U. S. NUCLEAR REGULATORY COMMISSION

REGION V

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

SALP BOARD REPORT

Nos. 50-275/92-34 and 50-323/92-34

PACIFIC GAS & ELECTRIC COMPANY

DIABLO CANYON POWER PLANT

JULY 1, 1991 THROUGH DECEMBER 31, 1992

TABLE OF CONTENTS

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance based on this information. The program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to licensee management regarding the NRC's assessment of their facility's performance in each functional area.

An NRC SALP Board, composed of the members listed below, met in the Region V office on January 21, 1993, to review observations and data on the licensee's performance in accordance with NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance."

This report is the NRC's assessment of the licensee's safety performance at Diablo Canyon Power Plant for the period July 1, 1991 through December 31, 1992.

The SALP Board meeting for Diablo Canyon was attended by:

Voting Members

K. Perkins, Director, Division of Reactor Safety and Projects, RV (SALP Board Chairman)
M. Virgilio, Assistant Director for Region IV & V Reactors, Division of Reactor Projects III, IV, V, NRR
R. Scarano, Director, Division of Radiation Safety and Safeguards, RV
L. Miller, Chief, Reactor Safety Branch, RV
P. Johnson, Chief, Reactor Projects Section 1, RV
S. Peterson, Project Manager, NRR
M. Miller, Senior Resident Inspector, Diablo Canyon

Other Attendees

J. Reese, Chief, Facilities Radiological Protection Branch, RV
R. Pate, Chief, Safeguards, Emergency Preparedness and Non-Power Reactor Branch, RV
D. Kirsch, Technical Assistant, RV
P. Morrill, Chief, Operations Section, RV
W. Ang, Chief, Engineering Section, RV
P. Narbut, Team Leader, RV
D. Schuster, Safeguards Inspector, RV
A. McQueen, Emergency Preparedness Analyst, RV
L. Norderhaug, Safeguards Inspector, RV
L. Coblentz, Radiation Specialist, RV
D. Corporandy, Project Inspector, RV
C. Myers, Reactor Inspector, RV

II. SUMMARY OF RESULTS

A. Overview

The licensee's overall performance level during this assessment period was good or superior in all areas. Examples of superior performance were demonstrated by relatively event-free operation, low occupational radiation exposure, awareness and training of personnel to minimize safety risks during outages, prompt and aggressive response to indications of cracking in feedwater piping nozzles, and aggressive and well focused insight into performance weaknesses by the Onsite Safety Review Group.

The strengths observed in the Operations, Radiological Controls, Engineering/Technical Support, Emergency Preparedness, and Safety Assessment/Quality Verification functional areas resulted in these areas being rated as Category 1. The board noted in the functional area of Maintenance/Surveillance that early in the SALP period there were a few problems involving prompt problem identification and resolution, and engineering involvement in maintenance issues. The board concluded, however, that the overall performance was superior based on strong corrective actions and very high quality performance throughout the remainder of the period.

While strengths were noted in the security area, security management did not appear to have conducted an adequately broad examination of their activities to assure a high standard of performance throughout the organization. The board discussed NRC-identified problems at length, particularly in comparison with the high level of performance seen in most of the security organization. While corrective actions were taken for specific problems identified by the NRC, it appeared that the requirements of the security organization had not been implemented with a consistent level of assurance of quality. Although management appeared to have corrected weaknesses noted during the previous SALP period, weak management involvement in maintaining high quality in all security program areas detracted from otherwise superior performance in this area.

B. Results of Board Assessment

Overall, the SALP Board found the performance of NRC licensed activities to be very effective and directed toward safe operation of Diablo Canyon. The SALP Board has made specific recommendations in most functional areas for licensee management consideration. The results of the Board's assessment of the licensee's performance in each functional area, along with the results from the previous period, are as follows:

Functional Area	Rating Last Period	Trend	Rating This Period	Trend
A. Plant Operations	1		1	
B. Radiological Controls	1		1	
C. Maintenance/Surveillance	2		1	
D. Emergency Preparedness	2		1	
E. Security	2	Improving	2	Improving

F. Engineering/Technical Support	1	1
G. Safety Assessment/ Quality Verification	1	1

III. PERFORMANCE ANALYSIS

The following is the Board's assessment of the licensee's performance in each of the functional areas, along with the Board's conclusion for each area and its recommendations with respect to licensee actions and management emphasis.

A. Plant Operations

1. Analysis

During the assessment period, the resident inspectors conducted frequent inspections involving observation of operations activities. Some engineering section and project inspector inspections also evaluated operations activities. Review of operations activities accounted for about 34 percent of the total inspection effort.

The last SALP assessment rated the licensee's performance in this area Category 1. Strengths were noted in relatively event-free operation, and in superior operator response to plant transients. Operations exhibited significant strength in conservative operational decisions. The previous SALP Board also noted weaknesses in occasional lack of timeliness in identifying and resolving problems and in issuing operability determinations.

During this SALP assessment period, the licensee continued to show superior performance in this area. Strengths were observed in the general high quality of the Operations staff's performance, and in relatively event-free and uncomplicated operations. Management involvement has been frequent and probing, assuring timeliness in identifying and resolving problems and in making operability determinations. Operations management has set high performance standards which have usually been met or exceeded.

Recovery from each event, regardless of cause, and the subsequent root cause investigation indicated significant strengths. This was due in part to a high level of skill and sense of ownership among the Operations staff, and to intensive management involvement at all levels of the organization.

During operations at power and during outages, the Operations staff showed strong awareness of overall plant safety system availability and the significance of evolutions relative to the risk to the plant. This appeared to have been a direct result of aggressive management commitment to plant safety and risk reductions. The licensee developed and implemented a comprehensive and effective outage plan that appropriately considered risk associated with plant shutdown evolutions. Operations staffing levels appeared to be appropriate, and operations staff qualifications were strong.

Other examples of significant strengths were as follows:

- Active Operations involvement with maintenance crews near sensitive equipment helped to avert events.

- Documentation of operability determinations was strong, timely and consistent. Also, a very low threshold was established for the level of equipment degradation which required an operability evaluation.

- Operations simulator training was challenging and effective, and critiques appeared to be appropriately critical and probing.

- Toward the end of the SALP period, Operations personnel were progressively more alert to anomalous plant conditions. For example, an operator's observation and followup of a failed fastener resulted in identification and repair of a degraded neutral connector to a main transformer, potentially averting a plant trip.

During this SALP period, two severity Level IV violations occurred in this area. One was a repeat violation, for operation in Modes 2 and 3 with one of two reactor cavity sump wide range level channels inoperable. The other violation involved inadequate instructions to operators for avoiding excessive piping vibration on loss of speed control to the positive displacement charging pump. Neither had an impact on safe plant operation, and each of these instances was promptly corrected.

During the first part of the SALP period, a few Licensee Event Reports (LERs) were issued as a result of personnel errors. Although this was not an unusually high rate, the concern was that it indicated an increasing trend. The personnel error rate was reduced later in the assessment period as a result of strong management involvement.

Four isolated instances of minor weakness were observed, either in following procedures or in coordination with other groups. The most significant involved an inadvertent chemical spill, which generated noxious fumes and prompted declaration of an Unusual Event. Another instance occurred as a result of unclear procedures, which allowed a condenser vacuum pump to be started before its seal water isolation valve was opened. This ultimately resulted in a reactor trip. In each of these cases, root cause evaluation and corrective actions were immediate and appeared appropriate.

In summary, the performance of Operations has been strong, and has continued to improve. Weaknesses have been minor, isolated and infrequent, and have been corrected promptly and appropriately.

2. Performance Rating

Performance Assessment: Category 1

3. Recommendations

None

B. Radiological Controls

1. Analysis

Radiological controls inspections during this SALP period found that the licensee continued to be aggressive in assuring quality. Radioactive effluents continued to decrease, and occupational dose was reduced in 1992 despite a demanding outage schedule. A continued strength was the licensee's innovative approaches to improving measures for personnel radiation protection. Minor weaknesses identified, related to radiological posting and labeling, were solved rapidly and thoroughly. Regional inspectors examining this functional area contributed approximately 5 percent of the total inspection effort during this assessment period.

The licensee's radiological controls performance during the previous SALP period was rated Category 1. The previous SALP Board recommended that management continue to fully support site and corporate initiatives for improving performance. The board also recommended added emphasis toward correcting minor weaknesses in controlling personnel contaminations, reducing the backlog of non-Technical Specification radiation monitoring equipment needing calibration, and training dosimetry clerks and radwaste handlers.

During this assessment period, management continued to be proactive in assuring quality. The ALARA awareness program, established to reward outstanding outage performance, continued to be an effective incentive toward meeting rigorous ALARA goals. The 1991 average occupational dose per reactor was 273 person-rem, and for 1992 was 214 person-rem. Liquid effluents continued to decrease. Gaseous effluents were also maintained at a small fraction of the Technical Specification limits.

Management support was evident in the elaborate remote monitoring capabilities used to support steam generator shot peening and eddy current testing during the 1R5 outage. Use of this equipment significantly reduced both the dose received and the radiological risk involved in conducting several complicated, high-dose tasks at once. In addition, corporate involvement and support was evident in continuing efforts associated with a major upgrade of radiation and effluent monitoring equipment.

The licensee's approach to resolving technical issues was conservative and timely, and demonstrated a clear understanding of the issues involved. In September 1992, the licensee voluntarily made a presentation to members of the NRC Region V staff concerning the status of radiation monitoring system upgrades. Detailed alternate monitoring methods had been analyzed, for use during interim periods while system upgrades were being performed, to ensure proper monitor ranges, efficiencies, and sensitivity to airborne radioactivity. Technical

improvements were observed in licensee programs for radwaste classification, the process control program, and radiological environmental monitoring. Technically sound judgment was also in evidence in the licensee's radiological controls preparations for potential high-dose outage tasks, such as steam generator shot peening, steam generator eddy current inspection, and core barrel inspection.

Licensee management support of training was demonstrated by the extensive efforts made in mock-up training prior to the 1R5 outage. The steam generator mock-up included a fully operational shot-peening apparatus. One weakness was observed involving failure to thoroughly train eddy current testing personnel on the impact that shot peening would have on steam generator airborne radioactivity hazards. A Severity Level IV violation was cited for the resulting hazard. The licensee took prompt corrective action to resolve this weakness.

The licensee's other training practices continued to exhibit excellence. Training and qualification programs made a positive contribution to the understanding of radiological controls issues and adherence to procedures. Staff members were kept abreast of industry knowledge and development through extensive participation in offsite owners' group meetings, Electric Power Research Institute (EPRI) conferences, and other opportunities for offsite involvement. An improvement was noticed in the licensee's training of radwaste handlers. Training on the new 10 CFR 20 requirements also continued for appropriate personnel.

The licensee's site and corporate radiological controls and chemistry groups continued to be well staffed. Key positions were generally filled on a priority basis. Authorities and responsibilities, both in the chemistry and radiation protection organizations, were well defined, and resulted in clear communications both within the groups and with other site organizations.

One voluntary Licensee Event Report (LER) was submitted relevant to radiological controls during this assessment period. The LER dealt with overexposures received by contract radiographers, due to personnel error by the radiographers while performing radiography on the licensee's site. Three Severity Level IV violations were identified in this functional area. Two resulted from inadequate posting and labeling, and one involved the failure to implement procedures to control airborne radioactivity from steam generator work. Neither the violations nor the LER indicated a programmatic breakdown of the radiation protection program. The licensee's root cause analyses and corrective actions were prompt and were effectively implemented.

2. Performance Rating

Performance Assessment: Category 1

3. Board Recommendation

None.

C. Maintenance/Surveillance

1. Analysis

During the assessment period, the resident inspectors conducted frequent inspections which included observation of maintenance and surveillance activities. Engineering inspections also evaluated maintenance and surveillance programs. Review of maintenance and surveillance activities accounted for about 10 percent of the total Diablo Canyon inspection effort.

The last SALP assessment rated the licensee's performance in this area Category 2. Strengths were noted in the initiation of a program for trending safety equipment out-of-service time, and in the use of probabilistic risk assessment to evaluate preventive maintenance programs. Weaknesses were noted in a lack of management aggressiveness in dealing with problem areas; occasional failure to follow procedures, resulting in safety significant events; and a tendency for personnel errors due to lack of self-verification. The licensee was encouraged to involve management in timely problem identification and root cause investigation, and to continue to support industry initiatives.

During this assessment period, the licensee generally displayed improved performance in this area. Virtually trouble-free plant operation evidenced a high quality of maintenance work in that no plant events and almost no equipment failures occurred as a result of improper maintenance. Strengths were observed in the general high quality of maintenance and surveillance work. Additionally, a high level of management involvement in scheduling and planning maintenance and surveillance work maximized safety system availability from a probabilistic risk standpoint, both at power and during outages. This resulted in a considerable benefit to plant safety.

Noteworthy strengths were as follows:

- Outage Management: The management of outages was marked by an overriding understanding and emphasis of the probabilistic risk of each job and evolution. Work crews and planners were trained and aware of the safety significance of the jobs and systems on which they worked at every stage of the outage.

- Qualifications: The training and qualification program for Maintenance personnel was strong. Well maintained training facilities and a dedicated training staff were significant factors in good performance, as was the sense of ownership shown by Maintenance personnel.

- Plant Safety: Maintenance personnel were trained and informed regarding overall plant safety system availability and the significance of their individually assigned work relative to its risk to the plant.

- Prioritization of Work: Outstanding work items were well prioritized, with safety-significant issues given high priority. The backlog of non-outage safety related work items was low.

- Root Cause Investigations: The routine involvement and leadership shown by the Plant Maintenance staff in root cause investigations was a significant strength, as was the routine integration of the Maintenance, Operations, and Engineering staffs in maintenance and surveillance operations.

- Reduction of Personnel Errors: A relatively high number of personnel errors were observed at the beginning of the SALP period. Several of these errors resulted in conditions which prompted a Licensee Event Report or Non-conformance Report. This number was reduced by about half during the remainder of the period due to a high level of management involvement throughout the organization.

- Response to Problems: Overall, the maintenance staff improved their response to problems by identifying, analyzing and correcting maintenance and surveillance problems promptly. This represented an improvement over the last assessment period. Examples of this improvement were the identification and correction of an incorrect reactor coolant system leakage surveillance; prompt, in-depth evaluation and compensatory action for problems with auxiliary feedwater pump steam admission valve FCV-95; and improvement of the clarity of some instrumentation and control surveillances.

Four Level IV violations were cited in this area, involving improper maintenance of containment fan cooler unit (CFCU) backdraft dampers, failure to perform a containment airlock surveillance, failure to identify inconsistencies in a pump vibration measurement procedure by writing an action request, and improper rigging of a cask. In some cases, as illustrated by the inoperable containment fan cooler unit backdraft dampers, Engineering involvement should have been more timely. Improper maintenance of CFCU dampers was significant in that the dampers were not functional, and only after additional analysis did the licensee determine that the CFCUs had been operable despite the improper maintenance. These concerns appear to have been isolated, although the CFCU issue was potentially significant to safety.

Other weaknesses were also observed. One example was the improper tightening of setscrews on some motor operated valve actuators, resulting in a common mode failure vulnerability. Additional, less significant weaknesses were observed. Most were identified by the licensee immediately upon occurrence. Management involvement was effective, and identified problems were promptly and appropriately corrected. Most of these examples occurred early in the SALP period. Since that time, significant improvement has been noted.

2. Performance Rating

Performance Assessment: Category 1

3. Board Recommendations

The Board encourages continued intrusive Engineering involvement in maintenance and surveillance issues, and focused management involvement to ensure continued low levels of personnel errors

D. Emergency Preparedness

1. Analysis

Two routine emergency preparedness (EP) inspections and two annual emergency exercise team inspections were conducted during this assessment period. Review of the EP program accounted for approximately 6 percent of the Diablo Canyon inspection effort. A strength identified during the current assessment period was in making timely and appropriate classifications during most actual emergency events, exercises and drills. A weakness was noted regarding the making of protective action recommendations (PARs) to offsite agencies during the 1991 annual emergency exercise. Generally, licensee performance in the EP area appears to have improved over the assessment period.

The licensee's EP performance in the last SALP cycle was rated Category 2. The SALP board at that time indicated several recommendations: that management ensure the establishment and implementation of an effective corrective action plan for drill and exercise findings; that licensee management evaluate the adequacy of classroom training provided to emergency response personnel and ensure that personnel are given an adequate number of opportunities to practice their assigned tasks during periodic drills; that the additional dose assessment training provided to Control Room personnel continue; that the need to adhere to radiation protection procedures under simulated emergency conditions also be stressed during classroom training and drills; that administrative procedures be enhanced to ensure that drills and exercises consistently meet emergency plan requirements; and that simulation of sample collection during drills and exercises be avoided to enhance realism and increase the training value.

During the current assessment period, licensee management appeared actively involved in EP activities and demonstrated support by providing the necessary resources to the EP staff. Management took interest in correcting problems and responding to NRC findings which indicated a need for corrective action. During the assessment period, the licensee worked closely with the state, local county governments, and FEMA in resolving issues in offsite preparedness planning. Each of the recommendations from the previous SALP Board was addressed by the licensee during this assessment period. Corrective actions were evaluated by the NRC during routine inspections and observation of the two annual exercises, and improvement was noted in each area. Dose assessment and projection, in particular, were noted as strengths in response facilities during the 1991 and 1992 annual emergency exercises.

Licensee management's approach to the resolution of technical issues appeared generally timely and thorough. During the assessment

period, the licensee significantly upgraded the emergency warning siren system. The new primary system was completed, tested and turned over to the county with 100 percent activation in September 1992. The upgrade provided several new capabilities such as an activation system which allows selective sounding of individual or groups of sirens as opposed to the entire system, and a siren feedback system which provides input to the county when a "runaway siren" sounds without intended activation.

One EP exercise weakness was identified during the 1991 annual emergency exercise. The licensee's system for providing Protective Action Recommendations (PARs) appeared excessively complicated and caused delay in the issuance of PARs. The system was not based solely on plant conditions as would be appropriate, but included coordination of PARs with offsite agencies. This delayed and possibly biased the licensee's decision making. The appropriate emergency plan implementing procedure (EPIP) was revised to insure licensee independence in PAR decision making and was validated through training, drills and exercises. The system appeared to have been effectively implemented during the 1992 annual exercise.

There were no enforcement actions in the EP area during the assessment period. Notifications to the NRC and offsite agencies were consistent with regulatory requirements. The licensee reported nine unusual events to the NRC during the assessment period, including three earthquakes detected at the site. The other events were a reactor coolant system (RCS) leak, a grass and brush fire near the site, a turbine stop valve failure, a sulfuric acid spill, radiation overexposure of two contractor employees, and a temporary loss of communications with the California Office of Emergency Services. All events appear to have been properly identified and analyzed in accordance with regulatory requirements.

EP staffing was an apparent strength, and staff members appeared conscientious toward accomplishment of their assigned duties. No significant changes occurred in the composition of the emergency response organization (ERO) during the assessment period. The licensee had a system to ensure that new ERO personnel were properly trained prior to assignment to emergency organization positions. EP staff and emergency response positions were clearly identified; authorities and responsibilities appeared clearly defined; and key positions were filled as appropriate. Decision-making authority appeared properly delegated to ensure quick identification of and response to problems and changes. Emergency facilities continued to be appropriately maintained and appeared ready for rapid activation. The licensee provided adequate levels of dedicated staff to implement the programs and to interact appropriately with offsite agencies.

During the assessment period, the licensee implemented what appeared to be a substantial change to the EP training program. Previously, the site and corporate headquarters had separate EP training programs and responsibilities. The company-wide responsibility for EP training management and accomplishment was shifted entirely to the site. A system was established to ensure that required training is

conducted and that training due dates are not exceeded, by linking accomplishment of EP training requirements to unescorted access privileges. To supplement and reinforce routine annual training, a program of monthly integrated drills was conducted.

2. Performance Rating

Performance Assessment: Category 1

3. Board Recommendations

The licensee should strive to maintain a consistent level of management oversight to continue and improve on the program quality achieved during this assessment period.

E. Security

1. Analysis

During this SALP period, approximately 4 percent of direct inspection effort was applied to the licensee's physical security and fitness for duty programs. In addition to region based inspections, the resident inspectors also monitored implementation of this program as part of their routine inspection activities.

The previous SALP report rated the licensee's performance Category 2, Improving, for Security. Primary weaknesses identified in that report focused on personnel access control to vital areas and failures of compensatory security measures. These weaknesses were significantly reduced during the current assessment period. In the previous SALP report, the Board encouraged the licensee to resolve a longstanding weakness in the CCTV alarm assessment capability, initially identified during a 1986 Regulatory Effectiveness Review. A significant equipment upgrade to incorporate a video capture system was installed during the current assessment period and has largely eliminated this weakness. Some minor limitations remain with the video capture system and the licensee is actively exploring further equipment and/or procedural improvements.

The licensee's performance in the areas of physical security and fitness for duty appeared, on the basis of inspections conducted, event reports, and other observations and analysis, to be good in all assessment areas. Both program strengths (vital area barriers and armed response) and weaknesses (effectiveness of the audit program and the number of pending requests for security equipment modification or maintenance) have been noted during the assessment period.

Principal strengths in the licensee's security and fitness for duty programs included control of access to vital areas, the use of roving patrols dedicated to armed response (carrying carbines or shotguns, as appropriate, as well as side arms), and the availability of Employee Assistance Programs for contractor employees. A major program upgrade to establish a search train at the intake structure protected area was completed during the assessment period.

A principal program weakness was noted concerning the number of cited and non-cited violations that could have been identified and corrected by a stronger audit program. This indicated a need for increased management attention to upgrade the audit program and make it more effective.

Although the licensee has been aware of a large backlog of action requests for maintenance or modification to security equipment, little progress was seen in addressing this concern. This was also seen as a program weakness. Discounting action requests of an administrative nature or otherwise having no direct effect on security activities, approximately 90 requests were identified as being more than 90 days old, nearly half of which were more than a year old. A more effective audit program could have identified this weakness. This further demonstrated the need for increased management attention.

One Licensee Event Report dealing with safeguards matters (requiring prompt reporting pursuant to 10 CFR 73.71) was issued and adequately resolved during the SALP period. This report dealt with failure of circuit boards in the alarm annunciation system, and prompted a full replacement of the obsolescent components which is scheduled to be completed in the near future. However, technical issues discussed in two reports issued in January and December 1990, and dealing with backup power to communications equipment and vital equipment protected by compensatory measures, respectively, remain to be resolved.

Enforcement actions during the assessment period included four violations, which were resolved by appropriate corrective actions: one each related to access control at the main and intake structure protected areas, one violation related to protection of Safeguards Information, and one violation related to urinalysis testing of fitness for duty program personnel. Two weaknesses related to fitness for duty and four non-cited violations dealing with vital area access control, communications, lighting, and protection of Safeguards Information were promptly corrected by the licensee.

The licensee's loggable safeguards events were promptly and completely reviewed and reported as required. The root cause and trend analyses of these events determined that most of the events were related to aging equipment scheduled for replacement by major hardware upgrades then underway. The frequency of occurrence has exhibited a decreasing trend as those projects have been completed.

Licensee staffing appeared effective in most areas, although the identified long delays in resolving security related action requests may indicate a need for additional senior management support. Key positions have been identified and responsibilities are well defined. Decision making authority appears properly assigned to ensure prompt identification and response to program challenges. During the current assessment period, management implemented team development workshops for all staff. This training showed significant promise in improving staff communications and cohesiveness.

The licensee's guard training and qualification program was well defined and implemented with dedicated resources. During this SALP period, the licensee initiated sophisticated contingency drills incorporating diversionary tactics and covert penetrations.

2. Performance Rating

Performance assessment: Category 2, Improving

3. Board Recommendation

Licensee management is encouraged to more effectively identify and address weak areas. More attention should be given to improving the effectiveness of the audit program and to reducing the number and age of outstanding maintenance requests.

F. Engineering/Technical Support

1. Analysis

During the assessment period, NRC regional and Headquarters inspectors conducted a total of twelve inspections. Two of these inspections were team inspections which addressed motor operated valves and shutdown risk management. The other inspections involved facility modifications, design changes, inservice inspection and testing, erosion/corrosion monitoring, eddy current testing of steam generator tubes, and procurement of a new emergency diesel generator. The resident and project inspectors also conducted inspections in this area. Review of Engineering and Technical Support activities accounted for approximately 15 percent of the total Diablo Canyon inspection effort.

The last SALP assessment rated the licensee's performance in this functional area Category 1. Improvements were recognized in Engineering involvement in plant operations and modification work, design basis reviews, setpoint reverification, vendor interface, personnel qualification and training. A particular strength was found in the commercial grade dedication program. Some weaknesses were noted in incomplete technical work and untimely identification and resolution of problems due to a weak sense of ownership of plant problems. The Board recommended that the licensee provide emphasis on early identification, effective engineering involvement, and timely and thorough correction of plant problems. The licensee was encouraged to continue building a strong interface between corporate and plant engineering groups, with corporate engineering taking a leadership role in the resolution of plant problems. Continuation of innovative corporate engineering training programs was specifically encouraged.

During this SALP assessment period, the licensee showed continued high quality performance in this functional area. Strengths were observed in a generally aggressive and thorough engineering attitude in resolving technical problems, an extensive erosion/corrosion monitoring program, eddy current testing of steam generator tubes, assessment of probabilistic risks to the shutdown plant, and overall

engineering involvement in plant operational activities. The NRR staff observed excellent quality in the technical content and presentation of licensee submittals, which included documents in support of license amendment requests, corrective actions regarding operations and Licensee Event Reports, and responses to NRC bulletins and generic letters. Improvements were observed in timely problem identification, engineering involvement, and problem ownership. Minor weaknesses were noted related to procurement of the new emergency diesel generator (EDG) and certain inservice inspection and testing activities.

Engineering involvement in resolving safety issues was generally timely. The most significant exception was Engineering's assessment of problems with containment fan cooler unit (CFCU) backdraft dampers in early 1992. Additionally, resolution of Regulatory Guide 1.97 issues was delayed by inadequate tracking of engineering actions, but the licensee later identified this weakness and pursued resolution in an aggressive manner. Substantial improvement was displayed later in the SALP period in Engineering's timely resolution of CFCU damper blade cracking.

Strong Engineering performance and initiative were evidenced in Engineering's evaluation of setscrew loosening on motor operated valve (MOV) actuators and the licensee's decision to examine the steam generator feedwater nozzles in response to problems observed at another facility. The feedwater nozzle examinations were extensive and used state-of-the-art techniques. The Engineering staff's assessment of crack indications in both feedwater piping and in a safety injection tank penetration resulted in a conservative decision to replace affected piping segments.

Proactive Engineering involvement was observed in the development of an extensive erosion/corrosion monitoring program. Despite extensive involvement with the industry in the development of predictive analytical computer programs, poor correlation between the quantitative predictions and measured wear rates had been experienced by the licensee. The licensee's program exhibited a defense-in-depth approach to compensate for recognized limitations in the state of the art. Although a program weakness in the measurement of pipe wall thickness was noted, strong engineering ownership of the program compensated for this minor weakness.

Throughout the SALP review period, the licensee demonstrated an aggressive engineering attitude in technical problem resolution. For example, the licensee instituted a supplemental program that is the first surveillance program in a U. S. commercially operated reactor vessel to investigate the effect of annealing and reirradiation on its reactor vessel beltline materials.

Another example of aggressive engineering was resolution of the long-term seismic program. The licensee performed a detailed analysis to demonstrate that adequate seismic margins exist for the structures and equipment which could be affected by increased ground motion in certain frequency ranges at the Diablo Canyon site.

The licensee also developed and implemented an effective outage risk assessment plan which was found superior to other plants which were inspected. The technical support provided for the outage risk assessment plan was excellent.

The engineering program developed for eddy current testing (ECT) of steam generator tubes was observed to be a high quality program incorporating current technology and industry guidance. However, a weakness was noted in that engineering guidelines for ECT data analysis and defect acceptance criteria, although adequate, were not controlled through the use of formal plant procedures.

Specific strengths noted in engineering activities were as follows:

- The motor operated valve (MOV) program was found to be aggressive and conducted in a well integrated manner. A minor weakness was identified in the lack of timely determination of operability following testing, due to the complexity of the engineering evaluation required to evaluate the test data.

- A strong safety perspective was evident in the development of engineering programs to resolve emerging technical issues. The programs were implemented with priority on safety significance.

- Quality assurance involvement was evident in the implementation of engineering programs.

- Design change packages for the installation of a new emergency diesel generator were generally thorough and complete, although minor housekeeping and cleanliness deficiencies were observed.

Four Severity Level IV violations, one Level V violation and one non-cited violation were identified. The violations were minor in nature and did not evidence programmatic breakdowns.

The low number of engineers and lack of clear goals for the plant's System Engineering staff was a concern earlier in the SALP period. The licensee has since increased the staff and clarified the goals for this group, and some improvement has been observed.

The commercial grade dedication of the sixth emergency diesel generator (EDG) presented unique challenges to the licensee's engineering and procurement activities. The Region and NRR Vendor Branch identified weaknesses in the quality of the procurement and commercial grade dedication of the new emergency diesel generator. However, the licensee's root cause investigation was candid and thorough. Also, although most problems encountered during testing of the sixth EDG were found to have been documented and resolved, the test program did not require formal documentation of problems. This weakness was promptly corrected after identification by the NRC.

Inservice inspection and testing activities were found to comply with approved programs. Observed deficiencies in personnel qualifications

and procedural adherence indicated minor weaknesses in the inservice inspection program.

In conclusion, Engineering and Technical Support demonstrated high quality, with continued strong performance. Some weaknesses were observed, but these were minor in that they appeared isolated, of low significance, and were promptly and appropriately corrected.

2. Performance Rating

Performance Assessment: Category 1

3. Board Recommendation

The Board recommends that licensee management provide continued support for the development and long term integration of proactive engineering programs.

G. Safety Assessment/Quality Verification

1. Analysis

Evaluation of this area was based on both region-based and resident inspections. Review of Safety Assessment/Quality Verification activities accounted for about 26 percent of the total Diablo Canyon inspection effort.

The last SALP assessment rated the licensee's performance in this area Category 1. Strengths were noted in the implementation of Event Investigation Teams (EITs). Weaknesses were noted in resolving problems in a timely manner and in occasional lack of management aggressiveness in dealing with problem areas. The licensee was encouraged to provide more management involvement in timely problem identification and root cause investigation, particularly in the area of repeat problems.

During this SALP assessment period, the licensee generally showed improved performance in this area. Management was more aggressive and timely in dealing with problems than during the previous period, and Safety Assessment/Quality Verification performance by line and quality organizations showed continued improvement. A weakness was noted in the identification and correction of precursors of potentially significant problems.

A significant strength was the aggressive implementation of programs to improve control of safety system availability during operating and shutdown modes. These programs were implemented at all levels of the licensee's organization. Plant design changes were also implemented to reduce risk, resulting in improved safety performance and safety system availability.

Audits performed by the Quality Assurance organization were generally good. Lack of intrusive involvement by Quality Assurance in problems such as the improper maintenance of the containment fan cooler back-

draft dampers was a weakness. As discussed in Section III.E, a need for more effective audits was also noted in the Security area. In fact, a factor in several of the problems experienced during this SALP period was insufficient QA involvement. Some improvement was observed in the latter portion of the SALP period. Audits required by Technical Specifications were adequate and appropriate. Additional audits performed as Quality Assurance initiatives showed significant technical depth, and identified weaknesses in complex technical areas not typically reviewed by quality organizations. A noteworthy improvement in QA effectiveness was evidenced in the increased use of surveillances, which are brief audits in specific areas of concern. These audits have allowed rapid focus of QA oversight in problem areas, which resulted in more timely management attention, root cause evaluation, and corrective action.

Safety groups continued to be very strong in safety focus and depth of technical assessment. The Onsite Safety Review Group identified problems consistent with issues of higher safety significance. Management support of this group was adequate. The Nuclear Safety Oversight Committee improved during this assessment period as a result of focus on higher level concerns, and the addition of non-licensee members. The Plant Safety Review Committee continued to be very strong, providing significant safety insight and conservative decision making.

Nuclear Operations Support (NOS), which is not by charter a quality oversight group, performed several reviews and audits during this assessment period which were instrumental in identifying and correcting problems in interfaces between licensee organizations. These NOS reviews and audits resulted in several improvements in the overall implementation of plant safety functions.

During this assessment period the NRR staff reviewed a large number of safety analyses performed by the licensee. The licensee's submittals demonstrated a clear understanding of safety issues and a conservative approach to technical problem resolution. The submittals for license amendment requests were technically adequate and generally complete. Also, several of the licensee's submittals contained probabilistic risk assessment (PRA) analyses which were of high quality (the PRA technique requires considerable effort by the licensee, and when properly used, adds to the basis for approving proposed changes). The licensee's replies to NRC generic letters and bulletins were also timely, responsive and of generally high quality.

Throughout the SALP review period, the licensee consistently and systematically addressed operability concerns in an aggressive manner, and made appropriately conservative decisions until each concern was resolved. Licensee management kept the NRC well informed of initial concerns as well as their followup plans for resolution.

An increased number of personnel errors were observed in several functional areas at the beginning of the SALP period. This number was reduced by about half during the remainder of the period as a

result of an effective human performance enhancement program and aggressive management involvement at all levels of the organization.

The licensee's program for assessing industry events was strong. A few vulnerabilities were identified and corrected promptly. Several programs were enhanced as a result of implementation of lessons learned from the industry.

While the licensee typically has been aggressive in problem resolution, there have been isolated examples of insufficient aggressiveness in pursuing safety issues. For example, based on the review of licensing submittals requesting relief regarding pumps and valves, the licensee's approach to the resolution of inservice testing program issues required amplifying information and in some cases were not technically justified.

Five Severity Level IV violations were cited in this area, one for failure to correct reverse rotation of containment fan cooler units, and the others for failure to correct repeated problems of a lower safety significance in various functional areas.

A few weaknesses were observed. For example, in three cases, precursors of plant problems occurred without being identified as such. An example of one of these three instances was an unplanned turbine speed-up event, corrected by operators, which had two precursors which were not identified and corrected. In each case, the more significant problem occurred because the precursor had not been adequately addressed. Another weakness was that the guidelines used to trend root causes of problems were imprecise, in that root causes of problems could be assigned to more than one area.

In conclusion, the performance of the licensee's line organization is very strong in the assessment of safety and assurance of quality. Independent safety groups, although already strong, showed additional strength during this assessment period. The Quality assurance organization's performance was not as strong as the line organizations, but was above an adequate level.

2. Performance Rating

Performance Assessment: Category 1

3. Board Recommendations

The Board recommends continued management involvement in Safety Assessment/Quality Verification activities, and strongly encourages prompt identification of problems, timely corrective action, effective Quality Assurance audits and prevention of repeat problems.

IV. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Unit 1

Diablo Canyon Unit 1 entered the assessment period at full power and operated nominally at full power during the SALP period, with occasional brief power curtailments for maintenance and testing activities, except as follows:

On July 5, 1991 an unplanned start of engineered safety features (ESF) equipment occurred when a licensed operator inadvertently actuated the wrong solid state protection system test switch. The control room operators promptly returned all actuated equipment to normal status.

On March 6, 1992 a plant trip occurred due to the loss of main feedwater pump 1-1. The cause of the trip was traced to a faulty fusible link in an inverter. Unit 1 was restarted on March 9, 1992 after a new inverter was installed for feedwater pump 1-1 and fusible links for feedwater pump 1-2 were inspected. Unit 1 reached 100% power on March 10, 1992.

On April 25, 1992, while conducting maintenance on main feedwater pump 1-1, vacuum in the condenser was lost, causing the main turbine and reactor to trip. The primary cause was attributed to inadequate instructions, which allowed a vacuum pump to be started before its seal water isolation valve was opened. Also, condenser vacuum pump suction line check valve CNC-1-747 was observed to leak excessively when the condenser vacuum pump suction valve was opened. Unit 1 was restarted on April 27, 1992 after evaluation of the event and correction of the cause of the trip. Full power was reached on April 28, 1992.

On July 24, 1992, after observing excessive flow noise from main turbine governor valve number 4, the licensee closed the valve, resulting in Unit 1 operating at 98% power.

On September 17, 1992, Unit 1 shut down for a scheduled 63-day refueling outage. The shutdown was complicated by spurious reopening of a main turbine stop valve and two governor valves, which caused the turbine to accelerate from 1100 RPM to 1870 RPM. A few hours later, during the cooldown, reactor coolant system (RCS) pressure rose above the 350 PSI setpoint. The system responded as expected, with the power operated relief valve opening and relieving pressure.

On November 9, 1992, Unit 1 completed its fifth refueling outage. The unit reached 100% power on November 11, 1992.

On December 23, 1992, an operator observed fragments of a fastening device on the ground. Followup investigation revealed a partially melted neutral line connector on a main transformer. The licensee curtailed power to 10% and separated from the grid, fixed the connector and inspected all similar connectors, and returned to 100% power.

Unit 2

Diablo Canyon Unit 2 entered the assessment period at full power and operated nominally at full power during the SALP period, with occasional brief power curtailments for maintenance and testing activities, except as follows:

On August 31, 1991 Unit 2 shut down for its fourth refueling outage about nine days early because of an unisolable leak in the charging system. The leak had been increasing since its discovery on August 13, 1991. The leak had not yet reached its Technical Specification limit at the time of shutdown. Unit 2's shutdown marked 482 days of continuous operation at power, a new world record.

On October 20, 1991, Unit 2 achieved criticality, marking the shortest refueling outage in Diablo Canyon history. Full power was reached on October 31, 1991.

On February 16, 1992, during a power curtailment to 50% for condenser cleaning, the Unit 2 reactor experienced an exaggerated quadrant power tilt ratio as a result of slightly different efficiencies of the secondary loops. The licensee decreased power below 50%, the level below which the quadrant power tilt action statement does not apply. The licensee also entered the action statement, as a conservative measure. During curtailment operations, the power tilt decreased due to xenon burnup, and did not recur until the following curtailment below 50% power for condenser cleaning on March 14, 1992. During this occurrence, the licensee repeated the earlier process, and entered the action statement. Upon power ascension, the power tilt decreased to normal, and the licensee exited the action statement.

On March 23, 1992, Unit 2 was shut down to investigate a failed turbine stop valve. The licensee disassembled the failed stop valve and found that the nut which secures the valve disk to the swing arm had disengaged, allowing the disk to separate and partially block main steam lead number 2. Unit 2 was returned to power on March 28, 1992 after the failed turbine stop valve was repaired and the other three Unit 2 turbine stop valves were verified to be properly assembled.

B. Inspection Activities

Fifty routine and special inspections were conducted during this assessment period (July 1991 through December 1992), as listed below.

1. Inspection Data

Inspection reports: 91-20, 91-22, 91-24 through 91-27, 91-29, 91-31, 91-32, 91-34 through 91-41, and 92-01 through 92-33. Six of these reports documented management meetings and one documented an enforcement conference.

2. Special Inspection Summary

Special inspections included the following:

91-39 October 21 - November 29, 1991: A review of the licensee's Generic Letter 89-10 program for safety related motor operated valves

92-09 March 10 - March 17, 1992: Review of the licensee's procurement activities for the 6th emergency diesel generator

92-17 March 17 - April 27, 1992: Review of the licensee's maintenance and inspection activities for the containment fan cooler units (CFCUs), as well as licensee operability assessments for the CFCUs

92-201 August 24 - October 30, 1992: Shutdown Risk Team Inspection

C. Enforcement Activity

Inspections during this period identified 19 cited violations. Of these, 18 were Severity Level IV and 1 was Severity Level V. No deviations were identified during this period.

D. Confirmatory Action Letters

None.

E. Licensee Event Reports

Unit 1 LERs

Unit 1 issued 40 LERs during this reporting period. The LERs were 83-39, 91-011 through 91-021, and 92-001 through 92-028. LERs 91-021, 92-003, 92-006, 92-010, 92-015, 92-016, and 92-022 were voluntary.

Unit 2 LERs

Unit 2 issued 18 LERs during this reporting period. The LERs were 91-001 through 91-012 and 92-001 through 92-006. LERs 91-002 and 91-008 were voluntary.