification, the resolution of switchgear room cable separation problems, and modifications to the spent fuel pool cooling system. Programmatic activities that the licensee conducted, such as the erosion/corrosion program, were consistently well controlled. The licensee also made significant improvements in the motor-operated-valve testing program.

The experience, knowledge, and qualifications of the engineering and technical staff contributed positively to safe continued plant operations. That knowledge and experience were effectively applied to design and analysis activities and to the licensee's self-assessment programs.

Although the licensee's performance with respect to issues it focuses on is strong, noteworthy weaknesses existed in the licensee's approach to testing (and their evaluation of test results) of certain systems to ensure their reliability and functionality. The licensee did not have a formal, organized, and technically-supported approach to testing of safety-related systems for which specific test requirements do not exist in TS. Systems such as the Alternate Cooling System and the control room heating, ventilating, and air conditioning (HVAC) system received minimal, if any, planned, periodic testing. Further, the ineffective initial response to slow control rod drop times resulted from an evaluation of trends in equipment performance that was neither aggressive nor timely. Finally, while the licensee effectively designed and implemented the Vernon tie-line modification, the licensee's initial test program proposal for that modification was somewhat narrowly focused, in that it did not include a functional test under load.

Near the end of the period, the licensee started to review and assess industry experience in a more formal, effective manner, to confirm the plant design basis and to uncover existing problems. The reviewers also began to more actively question and challenge the adequacy of plant systems and processes.

Other minor weaknesses persisted from the previous SALP period, in the consistency of depth and breadth of the analyses, evaluations, and corrective actions for licensee event reports (LERs). Minor weaknesses were also seen in EDG trending, in scaffolding control, in safety evaluations for EDG cylinder liner replacement, and in a temporary modification of the refueling interlocks. Also, the licensee's weak root cause analysis of prior problems with an emergency diesel generator (EDG) fuel line contributed to the failure of that line on the other engine.

In summary, the licensee's performance was generally very good in those areas on which it chose to focus. That high quality of performance came from the experience and knowledge of its staff, and from effective communications among the various plant and corporate organizations. Technical quality of design products has been high and significantly contributed to safe unit operation. However, noteworthy weaknesses existed in some areas on which the licensee did not focus, such as the lack of a testing program for safety-related systems for which TSs do not provide specific test requirements.

Engineering was rated **Category 2**.

V. PERFORMANCE ANALYSIS - PLANT SUPPORT

This functional area is new, representing a significant change from the previous SALPs. The plant support functional area covers all activities related to plant support functions, including radiological controls, emergency preparedness, security, chemistry, fire protection, and housekeeping controls.

In the previous SALP period, radiological controls was rated Category 2, Improving, emergency preparedness was rated Category 1, and the security area was rated Category 3. Performance strengths in radiation protection included effective management of technical issues, improved quality assurance and staffing of the radiation protection organization for both outage and non-outage periods, and effective performance-based training of health physics technicians. The effluent and environmental monitoring programs were highly effective. Strengths in the radwaste and transportation area included installation and use of a new resin processing system, decontamination efforts in the radwaste truck bay, and disposal of radioactive materials from the spent fuel pool. Some weaknesses in radwaste training and quality assurance activities were identified. Performance in the emergency preparedness area was excellent showing strengths in the staffing and training of the emergency response organization and effective self-assessments. Frequent drills helped ensure a high state of readiness. Some reporting problems were identified during actual Unusual Event situations. The security program was identified as an area of significant concern. Although toward the end of the period management had demonstrated a more active role in program oversight, earlier weaknesses in key elements of the security program caused significant performance problems.

During the current SALP period, radiation controls continued to improve. Excellent health physics coverage of radiological activities and many As Low As Reasonably Achievable (ALARA) program improvements resulted in significant dose savings and communications of radiation protection information to workers. Total dose remained very low, significantly improving on aggressive plant goals. Contamination controls were effective in minimizing the spread of radioactive contamination. Staffing levels for radiation protection personnel were very good for the scope of work performed during the refueling outage. Excellent radiation surveys and radiological postings resulted in clear definition of radiation area

boundaries and effectively communicated dose gradients to workers. Controls over access to high radiation areas were further strengthened during the period. Minor weaknesses were identified regarding the completion of contractor technician qualification records and the coordination between radiation protection and engineering personnel on temporary shielding requests. A problem with ensuring that radioactive materials were not removed inadvertently from the radiation control area was being aggressively addressed. Radiological housekeeping was generally very good, but degraded somewhat during the refueling outage.

Performance in the radiological environmental monitoring and effluent control programs continued to be strong. Progress was made in resolving a longstanding issue regarding monitoring of the roof vents of the turbine building. Quality assurance audits were thorough and of high technical quality. An aggressive chemistry program continued to be effective in identifying and correcting adverse trends. Records for shipments of radioactive material were well organized, complete, and effectively reviewed. A new liquid waste processing system improved efficiency and reduced total personnel exposure for radwaste processing. The licensee implemented an aggressive investigation and corrective action program upon discovering contamination in the south storm drain and west cooling tower basin.

The emergency preparedness program continued to be effectively implemented. Emergency response facilities were operationally ready, independent program audits were effective in identifying areas for improvement, the emergency response training program remained strong, and support from site management was evident. Performance during both emergency exercises was excellent with proper event classifications, prompt and accurate information flow between emergency response facilities, and effective interactions with state and local governments. Operator performance in implementing the emergency operating procedures was recognized as a strength. No exercise weaknesses were identified; however, areas for improvement included documentation of operator activities in the field, control of emergency plan documents, and inventories of equipment.

Substantial program changes implemented near the end of the previous SALP period coupled with improved management oversight and involvement resulted in a marked increase in the effectiveness of the security program during this SALP period. Licensee management demonstrated an improved approach to understanding and implementing the fundamentals of a sound nuclear security program. Program improvements included enhancing the perimeter alarm system and resolving longstanding problems involving assessment aids. During this SALP period, the licensee hired a new security contractor. Improved communications between licensee management and security contractor management were evident. A more sophisticated and comprehensive self-assessment program substantially reduced personnel errors and the number of loggable events. An effective program of periodic backshift oversight by licensee security personnel was implemented. Overtime problems were resolved and training of security officers and supervisors was greatly improved. Maintenance support of security equipment improved markedly and resulted in more timely repairs and a significant reduction in staff hours for compensatory measures. By the end of this SALP period, the licensee had transformed the security program into a facility strength.

The fire protection program continued to be effectively implemented. The fire protection staff effectively inspected areas for potential fire hazards. Once identified, the licensee effectively resolved discrepancies with degraded fire barrier penetration seals (refer to Section III, Maintenance, Page 4). Housekeeping and cleanliness continued to be strengths; however, in some instances, the installation of scaffolding potentially affected safety-related equipment.

Overall, the plant support functions substantially contributed to safe plant performance. Already strong performance in the radiation protection area continued to improve. There was continued excellent performance in the emergency preparedness area. Performance in the security area improved significantly over the period. Strong performance in fire protection and housekeeping was noted.

Plant support was rated **Category 1**.