INITIAL SALP REPORT

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBERS

50-445/92-99
50-446/92-99

TU ELECTRIC

Comanche Peak Steam Electric Station
Units 1 and 2

February 3, 1991, through February 1, 1992

welding on the reactor coolant pressure boundary piping and other safety-related piping, along with the program for training and indoctrination of welders was considered a strength. Effective programs for the fabrication, erection/installation, and documentation of safety-related piping, pipe supports, and mechanical components were implemented. A special inspection by the NRC Mobile NDE Laboratory confirmed that licensee NDE methods and results conformed to ASME Code requirements. The Configuration Management Inspection (CMI) determined that the design control program and the translation of design requirements were being performed in an excellent manner. The CMI also concluded that identified deficiencies were corrected and tracked to completion. Superior procedural controls and quality oversight were identified on activities associated with the reactor vessel and internals. Improvements in housekeeping were observed during the latter part of the assessment period. The engineering staff was highly responsive to technical concerns and demonstrated an aggressive approach to problem solving. Although some minor weaknesses were identified in the development of design calculations and assumptions, the overall design basis documentation program was considered extensive and thorough. The QA program oversight of construction activities indicated a high level of management involvement, although corrective actions from QA audit findings were not always effective. An extensive program for the identification, documentation, and correction of nonconforming or deficient conditions is working well. The preoperational test program began late in the assessment period and several deficiencies were identified in the test procedures and the review process.

The licensee's performance category rating for each functional area assessed is provided in the table below, along with the ratings from the previous SALP assessment period.

Functional Area	Rating Last Period 9/1/89-1/31/91	Rating This Period 2/3/91-2/1/92	Trend
Plant Operation	2I*	2	
Radiological Controls	2	1	
Maintenance/Surveillance	2	2	
Emergency Preparedness	1	1	
Security	1	1	
Engineering/Technical Support - Unit 1	2	1	
Safety Assessment/ Quality Verification - Unit 1	2I*	1	
Unit 1 Startup Program	1	NA	
Construction Activities	NA	1	
Engineering/Technical Support - Unit 2	NA	1	
Safety Assessment/ Quality Verification - Unit 2	NA	1	
Preoperational Testing - Unit 2	NA	2	

*Improving Trend - Licensee performance was determined to be improving during the assessment period. Continuation of the trend may result in a change in performance rating.

NA - Not Assessed. The Unit 1 startup program was completed during the last assessment period. Unit 2 programs were not assessed last assessment period because of minimal activity.

III. CRITERIA

The evaluation criteria, category definitions, and SALP process methodology, which were used, as applicable, to assess each functional area, are described in detail in NRC Manual Chapter 0516. This chapter is available in the Public Document Room files. Therefore, these criteria are not repeated here, but will be presented in detail at the public meeting to be held with the licensee on April 21, 1992.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

This functional area consists primarily of the control and execution of activities directly related to operating the plant.

The previous SALP report characterized performance as good, with an improving trend, and noted a strong commitment by management to quality in operations and a conservative safety philosophy in the resolution of potential safety issues. Staffing and training effectiveness for licensed operators was considered a strength, and excellent operator response to several operational events was identified. Weaknesses were noted in secondary plant material condition and housekeeping.

NRC inspection effort consisted of the core inspection program plus regional initiative inspections. A particular regional initiative in the area of operational safety verification added approximately 50 percent more hours beyond that which was allotted in the core inspection program in order to provide expanded inspection coverage during the first full operational cycle since plant licensing. Additionally, the regional initiatives focused on preparation for refueling as well as refueling activities, operation and management of the balance-of-plant (BOP), cold weather preparations, spent fuel pool activities, and reduced inventory operations.

In the previous assessment period, system configuration control was considered a strength. Programmatically, configuration control remains a strength, but the recurring nature of operator errors and misalignments indicated a weakness in the licensee's ability to implement the program effectively.

Several operator errors occurred which resulted in equipment and systems being in the wrong configuration and, in one instance, caused damage which rendered a

train of safety-related equipment inoperable. Toward the end of the assessment period, two specific examples of operator error confirmed weaknesses in system configuration control. These examples occurred during plant startup from refueling in December 1991. In one instance, the turbine-driven auxiliary feedwater pump was inoperable upon entry into Mode 3. In the second instance, the residual heat removal (RHR) system was misaligned while entering Mode 3 such that it would not have been able to perform as designed under certain postulated conditions. These startup problems resulted in an enforcement conference at which the licensee presented the results of its investigation into the matter and proposed corrective actions. The investigation was thorough and the proposed corrective actions encompassing. A civil penalty was imposed for the second instance involving the RHR system.

In addition to the system misalignments, operator error or inattention to detail resulted in three of the four automatic reactor trips and two engineered safety features actuations that occurred during this assessment period.

Recognizing that the personnel error rate was higher than desired, the licensee initiated actions to track and trend personnel errors, increase personnel accountability, encourage self-verification techniques, and ensure performance of crew briefings. The licensee also initiated action to take into consideration crew experience prior to performing infrequent or complex operations.

Also during this assessment period, there were numerous examples of excellent operator performance. Several plant transients, involving both offsite and in-plant situations, demonstrated operator skill and ability to perform under pressure. In several of these instances, operator skill and prompt response prevented the transient from causing a reactor trip or progressing to a more significant event. In each of these instances the operators displayed a sound knowledge of system interrelationships.

Operations personnel maintained a professional work environment in the control room. Access control was good, work areas were appropriately maintained, assignment of responsibilities was clear, and communications among operators and other plant personnel were normally clear and focused. Comprehensive controls were implemented to ensure that Unit 2 work did not adversely affect Unit 1 systems. Qualified operators performed and documented impact reviews prior to approving Unit 2 work in the Unit 1 operations controlled area. Unit 2 work identified to have a potential impact on Unit 1 was required to be approved by the shift supervisor and to be performed in accordance with the normal control process for work on Unit 1 systems.

Operations' ability to control and direct complex evolutions was generally evident. NRC witnessed this coordination in preparations for reduced inventory operations, plant startups and shutdowns, resin transfer operations, high risk maintenance on a feedwater control valve controller, and electrohydraulic control system troubleshooting. However, one occurrence of poor communications led to a significant secondary plant transient requiring a load reduction. An auxiliary operator, dispatched to open a heater drain tank alternate level control valve, manipulated the wrong component. A contributing factor to the

transient was found to be lack of specificity in communications. Poor shift communications also contributed to the RHR system misalignment discussed earlier. These miscommunications appeared to be an exception to generally strong communications and coordination.

The licensee's preparations for both a maintenance outage and the first refueling outage were considered to be detailed and comprehensive. Before each planned outage, personnel performed an independent outage risk assessment. This effort was beneficial and yielded a reduction in risk during the outages. Risk assessment was continued on a daily basis during the outages to consider the effect of schedule changes. An internal task team assessed the readiness for the refueling by examining personnel resources, systems, procedures, training, and licensing support necessary to facilitate the outage effort. The assessment team found a strong program being implemented to incorporate lessons learned from industry refueling experience. The assessment was considered comprehensive and effective. Experience of industry events was reflected in appropriate procedures. Additionally, a superior program for performing and monitoring reduced inventory operations was established.

The conduct of operations during the refueling outage was notable. Operations involving fuel movement were performed conservatively, with concerns for nuclear safety being given highest priority. In one instance, fuel loading was held up for several days to improve water clarity even though this had become the critical path activity. Other complex outage activities were well planned and performed.

Operator staffing continued to be a strength with a total of 61 licensed personnel. There were six operational crews working 12-hour shifts in a 42-day rotation. Assigned to each shift was at least one, and usually two, additional senior reactor operators; one additional reactor operator; and at least 6 nonlicensed auxiliary operators above that which were required by license conditions. A further strength was the licensee's shift technical advisor (STA) program. All STAs were licensed senior reactor operators and qualified to serve as unit supervisors. The licensee maintained a good program for developing licensed operators. Nineteen applicants were expected to sit for the NRC-administered license examination in June 1992.

The material condition of the plant continued to be maintained at an excellent level. Previously, there was concern that the BOP material condition, primarily the turbine building, was poor and several transients were initiated by secondary plant equipment problems. A task team was initiated to improve secondary plant reliability and material condition, which resulted in significant improvement.

Plant labeling was seen as a weakness early in the previous assessment period, but a comprehensive labeling upgrade program has been completed. Implementation of the program was effective and labeling was considered a strength at the end of this assessment period. During the first fuel cycle, the number of illuminated annunciator windows on the main control boards at full power was approximately 25. The licensee has a goal of reducing this number to

zero by the end of the second refueling outage. After the first refueling, some progress toward this goal was noted, with approximately 15 annunciators illuminated at full power.

Management support of operations continued to be a strength. Corporate managers are located at the site to provide senior management oversight and support to nuclear operations. Management attention to operational problems has normally been prompt, comprehensive, and effective as was evident by frequent establishment of qualified task teams representing diverse organizations to investigate events or concerns, determine root causes, and propose corrective actions. These teams and management's implementation of their recommendations have been effective in improving operations. One noted exception to this practice was the incident of water instrusion into the instrument air system. The NRC considered this a significant event and found management's initial response to be slow and ineffective. Once prompted by the NRC, licensee corrective actions were effective.

In summary, licensee management has established excellent operational programs. Strengths were identified in the areas of operator response to transients, performance of complex evolutions, operator staffing and STA program, control room operations, Unit 1/Unit 2 interface, maintenance and refueling outage planning and performance, material condition, plant labeling, and management support. However, errors in system configuration control and personnel errors leading to reactor trips, engineered safety feature actuations, and other plant transients indicated the need for additional management attention to operational program implementation.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Perform regional initiative inspections to review licensee actions to prevent operator errors, strengthen configuration control and monitor control of Unit 1/Unit 2 interface.

b. Licensee Actions

Implement corrective actions to prevent operator errors and strengthen system configuration control. Continue focus to increase reliability of secondary plant equipment and to control Unit 1/Unit 2 interface activities.

B. Radiological Controls

1. Analysis

This functional area consists primarily of activities related to radiation protection, radioactive waste management, radiological effluent control and

monitoring, radiological environmental monitoring, water chemistry control, and transportation of radioactive materials.

The previous SALP report noted that essential elements for an effective radiological controls program were in place; however, the radiation protection department had not been challenged with activities that stressed the department such as those encountered during a refueling outage. The report also noted heavy reliance on contract radiation protection technicians to supplement the permanent plant staff. Recommendations included that the licensee continue its program for the self-identification of problem areas, focus on the implementation of a proper radiation protection program for the upcoming refueling outage, and complete implementation of the transportation program. During this assessment period, the radiation protection department performed well during both a mid-cycle maintenance outage and the first refueling outage, and has addressed other recommendations.

The radiation protection area was inspected two times during the assessment period by radiation specialists in addition to the periodic reviews by the resident inspectors. Management demonstrated excellent support for the radiation protection program by ensuring ample staffing to support plant operations. The corporate health physics group was eliminated; however, a senior health physicist was transferred to Nuclear Overview to provide increased radiological expertise for oversight activities. Other members of the corporate health physics group were transferred to the onsite radiation protection department. The radiation protection department maintained good working relationships with other departments such as maintenance and operations. A good radiological incident reporting system was in use, and it effectively identified, tracked, and corrected radiological problems. Personnel turnover within the department was low, and the department reduced reliance on contract radiation protection technicians during routine operation. An appropriate number of properly trained contract radiation protection technicians were utilized to supplement the permanent staff during outages. Radiation protection supervisors provided good oversight of work activities and made frequent inspections of the radiological controlled area.

An effective screening and qualification program was implemented for the selection of prospective contract radiation protection technicians. Supervisors and professionals in the radiation protection department were provided opportunities to develop technical expertise by attending special offsite training courses. A training course had been established for radiation protection technicians to prepare them for the examination in order to be registered by the National Registry of Radiation Protection Technologists.

An effective as low as reasonably achievable (ALARA) program, which included challenging ALARA goals, had been implemented. Person-rem exposures were low during this assessment period. The ALARA staff was routinely given notification of planned work activities, and this resulted in the development of good ALARA packages. The ALARA group was sufficiently staffed, which allowed the ALARA personnel time to visit job sites and to monitor outage work activities.

Mock-up training for jobs such as reactor coolant pump seal replacement was excellent, and this resulted in work being completed with the person-rem exposure below the original projections.

The radiation protection department maintained good internal and external radiation exposure control programs and an excellent program for control of radioactive materials and contamination. The licensee took appropriate corrective action concerning one violation for the failure of workers to follow instructions on radiation work permits. The number of personnel contaminations was low. Each personnel contamination event was reviewed extensively for causes and lessons learned, and each event received senior management attention. The amount of contaminated area within the radiological controlled area was maintained at a low level and was routinely tracked by management. During the refueling outage, the radiation protection department demonstrated the ability to manage potential radiological problems effectively and provided necessary health physics coverage for outage activities. For example, the response of the radiation protection department to the identification of hot particles in the refueling cavity was prompt and effective.

The radioactive waste management and the radioactive effluent control and monitoring programs were inspected once during the assessment period. The licensee maintained an excellent gaseous and liquid effluent control program. An excellent sampling and analyses program was implemented and met all the Radiological Effluent Technical Specifications and Offsite Dose Calculation Manual requirements. An effective gaseous and liquid effluent release permit program was established to assure that planned effluent releases to the environment received appropriate review and approval prior to the release. The quantities of radionuclides released and calculated offsite doses were within regulatory limits. The licensee reported one unplanned liquid release involving the failure to sample and analyze prior to discharge and one unplanned gaseous release involving a nonconservative setpoint on an effluent monitor. The unplanned releases did not result in any violation of Technical Specification limits, and appropriate corrective actions were promptly implemented to prevent recurrence. Semiannual effluent release reports were submitted in the correct format and contained the required information. A good program was maintained for testing and surveillance of safety-related air cleaning systems. Additionally, process and effluent radiation monitoring instrumentation was appropriately calibrated and well maintained.

The radiochemistry and water chemistry programs were inspected once during the assessment period. Excellent radiochemistry and water chemistry programs were maintained, which followed industry guidelines and met regulatory requirements. The radiochemistry and water chemistry confirmatory measurements results that were compared with NRC measurements were within 99 percent agreement. The licensee had state-of-the-art instrumentation and excellent water chemistry and radiochemistry procedures which specified the latest analytical techniques. An excellent program was implemented for the maintenance of the chemistry laboratories and analytical instrumentation. Station chemistry control procedures specified Electric Power Research Institute chemistry control guidelines and Westinghouse chemistry specifications. The licensee had implemented an excellent chemistry data management program to record and trend chemistry water quality data.

The Radiological Environmental Monitoring Program (REMP) was inspected once during the assessment period. Environmental sampling stations were operational and well maintained. The 1990 Annual Radiological Environmental Operating Report was timely and complete. Excellent procedures were in place for implementation and administration of the REMP. The minor problem areas identified by audits were resolved quickly and completely. Appropriate staffing was provided to handle REMP activities.

The solid radioactive waste processing and transportation program was inspected once during the assessment period. No significant problems were identified in this area. Although the staff responsible for implementing the solid radwaste and transportation program was small, it had kept up with its assigned work. Training in this program area was good. Also, the procedures classifying radioactive waste were excellent, and implementing procedures for transportation activities were adequate. Lack of storage space for low-level radioactive waste was noted as a potential problem.

QA audits and surveillances performed for the activities discussed in this functional area were comprehensive. The personnel performing the audits were knowledgeable of the areas being audited and the audit teams included personnel with appropriate technical expertise.

The training department had implemented very good training programs for this functional area. Training instructors were well qualified. Radiation protection instructors spent time in the plant in order to maintain an understanding of the work being performed by the radiation protection department.

In summary, the radiation protection department was well staffed and trained, and exhibited strong management involvement. The department performed well during the challenge of two outages and handled routine health physics activities in an excellent manner. The programs in the areas of radioactive waste management, water chemistry and radiochemistry, radiological environmental monitoring, and solid radioactive waste and transportation also functioned effectively and were considered to be performing significantly above minimum requirements.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

a. NRC Actions

None.

b. Licensee Actions

Evaluate the need for onsite storage space for low-level radioactive waste.

C. Maintenance/Surveillance

1. Analysis

This functional area consists of activities associated with maintenance of plant structures, systems, and components; procurement, including qualification controls; installation of plant modifications; and maintenance of the plant physical condition. It also includes the conduct of surveillance testing, containment integrated leak rate testing, welding activities, and inservice inspection activities.

The previous SALP report noted that programs in this area were well developed with generally good implementation. The SALP board recommended that the licensee take the necessary actions to eliminate instances of missed surveillance tests.

This area was inspected on a routine basis by the resident inspectors and on several occasions by regional inspectors. Regional inspection activities included followup on the maintenance team inspection, BOP maintenance activities, maintenance program implementation, surveillance testing and calibration control program, surveillance procedures and records, inservice inspection work activities, nondestructive examination activities, outage control as a part of the fuel integrity and reactor subcriticality inspection, welding activities, and installation and testing of design modifications. Enforcement history was generally good, violations were minor, and corrective actions were timely and effective.

An effective maintenance program was implemented with strong management support and oversight. Maintenance activities were generally performed in an acceptable manner using appropriate procedures and administrative controls. There were several instances of inattention to detail during performance of maintenance activities. Management has taken initiatives to improve the control, coordination, and implementation of the maintenance program. The preventive and predictive maintenance programs were effective in enhancing equipment reliability. Few preventive maintenance activities exceeded their due dates and were evaluated for possible impact on equipment reliability. Thermography, oil analysis, and check valve acoustic monitoring have proven useful in identifying potential failures. The backlog of outstanding maintenance items was held to manageable levels, and management reviews of the backlog ensured significant items received priority attention. The root cause analysis program with respect to equipment failures was complete and comprehensive in scope, identified pertinent root causes, and fully documented the techniques used in arriving at the stated conclusions.

Three minor program concerns were identified with regard to the absence of inspection requirements for the metering and relay testing activities which support maintenance activities, postmaintenance testing, and the performance of leak checks following work on components to repair external leakage.

Maintenance activities on BOP equipment were controlled and performed in a manner similar to safety related activities. Certain BOP maintenance activities were routinely reviewed by quality control personnel. A preventive maintenance program for BOP equipment was established and implemented. A good root cause and corrective action system was being applied to the BOP systems. Several plant trips and other transients had been initiated by problems with BOP equipment. Each of these received management attention, and appropriate corrective actions were taken or planned based on the findings of the root cause evaluations. A BOP reliability self-assessment was performed and then updated when new information became available. The licensee implemented many of the recommended corrective actions resulting from this assessment and planned future implementation of others. BOP system performance and general condition improved during this cycle, but continued enhanced attention was needed as indicated by several BOP problems during power ascension following the refueling outage.

First line supervisors were routinely observed in the plant supervising maintenance activities. Senior management personnel were often seen in the plant at the sites of more significant maintenance activities. Engineering personnel have provided timely and effective technical support for maintenance activities with the system engineers playing an important role. Maintenance staffing and training were strong and were supported by excellent training facilities with many equipment mockups. Field personnel were experienced and knowledgeable.

Maintenance activities were generally well-coordinated between the various involved departments. Radiation protection personnel coordinated with maintenance to establish appropriate contamination controls and personnel dose monitoring. Quality control personnel were usually involved in safety-related maintenance activities with quality control hold points being incorporated into the work orders and procedures. Quality control coverage also was often provided for BOP activities. Maintenance worker communications and coordination with the control room operators were generally excellent. Detailed planning and coordinated execution of high-risk maintenance activities were a strength. Training instructors were observed working in the field in the areas of instrumentation and control and electrical maintenance to gain actual field experience, while providing additional manpower to support outage activities.

As mentioned in the Engineering and Technical Support section of this report, the licensee has developed a comprehensive program for maintenance and testing of motor operated valves. Design differential pressure testing and postwork testing of motor-operated valves were observed to be performed properly.

Modification installations were generally performed very well. An example was the installation of the feedwater flow orifices which was completed during the midcycle maintenance outage. However, three minor instances were identified in which a modification was incorrectly installed, which indicates further need for improvement in the area of modification installation and verification of the as-built configurations.

In general, postmodification and postmaintenance testing were performed well. Postmodification testing procedures reviewed and performances observed were of high quality. Complex postmodification tests were performed smoothly with excellent test coordination. Some room for improvement was noted with test package document control and the lack of specific measures to verify that leaks had been effectively repaired. Also, one instance was noted where postmaintenance testing was not addressed for maintenance involving a safety-related flow orifice.

Although no specific programmatic weaknesses were identified during inspections of the surveillance testing program, several surveillance tests were missed for various reasons. Licensee event reports (LERs) of the missed surveillance tests were considered to be thorough and comprehensive. Although appropriate corrective action was taken in each specific case, the actions were not effective in correcting the missed surveillance test problem. At the end of this assessment period, a licensee task team was reviewing the surveillance test program to determine the cause of continued instances of missed surveillance tests.

The surveillance testing activities observed were performed by qualified personnel using appropriate administrative controls. Surveillance tests were well coordinated with generally excellent communication practices used between the testing organization and the plant operators. Crew briefings held prior to complex surveillance tests were useful in ensuring that each crew member understood the planned evolutions. Coordination of complex surveillance tests was excellent.

Although personnel performance during surveillance testing was generally good, personnel errors during testing resulted in inadvertent equipment actuations on three occasions, and personnel errors contributed to missing several surveillance tests. This indicated a need for more attention to detail and improved self-checking techniques.

The surveillance test procedures reviewed were technically adequate and met Technical Specification requirements, but surveillance test procedure deficiencies led to both incorrect settings on the main steam safety valves and an inadvertent auxiliary feedwater system actuation. The length and complexity of certain surveillance test procedures had been a previous concern. These procedures were simplified by breaking them into several shorter procedures.

The scope of the inservice inspection (ISI) program included all required components, except for those which had been exempted. The nondestructive examination (NDE) procedures met the requirements of the American Society of Mechanical Engineers (ASME) Code, Sections V and XI, and the technical content of the procedures was satisfactory. ISI work activities were generally well defined and effectively implemented. Activities observed were in conformance with program, procedural, and ASME code requirements. A program weakness was identified with respect to the failure of management to review completed inservice testing surveillance work orders in a timely manner to ensure prompt attention, tracking, and trending. Two discrepancies identified during review of records of ISI activities indicated the need for increased licensee oversight of the ISI contractor.

There was a comprehensive program for control of welding with effective implementation with respect to the use of qualified welding procedures and personnel and performance of the required inspections. Welding activities were found to be well controlled during installation of flow restrictors and replacement of pipe elbows in the main feedwater system. The applicable welding procedure specifications and personnel were appropriately qualified, welding materials were properly controlled, and observed welding conformed to requirements.

A strong program for containment building leak rate testing exists. Local leak rate testing observed was properly performed using adequate procedures. Extensive walkdowns of containment penetrations and comparisons with the plant drawings and local leak rate testing procedures identified no discrepancies.

A midcycle maintenance outage and the first refueling outage occurred during this assessment period. These outages were well planned with extensive preparation. The licensee established detailed and effective work controls and clear lines of authority and responsibility for refueling and other outage activities. Effective mock-up training for reactor coolant pump seal replacement was conducted. This integrated training of various involved work groups was thorough, realistic, and detailed. As a result, seal replacement during the midcycle outage was performed in less time and with less personnel radiation dose than expected.

In summary, the licensee has developed excellent programs in the areas of maintenance and surveillance, with some implementation weaknesses noted. Management involvement continued to be at a high level, but examples of ineffective oversight were noted in the control of contractor activities. Staffing levels were appropriate, and personnel were experienced and well-trained. BOP maintenance has improved, but continued enhanced attention to the reliability of the BOP is warranted. Technical support of maintenance and surveillance continued to be strong, with effective coordination among the departments. However, the problem of missed surveillance tests had not been effectively addressed.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Perform regional initiative inspections in the area of surveillance program and implementation.

b. Licensee Actions

The licensee should ensure the success of the current effort to identify problems in the surveillance testing program and take effective corrective action to preclude instances of missed surveillance tests.

D. Emergency Preparedness

1. Analysis

This functional area includes activities related to the establishment and implementation of the emergency plan and implementing procedures, onsite and offsite plan development and coordination, support and training of emergency response organizations, licensee performance during exercises and actual events that test emergency plans, and interactions with onsite and offsite emergency response organizations during planned exercises and actual events.

During this assessment period, no emergency events were declared.

The previous SALP report recommended that licensee management continue to provide a strong support for the emergency preparedness program. It was evident that such support continued during this assessment period.

Evaluation of this functional area was based on the results of two inspections by the regional staff and observations made by the resident inspectors. The two inspections included evaluation of the 1991 annual emergency exercise and one operational status inspection.

During the 1991 exercise, the emergency response organization effectively implemented the emergency plan and demonstrated that it was prepared to protect the health and safety of the public. The licensee used its control room simulator in the dynamic mode to run the exercise scenario. This provided increased realism and challenge to the operators participating in the exercise.

Performance during the 1991 annual exercise was excellent. The NRC inspection team noted numerous strengths as follows: all emergency response functions were effectively carried out by the control room staff; the actions taken by the technical support center staff to support the control room, mitigate events, propose alternative solutions, and coordinate and direct emergency response activities were effective; the emergency operations facility staff performed well by providing appropriate direction and coordination of the licensee's emergency response and made prompt protective action recommendations to offsite authorities; the operations support center staff and in-plant response teams were well coordinated and directed to support the control room and the technical support center in mitigating the emergency; the medical team responded promptly and efficiently; and the licensee's self-critique was superior, which indicated that significant improvements were made concerning the identification and characterization of exercise problem areas along with appropriate corrective actions for identified concerns. The NRC inspection team did not identify any exercise weaknesses. The Federal Emergency

Management Agency, however, identified a deficiency in the area of rumor control. A remedial drill was conducted February 6, 1992, to resolve this issue.

The inspection of the operational status of emergency preparedness involved the use of the simulator during walkthroughs to evaluate the response of control room personnel during a simulated emergency. One exercise weakness was identified during these walkthroughs. The exercise weakness pertained to difficulties in completing the fuel damage block of event classification, difficulties in making dose assessment calculations, and the issuance of nonconservative protective action recommendations. The weakness was the result of problems operations personnel had with certain emergency implementing procedures. These same problems were also identified during operator licensing examinations.

The operational status inspection found that the emergency preparedness program had been maintained in an excellent state of operational readiness. The emergency planning and coordination organization received strong support from senior management and had maintained an experienced and qualified staff. Emergency facilities, equipment, and supplies were maintained in an excellent manner. The emergency response organization was well trained and consisted of an appropriate number of well qualified individuals which could be promptly activated to respond to emergencies. Annual audits and surveillances were performed in an effective manner. The corrective action system for both internally identified problems and those identified by NRC, was clearly responsive. The licensee maintained a good working relationship with state and local offsite response agencies and kept these agencies informed of the status of emergency planning and changes in the emergency plan.

In summary, the licensee's emergency preparedness program showed a pattern of continued improvement, reaching excellent operational readiness for responding to emergencies. The 1991 annual emergency exercise was particularly notable in that no exercise weaknesses were identified. The emergency preparedness program had received excellent management support. The licensee demonstrated a proactive and responsive approach to the correction of weak areas and in the overall improvement of this functional area. Some control room personnel experienced difficulties in following certain emergency implementing procedures.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this area.

3. Board Recommendations

None

E. Security

1. Analysis

This functional area consists of activities associated with the security of the plant, including all aspects of access control, security background checks, safeguards information protection, and fitness-for-duty activities and controls.

The previous SALP report noted strong performance in this area and did not include any specific recommendations.

Region-based physical security inspectors conducted two security inspections and one fitness-for-duty inspection. The two security inspections included a review of the security program and one initiative in the area of access control. In addition, a Regulatory Effectiveness Review (RER) was performed, which included participation by the Region-based inspectors.

Management demonstrated excellent support for the security program. Security management was professional, knowledgeable, and well organized. The expertise present throughout the program area resulted in self-identified technical issues being quickly resolved. All NRC issues were also promptly and efficiently resolved. Improvement items identified during the RER received immediate action. Numerous program strengths were identified during both the RER evaluation and the fitness-for-duty inspections. The enforcement history was excellent during this assessment period.

The RER team found that management of the security program was competent and diligent. The RER team also concluded that effective provisions were in place to assure that safeguards measures did not adversely affect the safe operation of the plant.

The security systems were comprised of state-of-the-art equipment that performed well. The testing and maintenance program was excellent. Dedicated testing and maintenance personnel promptly identified and performed necessary maintenance. Comprehensive, performance-based QA audits were performed. The audit team included nuclear security expertise from another utility and audit findings were promptly resolved.

The security force was observed to be professional, dedicated, well trained, and highly motivated. A sufficient number of security officers were maintained to provide proper response to all contingencies.

An excellent fitness-for-duty program had been established. The program included excellent management support, comprehensive QA audits, and a well coordinated interface with corporate security.

In summary, the licensee continued to operate a strong and effective security program. Security and licensee management were proactive in implementing improvements to the program. Inspection results in this program area identified strong management support for the security program. Security systems were

viewed as state-of-the-art, and the security force was considered professional and dedicated. The RER noted several strengths in the program and confirmed that safeguards measures did not adversely affect the safe operation of the plant.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None

F. Engineering/Technical Support - Unit 1

1. Analysis

This functional area consists of technical and engineering support for all plant activities. It includes all licensee activities associated with the design of plant modifications, engineering and technical support for operations, training, procurement of safety-related and commercial-grade items, vendor interface activities, and fire protection and prevention.

The previous SALP report characterized performance as good and noted management commitment to a strong training program with strong staff and excellent facilities. One training concern resulted in a recommendation to evaluate and correct the root causes of poor performance of initial operator licensing training. The staffing in the engineering groups was considered a strength, with a strong system engineering group highly involved in problem solutions.

Inspection effort consisted of the core inspection program with regional initiative inspections, including a special inspection of the motor-operated valve program. In addition, a Configuration Management Inspection (CMI) was conducted primarily at Unit 2, with some inspection effort devoted to Unit 1. Enforcement history was superior.

The actions to address the previous poor performance of initial operator licensing training were effective. Two sets of initial licensing examinations were administered and all applicants passed. One set of requalification examinations was administered to twenty individuals comprising five crews. Seventeen licensed operators and four crews passed the examinations, and the requalification program was judged to be satisfactory. The requalification examination failures were limited in number and no single-root cause could be identified.

The system engineering program provided valuable support to operations and maintenance, with the system engineers serving as problem solvers and project coordinators for their systems. System engineering supervisors were often observed in the plant providing technical support and expertise in their areas.

Station nuclear engineers provided direct support to operations during the refueling and during approaches to criticality. Their interface with operators was professional, exhibiting excellent communications practices. System engineers and design engineers provided technical evaluations to address operability questions and to answer field inquiries. The general quality of technical evaluations improved; these evaluations used conservative input assumptions and had comprehensive reviews, producing soundly based conclusions. Engineering personnel were usually members of the multidisciplinary task teams formed to evaluate plant incidents and determine root causes. Their input to the findings of these teams was significant. Engineering personnel were quite responsive to emergent issues, often taking the lead to resolve them in a timely manner.

The handling of generic communications by the engineering staff was considered a strength. Examples of this include a superior program for the maintenance and testing of motor-operated valves, high quality program and engineering analyses for mitigating potential loss of decay heat removal events, and excellent engineering analyses for the core operating limits report. The engineering staff provided good technical descriptions of changes proposed to the plant and Technical Specifications. The overall efforts to address generic communications were very good and indicated strong management support, as was evident by the resources provided for these issues.

The design modification process functioned well. Engineering analyses were thorough and revealed conservative judgement. Design modification packages were generally comprehensive and well documented. They presented a clear picture of both the problem and the proposed solution. One minor exception was the lack of documentation identifying required personnel training following installation of a modification, although the appropriate training was provided.

The fire protection and prevention programs were effective. The fire brigade training and general housekeeping were noted as strengths.

The document control and records programs were appropriately defined and well implemented. In particular, the design basis documentation (DBD) program was generally a strength. However, some erroneous information was identified by the CMI within the DBDs that could adversely affect future design and analyses. Additional attention to this area is warranted.

In summary, the licensee was effective in addressing the problems in the training area as shown by the success rate on initial qualification tests. The engineering support for generic communications was considered a strength with management involvement evident. The system engineering group continues to be a strength as evidenced by its involvement in daily plant operations. The design modification process was functioning well. Programs for motor-operated valves, fire protection and prevention, and preventing loss of decay heat removal were well managed and considered strengths. The document control and records program and the DBD program were strengths. However, some erroneous information was identified within the DBDs and additional attention is warranted.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None.

G. Safety Assessment/Quality Verification - Unit 1

1. Analysis

This functional area consists of all licensee review activities associated with the implementation of licensee safety policies, including licensee activities related to exemption and relief requests and other regulatory initiatives. In addition, it includes licensee activities related to the resolution of safety issues, safety committee, and self-assessment activities and the effectiveness of the licensee's quality verification function in identifying and correcting substandard or anomalous performance, in identifying precursors of potential problems, and in monitoring the overall performance of the plant.

The previous SALP report characterized performance in this functional area as good and particularly noted senior management involvement, staffing and training, problem investigation, and corrective actions as strengths. In the report, the NRC recommended that licensee management continue its efforts to improve the thoroughness and comprehensiveness of the technical evaluations supporting root cause analysis and licensing actions.

Inspection effort in this area included the core program which required evaluation of the licensee's self-assessment capabilities. The core program was augmented by regional initiative inspections in the areas of handling of external communications, quality-related records and document control programs, and the licensee's corrective action and audit programs. The licensee actions taken in response to Generic Letter 88-17, "Loss of Decay Heat Removal," were evaluated. Additionally LERs, responses to notices of violation and other inspection findings, and docketed correspondence in support of the Unit 1 operating license were evaluated.

Licensee personnel exhibited a conservative safety philosophy from senior management through the organization to the field working level. Personnel at all levels generally maintained a questioning attitude, not taking safety for granted. Safety evaluations, operability evaluations, and reportability determinations were usually conservative and thorough. Employees were encouraged and held responsible to express safety concerns to their supervisors or to use the ONE Form, Hot Line, or SAFETEAM programs.

The overview and review groups established by the licensee were generally effective in providing management with current information regarding the operations of the facility. A particularly noteworthy example was the independent overview group established to perform risk assessments of outage

activities. The development of this overview group was innovative and beneficial to safety, as the risk assessment process was used to adjust the outage schedule to reduce risk. A weakness in the functioning of the review groups was that some licensing actions and an LER were submitted to the NRC with insufficient safety analyses.

A comprehensive program for establishing, scheduling, and performing internal QA and Technical Specification audits and surveillances was implemented. In addition, the licensee used independent parties to participate in the assessment of their QA program. Audit plans were comprehensive and well organized and ensured adequate overview of the specified quality and technical attributes. Where audits identified deficient conditions, the required followup was performed and the implementation of established corrective actions was verified.

The licensee's self-assessment and corrective action process was sound and effective. The corrective action process continued to be comprehensive and utilized a consolidated system for reporting problems and documenting corrective actions. The general lack of repetition of causes or responsible work unit indicates that problems were not recurring but were effectively resolved after initial identification.

LERs were integral to the corrective action process. In general, these reports were complete and documented adverse conditions, the root cause, and the corrective actions that prevent recurrence. LERs were routinely reviewed by plant management and overview groups and reflected a conservative reporting threshold. A weakness identified in the preparation and review of LERs concerned an inadequate safety analysis in a LER, resulting in the need for a supplemental report.

The licensee developed a comprehensive industry operating experience review program to ensure that lessons learned from industry operating experience were identified and acted upon to improve plant safety and reliability. This program used information from a variety of sources, including event reports, operating reports, component engineering and failure data and vendor reports, including Westinghouse Technical Bulletins, and NRC Information Notices. This information was widely disseminated by management through the monthly operating experience reports. Overall, evaluations of external information were considered to be in-depth and comprehensive and the conclusions well supported.

An example of effective use of industry experience was the program developed to review and incorporate information on fuel-related experience at CPSES and other facilities. The program generated detailed assessments of numerous events and concerns and corrective actions implemented in response to those efforts. An exception was the assessment of information involving the inadvertent loss of spent fuel pool level and cooling events, which did not adequately address the potential for beyond-design-basis conditions.

Weaknesses in the use of industry experience were identified with respect to administration of the Vendor Equipment Technical Information Program. Documentation conflicts existed, formal prioritization of review activities had not been established, and there was no apparent mechanism for administratively closing out unnecessary vendor documentation packages.

The previous SALP report identified that improvement was needed in technical evaluations that support licensing actions. This continues to be a concern. Some licensing submittals lacked sufficient detail in the safety analysis. None of the proposals would have resulted in a degradation of safety, however, this determination could not be made solely on the basis of the information provided in the original submittals. During discussions to supplement the safety basis for the submittals, the licensee's staff exhibited a high degree of technical competence.

In summary, the licensee had superior programs with strong management involvement to ensure that safety and quality problems will be effectively identified, evaluated, and corrected. Of particular note were the corrective action process using the ONE form, the program to incorporate industry experience into activities at CPSES, and the independent overview group established to perform risk assessments of outage activities. Weaknesses were noted in the development and review processe for safety analyses in licensing submittals and in the implementation of ome corrective actions.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

a. NRC Actions

None.

b. Licensee Actions

Licensee's management should increase efforts to improve the thoroughness and comprehensiveness of technical evaluations supporting licensing actions.

H. Construction Activities

1. Analysis

Construction activities for CPSES, Unit 2, were reinitiated in January 1991 following the suspension of these activities in April 1988. During this assessment period, numerous inspections were performed to evaluate the acceptability of construction programs involving the installation, maintenance, and testing of those systems and components which are required for the safe operation of Unit 2. Specifically, these included inspections of safety-related piping systems and supports, structural concrete, structural steel supports, concrete expansion anchors, mechanical components, auxiliary systems, electrical equipment and cables, and instrumentation. Additionally, special inspection involving independent NRC nondestructive examinations and a major configuration management team inspection were performed.

Areas not specifically evaluated during this SALP reporting period included soils and foundations, containment major structures, structural masonry construction, and major structural steel supports. These construction phase activities, which are common to both Units 1 and 2, were extensively reviewed prior to the licensing of Unit 1.

The previous SALP recommended that the licensee provide for periodic meetings with NRC to review construction status and assess oversight activities and findings. To date, four such meetings have been held at approximately 3-month intervals. NRC has found these meetings to be beneficial in reviewing construction progress and status, as well as assessing oversight activities and findings. Coupled with inspection findings, these meetings have demonstrated that licensee management is effectively involved in construction oversight.

Enforcement history has been excellent based on the small number and minor nature of the issues identified. Corrective actions have typically been prompt and effective in preventing recurrence. Management's response to identified violations demonstrated a strong commitment to effective corrective actions.

A special inspection was conducted with respect to safety-related piping systems and supports, using the NRC Mobile NDE Laboratory. Independent evaluations of components, systems, and welds were performed to assure that NDE procedures performed by the licensee were in compliance with established ASME Code requirements. It was generally determined that the licensee's NDE methods and results were consistent with and acceptable to ASME Code requirements. One deficiency involving an unqualified procedure for locating the centerline of ASME Code class welds had no safety impact and was appropriately addressed by the licensee.

The CMI was performed late in the assessment period by a multidisciplinary team to assess the adequacy of the design control program and implementation of design requirements in construction activities. The inspection team examined both design and construction attributes and reviewed the as-built components, systems, and structures. The team focused on the Unit 2 RHR system and power distribution systems for alternating current (ac) and direct current (dc). The team also assessed the adequacy of the licensee's self-assessment initiatives, which involved a construction appraisal team (CAT), an integrated design assessment (IDA), and the interface between both Units 1 and 2. Relative to safety-related piping systems and supports, the results of the CMI indicated that the RHR system was adequately installed, tested, and configured in accordance with the applicable installation specification and governing system drawings.

The CMI team also concluded that design and construction activities had been accomplished appropriately and that identified deficiencies and the associated corrective actions were being tracked to completion. However, a general concern regarding system cleanliness controls, including uncapped piping systems, was identified as well as a concern regarding the segregation of Q and non-Q material. The licensee has developed and implemented corrective actions within this area and improvements have been noted.

Early in the assessment period, the general level of plant housekeeping was identified as an area of concern. In response to this concern, the construction department issued more definitive guidance on housekeeping and assigned responsibility to superintendents for housekeeping in specific areas of the plant. As a result of these actions, improvements in housekeeping were observed during the latter part of the assessment period.

Inspections of the installation and quality verification of reactor coolant pressure boundary piping and safety-related piping determined that the licensee had established comprehensive instructions for the control of welding, with the program for the indoctrination and training of welders being considered a strength. The welding program requirements with respect to welding material control, quality control surveillance of in-process welding, use of qualified welding procedure specifications, and documentation of welding activities were, in general, being appropriately implemented. However, a lack of effective control of welding purge dams was noted, and minor instances were also identified by both NRC and the licensee's quality control surveillance personnel where welders failed to comply fully with the requirements of welding procedure specifications.

Effective programs for the fabrication, erection/installation, and documentation of safety-related piping and pipe supports had been developed and implemented. Craft and inspection personnel were trained and qualified and were complying with the requirements of the applicable specifications, drawings, and procedures. A minor weakness was identified regarding the omission in a work package of a required liquid penetrant examination which subsequently was performed. The licensee's verification of as-built conditions had been accurately reflected in controlled design drawings.

Programs associated with mechanical components, reactor vessel and internals, and auxiliary systems were examined. Excellent programs for the fabrication, installation, maintenance, and documentation of these safety-related systems and components were developed and implemented. Notable strengths were identified relative to Unit 2 project management involvement in the overhaul and upgrade of the emergency diesel generators (EDGs) and the replacement of all seismic Category I heating, ventilation, and air-conditioning (HVAC) duct and duct supports. Inspection results associated with the design review/quality reverification of the A EDG concluded that the mechanical maintenance and quality control personnel involved with this activity demonstrated superior work control practices. The successful completion of the A EDG overhaul represented an excellent example of work execution on the part of mechanical maintenance, quality control, and startup personnel. Additionally, the inspection results from extensive evaluations of the licensee's program for the replacement of safety-related HVAC duct and duct supports indicated a well controlled and effectively implemented program.

Evidence of strong management support for these programs was also observed in the activities associated with the reactor vessel and internals. Superior procedural controls and quality oversight were being effectively implemented. However, one example of procedural noncompliance identified during the lifting of the reactor pressure vessel head indicated a lack of attention to detail.

Inspections were also performed with respect to Unit 2 safety-related components which had been utilized under the permanent equipment transfer (PET) program. The previous SALP report indicated the need for continued emphasis on the PET program to ensure minimal impact of the process on Unit 2 construction and startup activities. Inspections determined that the licensee continued to effectively control the replacement of removed components, and the PET tracking system included thorough and complete records.

The program for procedural control of construction activities associated with electrical components and systems was well documented and detailed with appropriate procedures in place to control work activities regarding electrical cable and instrument components and systems. The procedures were also appropriate to ensure that the instruments were properly tested and protected prior to startup. Craft personnel were competent and knowledgeable regarding their work activities. Supervision, engineering support, and quality control personnel were active at the job sites and strong management controls and oversight were evident. Cable pulling activities were well controlled and appropriate care was taken to ensure that specified cable pulling tensions were not exceeded. Instrumentation tubing installation was performed in accordance with the applicable design and work control documents. The fuse control program and safety practices concerning work on energized circuits were identified as strengths. Additionally, the CMI team determined that the ac and dc distribution systems were installed, tested, and configured in accordance with the applicable construction specifications and system drawings. Records were complete, readily retrievable and properly documented and stored.

The QA organization conducted numerous performance based audits and surveillances of construction activities. These audits and surveillances were instrumental in the early identification and resolution of hardware and programmatic deficiencies. Management has taken an active and aggressive role in the resolution of identified deficiencies.

The coordination and communications between the construction, engineering, startup, and quality organizations have been excellent. This synergism resulted in consistently high quality levels which was indicative of strong management involvement and oversight, although one instance was identified where several RHR system pipe supports, which had been verified to be in place when the system was released for flushing, were removed prior to commencement of flushing activities and temporary supports were not installed. This occurrence was determined to be isolated in nature, and the licensee implemented administrative controls to prevent recurrence. Management involvement in the resolution of technical issues has also been excellent. The quality and engineering organizations provide internal, multidisciplined reviews of identified potentially safety-related deficiencies and the subsequent dispositions.

A strength was identified in the comprehensive indoctrination training which was provided to construction personnel prior to work initiation. Specifically, this training included reviews of 10 CFR Part 50, Appendix B, requirements for the construction of nuclear power plants and an overview of site procedures and policies not necessarily related to the construction of Unit 2. Also, each discipline-specific curriculum included information related to construction engineering and quality control activities.

In summary, the licensee had developed a strong, coordinated, and actively involved management organization. Construction activity programs and procedures were comprehensive. The construction programs and procedures were being effectively implemented with extensive management and quality oversight, and the general results have been high quality level work. The multidisciplined CMI determined that design and construction activities were being accomplished in accordance with design requirements. Although some instances of failure to follow the prescribed procedure were identified, these occurrences were minor in nature. Corrective actions for identified deficiencies have been timely and effective. A superior construction training program was in use.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

a. NRC Actions

Inspection effort in this functional area should be consistent with completion of the reactor construction inspection program and implementation of the preoperational and startup phases of the inspection program in accordance with the Master Inspection Plan.

b. Licensee Actions

Continue to provide for periodic status meetings with NRC to review construction status and assess oversight activities and findings. Continue emphasis on plant and system cleanliness.

I. Engineering/Technical Support - Unit 2

1. Analysis

This functional area consists of activities associated with engineering and technical support for all Unit 2 plant activities. It included all licensee activities associated with the engineering and technical support for construction, preventive maintenance, preoperational testing, the review of industry information, configuration management, fire protection/prevention, and the DBD review.

This area was inspected on a routine basis by the resident inspectors and periodically by Region-based personnel. The NRC inspection effort also included the CMI.

The licensee demonstrated an aggressive approach to problem solving, particularly with technical problems of a programmatic/repetitive nature. Corrective actions involving improvements related to the engineering and technical support functions were generally effective. Management was extensively involved in the resolution of technical issues. Startup engineers provided good support to the construction and engineering groups. Technical support for maintenance, construction, and operational activities was good, and the review of technical evaluations was effective and timely. Programs for the technical review of design calculations, as well as technical evaluations of conditions potentially affecting the safe operation of Unit 1, were generally comprehensive and conservative in their approach. In regard to DBDs, the licensee's program was both thorough and extensive. In some engineering disciplines, the associated procedure, guidelines, and design criteria were comprehensive and detailed. The scaling calculation manual exemplified an area where the design guidance was thorough. As such, the DBDs were well structured and have the potential to be useful for design activities. However, the use of incorrect design temperature and pressure in a Vendor Class 1 piping analysis, as well as calculational inaccuracies identified by the CMI, raised a concern regarding the implementation of the design verification program.

The engineering staff was highly responsive to technical concerns and provided additional information where necessary. Corrections and enhancements to identified calculation and analyses issues were implemented in a timely manner. Enforcement history during this assessment period was excellent, but deficiencies identified by the CMI were under consideration for enforcement action at the end of the assessment period.

Technical evaluations associated with piping stress analyses, pipe supports and restraints, seismic qualification calculations for plant safety equipment, penetrations, HVAC installations, and electrical cable raceways were comprehensive and technically valid. The engineering reviews of the DBDs to ensure translation of technical requirements into emergency and abnormal operating procedures were noted as a strength.

Additionally, a superior motor-operated valve program was managed in a proactive manner and was considered a strength. A comprehensive program for the refurbishment, static testing, and dynamic testing at the maximum expected differential pressure was established for Unit 2 valves.

Multiple Architect/Engineering (A/E) firms were effectively integrated into a unified work group. The "Team Plus" approach stressed team building and team problem resolution. Communication and coordination between the various work scope A/Es was good.

In summary, the licensee's aggressive approach to problem solving, management involvement with technical issues, and technical support to field activities was comprehensive, effective, and timely. An effective program was established to ensure that technical problems discovered on Unit 2 are properly considered for their impact upon the operations of Unit 1. The strong program identified on Unit 1 for motor-operated valves was evident on Unit 2 as well. The DBD program is extensive and thorough. Technical evaluations were comprehensive

and technically sound, and a strong motor-operated valve program was developed. The "Team Plus" program encourages teamwork and has provided for good coordination between the various onsite A/E firms. Some minor weaknesses were identified in the development of design calculations and assumptions which raised a concern regarding the effectiveness of the design verification process.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None

J. Safety Assessment/Quality Verification - Unit 2

1. Analysis

This functional area includes all licensee review activities associated with the implementation of safety policies and QA programs for CPSES, Unit 2. In particular, it includes licensee activities related to the resolution of safety issues, including construction deficiencies, safety committee and self-assessment activities, analysis of industry operating experience, use of feedback from QA activities, participation in self-improvement programs, the effectiveness of the licensee's quality verification function in the identification and correction of substandard or anomalous performance, and the licensing submittals related to changes to the Final Safety Analysis Report (FSAR).

Evaluations of this functional area were based on the results of routine inspections conducted by the resident inspectors and inspectors from the Regional office, the results of the CMI, and the insights gained during reviews by the Office of Nuclear Reactor Regulation. Additionally, the NRC staff conducted detailed reviews of submittals related to licensing activities during this assessment period.

Enforcement history within this functional area has been good with the identified weaknesses considered to be minor and isolated.

The Unit 2 project organization was comprised of highly experienced individuals with extensive backgrounds in nuclear plant construction, startup, and outage management. Management's involvement at all levels of project activities and their commitment to quality were strengths.

The QA program applicable to the areas of construction, design, and procurement was found to be well defined and effectively implemented. Responsibilities and functions were well established and proceduralized. The activities of the Senior Quality Assurance Oversight Committee continued to indicate a high level of management interest in quality. The establishment of

the Quality Accountability Program, in which a stated objective was to focus project attention on areas where quality improvement could be achieved, was viewed as a positive reflection of management's attitude toward establishing and maintaining a high level of quality in the Unit 2 organization and activities. QA audits and engineering assurance assessments were found to be well planned, generally comprehensive, and technically competent. Audit and assessment personnel were qualified and were being appropriately used based on their engineering disciplines. During this assessment period, the licensee improved the effectiveness of their QA audits and surveillances in order to self-identify technical problems proactively. One noted example involved the QA staff's identification of problems associated with the system flushing test program. Other QA audits and surveillances of engineering and technical support activities such as piping supports and restraints provided the licensee with an effective quality oversight feedback mechanism. Vendor audits, vendor performance evaluations, and QA reviews of procurement documentation were being performed in accordance with program requirements, and receiving inspection activities were determined to be functioning properly.

The corrective actions resulting from QA audit findings were not always effective, as exemplified by an audit of the startup organization in April 1991 which identified a number of deficiencies in the training and documentation of training for startup personnel. A followup audit performed in September 1991 identified similar deficiencies. In addition to this instance of inadequate followup of corrective actions, the NRC staff also determined that the audits in this area were not comprehensive. A December 1991 inspection of the preoperational test program identified problems that were not detected in the QA audits. The licensee promptly responded to the inspection findings by planning additional oversight of the preoperational test program.

Pipe support and structural steel work activities were effectively controlled. The installation work packages contained comprehensive checklists for the inspection attributes, which were considered to be a strength of the construction and quality programs. The surveillance and monitoring activities performed by QA, quality control, and the code control group were well documented and provided a good assessment of the quality of construction activities.

A comprehensive program for the handling of external information was developed and implemented. Overall, evaluations were found to be extensive and the Industry Operating Experience Review Program was considered to be a strength. Minor weaknesses were identified with respect to the administration of the Vendor Equipment Technical Information Program, in that documentation conflicts existed, formal prioritization of review activities had not been established, and there was no apparent mechanism for administratively closing out unnecessary vendor documentation packages. The program for 10 CFR Part 21 assessments and tracking was found to be effective. A superior program for complying with the requirements of Generic Letter 89-10 regarding MOVs was in place and was being implemented ahead of schedule. The program was proactive, with excellent resources and knowledgeable personnel. One noted

strength was the management decision to utilize the same group of individuals to perform the MOV activities on Unit 2 that performed the MOV work activities on Unit 1.

Potentially generic issues identified by internal QA audits and external NRC generic communication sources received broad reviews to evaluate the issues. Corrective measures were generally established in a timely manner and provided well thought out actions to resolve the area of concern. This was exemplified by the immediate correction of deficiencies in the welding and calculation areas.

The principal program for identification, documentation, and correction of nonconforming or deficient conditions for Unit 2 was the TU Evaluation (TUE) form process. It was an excellent program for identifying, evaluating, and resolving potentially safety-significant deficiencies. The process was comprehensive in that it included a multi-disciplined review of the identified item for Unit 1 impact and it assessed the significance of the item from a safety and regulatory standpoint including reportability. The deficiencies were also reviewed for programmatic/repetitive concerns which initiated the performance of a root cause analysis. Although instances did occur where the resolutions of individual TUE forms were not adequate, as was the case with the bulk closure of approximately 550 commodity clearance deficiencies; these occurrences were rare. In general, the TUE program was effective in obtaining the identification, thorough technical review, and resolution of construction deficiencies. Significant progress had been made in reducing the number of outstanding nonconforming conditions. Also, good interaction and early analysis of trends occurred during an observed quality accountability meeting.

The licensee voluntarily initiated two self-assessment programs: the IDA and the CAT. The CMI review substantiated the licensee's methodology for the conclusions drawn by the IDA and CAT self-assessment effort. The CAT provided a satisfactory assessment of CPSES construction work and the conclusions reached by the IDA were found acceptable by the CMI.

The onsite licensing organization provided complete, high quality closure packages for those regulatory items that were tracked to closure. Examples included responses to NRC Bulletins and TMI Action Items, violations and inspector followup items, and Significant Deficiency Analysis Reports.

The scheduling and content of FSAR changes to support the licensing of Unit 2 were adequate. The advance FSAR submittal package prepared for each significant FSAR change was a strength. Each package addressed pertinent regulatory requirements and clearly identified what the FSAR change was and how it impacted previous Safety Evaluation Reports published by the staff. A minor weakness in this approach was identified in the submittal developed by the licensee to support the staff's evaluation of the use of 1-hour fire rated cables at the plant. This package did not explicitly identify that the cable would not be aged in accordance with industry standards before testing was performed.

In summary, the licensee has developed a strong safety conscience throughout the organization, as demonstrated by extensive management involvement in safety and quality. The IDA and CAT self-assessment effort also reflected strong management oversight of construction. The QA program was well defined and effectively implemented. QA audits were found to be well planned, generally comprehensive, and technically competent. Corrective actions resulting from QA audits were not always effective. An excellent program existed for utilizing external information from vendors and industry organizations. The program for identifying, documenting, and correcting nonconforming conditions was effectively implemented and was useful in evaluating and resolving potentially safety-significant deficiencies. Closure packages for regulatory items and advance FSAR submittal packages were of high quality.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None

K. Preoperational Testing

1. Analysis

This area included activities which were related to the turnover of systems from construction to startup, the preparation of these systems for preoperational testing, and the implementation of the preoperational testing program.

This area was inspected on a routine basis by the Unit 2 resident inspectors. Additional inspections which focused on the overall adequacy of the test program controls and the test procedures were performed by regional-based inspectors and the CMI team.

At the end of the assessment period, the majority of preoperational flushes were complete. A number of preoperational test procedures were approved and issued, but the procedure writing and approval process was being evaluated because of weaknesses identified by both licensee audits and NRC inspections. Acceptance testing of components was ongoing and only a few preoperational tests had been completed.

System flushing activities were effectively performed to assure the cleanliness of the systems prior to testing activities. Some weaknesses in the flushing procedures were identified by the licensee's QA organization. The weaknesses did not invalidate the previous flush results, and prompt corrective action was taken to resolve the weaknesses, including the retraining of startup engineers.

The performance of prerequisite testing activities was good. The tests were well controlled and had effectively prepared the systems for preoperational

testing. Some minor weaknesses were found regarding procedure adherence and the documentation of test results. The licensee took prompt action to correct the weaknesses.

A new startup manager was assigned in October 1991 and the department was reorganized late in the assessment period to improve effectiveness and efficiency. The revised startup organization included a number of individuals with significant nuclear plant startup experience, and the Unit 2 preoperational testing organization was similarly staffed with experienced test personnel. A close working relationship between construction and startup was seen as a positive factor in the successful implementation of the preoperational test program.

The system turnover process was good and effectively controlled jurisdictional boundaries between systems. System and subsystem boundaries were well defined and systems were sufficiently complete to support ongoing testing.

The administrative controls established for preoperational testing of Unit 2 included the appropriate detail and conservatism. Effective controls for Unit 2 activities which might affect the operation of Unit 1 were provided.

Several deficiencies were identified during the review of approved preoperational test procedures. A sampling revealed numerous administrative errors and several minor technical errors that should have been detected and corrected during the review process. The licensee initiated comprehensive corrective actions to resolve these weakness. In addition, the administrative control processes were simplified and existing operational programs were used where appropriate.

In summary, the implementation of turnover and testing activities was good. The observed prerequisite component tests were well controlled and executed, and personnel were found to be knowledgeable of test requirements and procedures. The licensee's process for controlling system turnovers has been effectively implemented. The administrative control of preoperational testing activities was comprehensive and well developed. The original preoperational test procedures and system flushing procedures developed by the startup group were deficient, and considerable effort has been initiated to revise the procedures to support testing under the licensee's test program schedule. The close working relationship between construction and startup was noted as a strength.

2. Performance Rating

The licensee is considered to be in performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Inspection effort in this functional area should be consistent with the preoperational phase inspection program.

b. Licensee's Actions

The licensee should ensure that preoperational test procedures are written to encompass all technical and administrative requirements and that appropriate management oversight is provided.

V. SUPPORTING DATA AND SUMMARIES

A. Major Licensee Activities

1. Major Outages

The licensee commenced a scheduled midcycle outage on March 22, 1991, earlier than planned, due to a condenser tube failure. This outage was extended to repair main turbine damage and the unit was restarted on May 26, 1991. The unit was shut down on October 4, 1991, for its first refueling outage. Startup was conducted on December 7, 1991.

2. Major Milestones - Unit 2

- June 29, 1991 - The first system turnover from construction to startup occurred following resumption of construction activities.
- January 17, 1992 - The first system turnover from startup to operations occurred following resumption of construction activities.
- All major NSSS motors have been operated.
- Approximately 57 percent of the system flushes have been completed.
- Approximately 47 percent of the component testing has been completed.

3. License Amendments

Five license amendments were issued.

4. Significant Modifications

Major modifications included:

- Establishing two-of-three coincidence logic for main feedwater pump trips
- Enhancing residual heat removal monitoring instrumentation
- Installing orifice plates in main feedwater lines
- Installing upgraded main generator rotor

- Modifying switchyard to enhance reliability
- Removing residual heat removal suction valve autoclosure circuits
- Removing main feedwater suction strainers

B. Direct Inspection and Review Activities

NRC inspection activity consisted of 40 inspections for a total of 3748 inspection hours for Unit 1.

NRC inspection activity consisted of a total of 40 inspections for a total of 4924 inspection hours for Unit 2.