

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

MAINE YANKEE ATOMIC POWER STATION

Report No. 50-309/92-99

I. BACKGROUND

The SALP Board convened on February 25, 1994, to assess the nuclear safety performance of Maine Yankee for the period June 28, 1992 to February 5, 1994. The board was convened pursuant to U.S. Nuclear Regulatory Commission (NRC) Management Directive (MD) 8.6, "Systematic Assessment of Licensee Performance (SALP)" (see NRC Administrative Letter 93-02). Board members were Wayne D. Lanning (Board Chairman), Acting Director, Division of Reactor Projects, NRC 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; Jose A. Calvo, Assistant Director for Region I Reactors, NRC Office of Nuclear Reactor Regulation. The board developed this assessment for approval of the Region I Administrator.

The following performance category ratings and the assessment functional areas are defined and described in NRC MD 8.6.

II. PERFORMANCE ANALYSIS - OPERATIONS

The operations area was rated Category 1 in the previous assessment period. Operations management demonstrated a strong safety perspective in response to issues, and corporate management effectively participated in decisions involving safe plant operations. Operators aggressively and proactively monitored plant conditions and activities. They generally performed plant evolutions deliberately and skillfully and demonstrated vigilance and foresight in responding to equipment malfunctions and plant transients. On several occasions, operators averted plant transients.

During this assessment period, Maine Yankee corporate and site management demonstrated an excellent safety-oriented philosophy, as evidenced by a conservative approach to plant operations and by thorough review, planning, and resolution of operational concerns. Maine Yankee management conservatively shut down the plant in response to increased reactor coolant pump vibrations on two occasions, to a secondary system leak, and to a degraded cooling fan for the main generator leads. Maine Yankee management took excellent precautionary measures in response to increased primary-to-secondary leakage, a reactor coolant pump seal water supply leak, and a severe winter storm. The review, planning, and resolution of these operational concerns were thorough and prevented further problems.

The operations staff's excellent performance contributed to the continued safe operation of the plant. Plant operators completed infrequent evolutions, such as plant startups and shutdowns, and refueling outage activities in a deliberate, controlled manner and without

incident. Plant operators promptly identified and effectively responded to equipment problems. Operator attentiveness resulted in detection of equipment deficiencies, such as a small air leak in a diesel generator air start system. Effective and prompt operator actions averted potential plant transients and trips, such as during the responses to impending failure of the cooling fan for the main generator leads and the abnormal operation of secondary system valves. Plant shift supervisors made timely and appropriate operability determinations and provided good safety assessments of the impact of equipment deficiencies on safety systems performance. Particularly noteworthy were the questioning attitude and safety assessment of a plant shift supervisor who identified a leaking secondary component cooling valve, which affected system operability. No plant trips or engineered safety feature actuations occurred during the period.

Both corporate and site management were closely involved in daily issues and provided excellent oversight of plant activities. The daily meeting was an excellent forum to manage emerging plant issues and events. During these meetings, management raised pertinent safety questions and ensured that problems were properly resolved. The threshold for raising issues and events to management appropriately ensured that management was informed of significant operational concerns. During the outage, shutdown risk was managed well through the effective use of critical safety functions. Both the Plant Operations Review Committee and the Nuclear Safety Audit and Review Committee effectively oversaw plant activities, with a proper focus on safety issues.

The training program was very effective and contributed significantly toward maintaining operator qualification. The operations manager was very involved in the training program, as indicated by his participation in the determination of crew critical tasks, the evaluation of individual crews, and the insightful and probing critiques of the crews' performance. Simulator scenarios were very challenging and allowed ample opportunities for evaluating operator abilities. Operator license candidates were well prepared, as evidenced by the good performance during the examination. All licensed operators and initial license candidates evaluated by the NRC passed.

The operations staff demonstrated excellent initiative in enhancing maneuvering procedures. During the procedure revision process, senior reactor operators developed flow charts to maximize the flexibility and ease of use of the new procedures, conducted table top exercises to validate the procedures, and obtained extensive reviews from other members of the operations staff. These efforts were completed before the end of the refueling outage, and the procedures were used during startup from the outage. However, weaknesses in the locked valve procedures indicate that Maine Yankee's continuing efforts to enhance procedures were warranted.

In summary, Maine Yankee corporate and site management demonstrated an excellent safety-oriented philosophy, as evidenced by a conservative approach to plant operations and by thorough review, planning, and resolution of operational concerns. Management was closely involved in daily issues and provided excellent oversight of plant activities. The operations

staff's excellent performance contributed to the safe operation of the plant. The training program was very effective and contributed significantly to excellent operator performance. The operations staff demonstrated excellent initiative in enhancing maneuvering procedures.

The operations area is rated Category 1.

III. PERFORMANCE ANALYSIS - MAINTENANCE

The maintenance area was rated Category 2 in the previous assessment period. Maintenance and surveillance activities contributed to safe and reliable plant operations. Refueling outage activities were well controlled. Maintenance personnel displayed excellent diagnostic and technical skills and resolved identified deficiencies and malfunctions carefully and promptly. Supervisory oversight of maintenance activities improved. However, use of and adherence to procedures were identified weaknesses.

During this assessment period, maintenance activities continued to contribute positively to plant safety and reliability. Site and maintenance management oversight of maintenance activities continued to be very good, and maintenance staff expertise continued to be demonstrated in daily activities. Procedures and procedural adherence improved.

Oversight and control of maintenance activities continued to be very good. Maintenance department supervisors closely observed activities in the field. Work planning and preparation were generally effective, the work backlog was well-managed, and the need for rework was minimal. Although extensive training was provided to contractor personnel, the work performed in the field, and oversight and control of contractor-performed tasks were occasionally weak. For example, maintenance department management relied to a great extent on the vendor's technical advice, rather than on detailed work procedures during the replacement of the emergency diesel generator (EDG) turbocharger and implementation of the leak-sealing program. In another example, a contractor failed to follow procedures and, as a result, failed to set the torque switch properly in a high pressure safety injection motor-operated valve, which resulted in valve damage during subsequent operation.

Technical problems that arose during the period were addressed in a quality manner. Good root cause and diagnostic skills were displayed in the conduct of troubleshooting activities. Site management's efforts to improve the quality of and adherence to maintenance procedures were generally effective and improved. However, the procedure used for post-maintenance testing of the turbine driven auxiliary feedwater pump was inadequate in that it did not verify that the maintenance had been satisfactorily completed.

Programmatic activities in the maintenance area were generally strong. Strong performance was shown in the inservice testing program, the motor-operated valve program, and the EDG reliability monitoring program. Each of these programs reflected close oversight and control.

Maintenance personnel displayed excellent technical knowledge and proficiency in their craft, contributing to the high quality of physical work in the plant. Contractor performance did not consistently meet those same high standards, occasionally resulting in improperly performed work activities and one instance of equipment damage. While maintenance personnel were typically well qualified on the activities they performed, a significant weakness existed in the training and procedures provided to licensee maintenance personnel regarding the digital diverse scram system. Despite the lack of training and appropriate procedures, a technician attempted to interact with the system and, as a result, defeated the system's function.

Surveillance and testing activities typically were well controlled. Testing activities continued to support maintenance of equipment operability and reliability. However, some noteworthy work control issues occurred. In one instance, a cardox system discharge test was carefully planned to ensure worker protection. However, the test was deferred. When the test was performed, the same level of detailed planning was not repeated; as a result, personnel were not removed from all areas that were affected by the system's discharge. In another instance, operators performing a control element assembly test disabled alarm functions without controlling that activity through the temporary modification control process. As a result, the alarm functions were not returned to service following the test and an inadvertent change in system configuration resulted.

In summary, the overall quality of maintenance activities was good, with indication that the licensee had improved since the last assessment period. Maintenance management oversight and controls were generally strong, and high-quality technical work was performed. Some weaknesses were noted in contractor performance and licensee oversight of contractors.

The maintenance area is rated Category 2.

IV. PERFORMANCE ANALYSIS - ENGINEERING

The engineering area was rated Category 2 in the previous assessment period. The effectiveness of design activities and safety evaluations improved, with strong management focus on safety and reliability. Plant and corporate engineering departments actively participated in operating activities. Weaknesses included root cause determinations that were occasionally shallow, and inadequate procedural controls for certain contractor-performed activities.

During the current assessment period, both corporate and plant engineering departments continued strong performance with respect to interaction with the operating organization. Both engineering organizations displayed good safety perspective and generally provided for the effective resolution of issues. However, some noteworthy weaknesses were evident. Engineering's response to piping erosion-corrosion concerns initially was narrow in focus, relying excessively on engineering judgement and operating experience. After a through-wall

pipng failure occurred, the licensee improved the program. The modification process did not always provide for adequate procedures and training, as evidenced by the problems associated with the diverse scram system modification.

The technical quality of engineering work products was usually very good. This high quality was evident, particularly in the design of the integrated non-nuclear safety digital information system. Technical resolutions for reactor coolant pump vibrations, Thermolag fire barriers issues, AK-25 breaker paddle failures, and heating concerns related to Limitorque motor operator performance also were of high quality. However, the analysis that supported a steam generator blowdown line modification was weak in that the effects of increased blowdown flow on emergency feedwater/auxiliary feedwater performance were not adequately considered.

The licensee was generally timely and thorough in addressing equipment problems at the plant. Notwithstanding that, occasional lapses in performance were observed. For instance, although the eventual resolution of the RMS-9 trip device issue in a non-safety-related application was thorough and appropriate, the licensee did not initially focus on the potential implications of the failure on safety-related applications. The licensee was slow to establish a closeout plan to ensure service water flow rates were sufficient to provide adequate heat transfer capability during summer months, and did not aggressively pursue pump "runout" concerns identified during the testing of high pressure safety injection pumps.

Performance in programmatic activities generally was good. Strengths included the motor-operated valve program, the cable separation validation program, and the fatigue cycle monitoring program. Also, the engineering self-assessment program was effective.

Site and corporate engineering personnel displayed comprehensive knowledge of their discipline and in the plant's design and operation. That knowledge was apparent from the quality of interactions with the operating staff and in the overall quality of engineering efforts. However, some minor attention-to-detail issues were noted, such as technical inadequacies in emergency diesel generator testing and in the calculation of the heat removal capability of the secondary component cooling water system.

In summary, engineering performance continued to be very good. Engineering management coordinated activities with the plant well. The technical quality of engineering work products was very good and engineering personnel were knowledgeable of their fields and of the plant. However, occasional weaknesses existed in aggressively pursuing the broader implications of engineering modifications and ensuring adequate procedures and training are provided to the site as part of the modification process.

The Engineering area is rated Category 2.

V. PERFORMANCE ANALYSIS - PLANT SUPPORT

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

In the previous assessment period, the radiological controls functional area was rated Category 2; the emergency preparedness functional area was rated Category 2, with an improving trend assigned; the security functional area was rated Category 1. Performance in radiation protection was enhanced by continued implementation of the radiation protection improvement program. Additionally, the effectiveness of the quality assurance surveillance program and efforts to reduce radioactive waste volume were noted strengths. Weaknesses were identified in worker compliance with radiological controls, the high incidence of personal contaminations, the effectiveness of the as-low-as-reasonably achievable (ALARA) program, and radiological worker training. The effluent and environmental monitoring programs remained very effective, with recognition of some minor weaknesses in the calibration of effluent and process radiation monitors. Performance in the emergency preparedness area was excellent, with effective response to actual events, good involvement with offsite agencies, appropriate staffing levels, and a highly effective training program. Minor weaknesses were identified in drill documentation and surveillance of the ventilation system in the emergency response facility. The previous SALP report identified the security program as a strength. Highlighted in the security area were excellent plant and corporate support, effective audit and self-assessment programs, program upgrades, and a well-trained and professional security force.

During the current assessment period, the licensee's radiation protection improvement program continued to be effective. There were significant improvements in maintaining occupational exposures ALARA as a result of enhanced outage planning, pre-job and in-progress ALARA reviews, use of shielding, and reduced reliance on respiratory protection. Efforts to maintain the total effective dose equivalent ALARA in accordance with the new 10 CFR Part 20, which was implemented early and before the outage, resulted in significant exposure savings. The total personnel radiological exposure for the 1993 refueling outage was the lowest for Maine Yankee since 1977. Organizational changes, including transferring personnel into the ALARA organization and assigning a radiation protection supervisor to the outage planning staff, highlighted the licensee's continuing commitment to the ALARA principle. Control of radiological work by the radiation protection staff was notable, including actions taken to reduce exposure, contaminated areas, and radwaste volume generated. Strong radiological housekeeping continued to be observed. Highly visible activities such as the cleanup of the spent fuel pool were characterized by strong supervisory oversight and good use of procedures. Monitoring was increased and prompt corrective action was taken in response to initial signs of poor worker practices during the outage.

However, the high number of personal contamination events during the period continued to be a concern. In spite of improvements in the radiation worker training program, some contract workers continued to exhibit poor work practices.

Performance of the radiological environmental monitoring and effluent control programs continued to be strong. Effective programs for measuring radioactivity in process and effluent samples were observed. Quality assurance audits were thorough and of high technical quality. Review and oversight of the chemistry program were excellent and resulted in improved analytical performance. The licensee continued to maintain an effective transportation and solid radwaste processing program.

The emergency preparedness program continued to be effectively implemented, and several major improvements were noted. Emergency action level documents were substantially upgraded. Staffing was enhanced by the assignment of an experienced senior reactor operator as the onsite coordinator. Emergency response facility (ERF) upgrades included installation of direct telephone lines to the State and between ERFs, improved ERF status boards, and enhanced emergency planning zone maps. Performance during the annual emergency exercise was very good; control room operators demonstrated a sound safety perspective, emergency response facilities were staffed in a timely manner, and interface activities with State and local governments were effective. Proficient shift crew performance during NRC walk-through drills further demonstrated the effectiveness of the emergency preparedness training program.

The effectiveness of the security program continued to be excellent. Management attention and involvement continued at a high level, as evidenced by further program improvements and enhancements. Maintenance support of security equipment was aggressive, demonstrated contingency capabilities were excellent, and the audit and self-assessment programs were effective. Corrective actions taken for identified problems were prompt and thorough.

There were limited NRC observations regarding implementation of the fire protection program during this assessment period. However, NRC observations during fire brigade drills noted continued successful performance in this aspect of the program.

Overall, plant support functions significantly contributed to safe plant performance. Performance in the radiation protection area continued to improve and resulted in the lowest personnel exposure for a Maine Yankee refueling outage since 1977. However, the high number of personal contamination events continued to be of concern. There was strong performance in the emergency preparedness area, and a number of important improvements were implemented. Security program performance continued to be a strength.

The plant support area is rated Category 1.