INITIAL SALP REPORT

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

50-346/90001

Toledo Edison

Davis-Besse Nuclear Power Plant

March 1, 1989 through June 30, 1990

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ACRONYMS

ALARA	as low as reasonably achievable
ARTS	anticipatory reactor trip system
ASME	American Society of Mechanical Engineers
ATWS	anticipated transient without scram
B&W	Babcock and Wilcox
CAL	confirmatory action letter
CFR	Code of Federal Regulations
CNRB	corporate nuclear review board
DAAS	data acquisition and analysis system
DCRDR	detailed control room design review
DRP	Division of Reactor Projects
DRSS	Division of Radiation Safety and Safeguards
DRS	Division of Reactor Safety
ERDS	emergency response data system
ESF	engineered safety features
FCR	facility change request
HPI	high-pressure injection
IAM	immediate action maintenance
I&C	instrument and control
ISEG	independent safety engineering group
ISI	inservice inspection
ISLOCA	interfacing system loss-of-coolant accident
LER	licensee event report
MCAR	management corrective action report
MWO	maintenance work order
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PCAQ	potential condition adverse to quality
PM	preventive maintenance
QA	quality assurance
QC	quality control
RO	reactor operator
RPS	reactor protection system
SALP	systematic assessment of licensee performance
SCC	simple configuration change
SFAS	safety features actuation system
SPIP	safety and performance improvement program
SRB	safety review board
SRO	senior reactor operator
SSOMI	safety system outage modifications inspection
TMI	Three Mile Island
TS	Technical Specifications
VR	Valve Repair

I. INTRODUCTION

The systematic assessment of licensee performance (SALP) program is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance on the basis of 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 the licensee's management regarding the NRC's assessment of the facility's performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on August 22, 1990, to review the observations and data on performance, and to assess licensee performance in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." The guidance and evaluation criteria are summarized in Section III of this report. The Board's findings and recommendations were forwarded to the NRC Regional Administrator for approval and issuance.

This report is the NRC's assessment of the licensee's safety performance at the Davis-Besse Nuclear Power Station for the period March 1, 1989, through June 30, 1990.

The SALP Board for Davis-Besse was composed of the following individuals:

Board Chairman

H. J. Miller, Director, Division of Reactor Safety (DRS)

Board Members

W. L. Axelson, Deputy Director, Division of Radiation Safety and Safeguards (DRSS)
W. L. Forney, Deputy Director, Division of Reactor Projects (DRP)
J. N. Hannon, Project Directorate III-3, Nuclear Reactor Regulation (NRR)
R. C. Knop, Chief, Reactor Projects Branch 3, DRP
P. M. Byron, Senior Resident Inspector, Davis-Besse, DRP
T. V. Wambach, Project Manager, NRR

Other Attendees at the SALP Board Meeting

A. B. Davis, Regional Administrator
C. J. Paperiello, Deputy Regional Administrator
L. R. Greger, Chief, Reactor Programs Branch, DRSS
I. N. Jackiw, Chief, Projects Section 3A, DRP
W. G. Snell, Chief, Radiological Controls and Emergency Preparedness, DRSS
M. P. Phillips, Chief, Operational Programs Section, DRS
A. Dunlop, Project Engineer, DRP
S. D. Burgess, Reactor Inspector, DRS
C. F. Gill, Senior Reactor Programs Specialist, DRSS

R. A. Paul, Senior Radiation Specialist, DRSS
G. M. Christoffer, Physical Security Inspector, DRSS
F. A. Maura, Reactor Inspector, DRS
H. A. Walker, Reactor Inspector, DRS
J. M. Jacobson, Reactor Inspector, DRS
J. L. Belanger, Physical Security Inspector, DRSS
A. H. Hsia, Project Manager, NRR

II. SUMMARY OF RESULTS

Overview

A. This assessment period was from March 1, 1989, through June 30, 1990. Overall performance remained about the same. While the Operations area shown improved performance in staffing levels, and management involvement and perspective, overall performance declined as a result of weaknesses identified during the recent refueling outage. A large number of operational events occurred during the refueling outage that were attributed to operators' inattention to detail, insufficient management overview, and a lack of awareness of plant conditions by the operations staff. Additionally, performance weaknesses were noted in control room communications and oversight activities of first line supervision. Increased attention appears to be necessary in this functional area. Improvements in Radiological Controls area included increased reliability of radiation monitors, efforts by department personnel in limiting exposure during the refueling outage, and advanced radiation worker training for maintenance. In the Maintenance/Surveillance area performance improved as demonstrated by a low forced outage rate, reduced maintenance work order (MWO) backlog, development of diagnostic techniques and tools for reliability based maintenance, and effective management of the preventive maintenance and surveillance programs. Performance in the Emergency Preparedness area continued to be very good as evidenced by the excellent emergency response organization staffing levels both onsite and offsite and the use of challenging exercise scenarios. Security continues to maintain good performance as evidenced by its improved fitness-for-duty (FFD) training, upgrading of detection equipment, and low threshold for problem reporting. Improvements in the Engineering/Technical Support area included completing almost all modification packages prior to the refueling outage, more timely resolution of technical issues, and use of thorough and comprehensive root cause analysis. Improvements in the Safety Assessment/Quality Verification area included more performance based audits, quality and the frequency of surveillances, the thorough investigation and assessment of events, comprehensive independent introspection, and a more effective management team.

The performance ratings during the previous assessment period and this assessment period according to functional areas are given below:

Functional Area	Rating Last Period	Rating This Period	Trend
Plant Operations	2	2	declining
Radiological Controls	2	2	
Maintenance/Surveillance	2	2	improving

Functional Area	Rating Last Period	Rating This Period	Trend
Emergency Preparedness	1	1	
Security	1	1	
Engineering/Technical Support	2	2	
Safety Assessment/Quality Verification	2	2	

B. Other Areas of Interest

None.

III. CRITERIA

Licensee performance is assessed in selected functional areas. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations. Special areas may be added to highlight significant observations.

The following evaluation criteria were used to assess each functional area:

1. Assurance of quality, including management involvement and control;

2. Approach to the identification and resolution of technical issues from a safety standpoint;

3. Responsiveness to NRC initiatives;

4. Enforcement history;

5. Operational events (including response to, analyses of, reporting of, and corrective actions for);

6. Staffing (including management); and

7. Effectiveness of training and qualification program.

However, the NRC is not limited to these criteria and other criteria may have been used where appropriate.

On the basis of the NRC assessment, each functional area evaluated is rated according to three performance categories. The definitions of these performance categories are as follows:

Category 1: Licensee management attention and involvement are readily evident and place emphasis on superior performance of nuclear safety or safeguards activities, with the resulting performance substantially exceeding regulatory requirements. Licensee resources are ample and effectively used so that a high level of plant and personnel performance is being achieved. Reduced NRC attention may be appropriate.

Category 2: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are good. The licensee has attained a level of performance above that needed to meet regulatory requirements. Licensee resources are adequate and reasonably allocated so that good plant and personnel performance is being achieved. NRC attention may be maintained at normal levels.

Category 3: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are not sufficient. The licensee's performance does not significantly exceed

that needed to meet minimal regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

The SALP report may include an appraisal of the performance trend in a functional area for use as a predictive indicator. Licensee performance during the assessment period should be examined to determine whether a trend exists. Normally, this performance trend should only be used if a definite trend is discernible.

The trend, if used, is defined as:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period, and the licensee had not taken meaningful steps to address this pattern.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

Evaluation of this functional area was based on the results of 10 routine inspections and 1 special inspection by the resident inspectors and 1 inspection by regional inspectors.

Enforcement history in this functional area declined from the previous assessment period. There was one Severity Level III violation issued for events that occurred during the previous assessment period. There were also seven Severity Level IV violations and one Severity Level V violation during the assessment period. An enforcement conference was held near the end of the assessment period and a supplemental enforcement conference was held with the licensee shortly after the assessment period to discuss a series of events that occurred during the refueling outage related to loss of control of task management. The staff is considering these for escalated enforcement.

The plant experienced two automatic reactor trips in the 11 months of operation compared with the same number of reactor trips in 5 months of operation during the previous assessment period. One of the trips was caused by a short-circuit in a balance-of-plant circuit and the other, ending fuel Cycle 6 on January 26, 1990, was caused by an electrical transient in the reactor protection system during the performance of a surveillance test. The plant also experienced a feedwater transient which resulted in a significant power reduction.

Eight events connected with activities in this functional area required the submittal of licensee event reports (LERs). Five of the events involved, at least in part, personnel errors. Design and procedural deficiencies were each involved in two LERs and an equipment malfunction was responsible for the remaining LER.

Assurance of quality, including management involvement and control, was mixed as evidenced by the management of control room activities. Control room activities were well managed during non-outage activities and non-routine events. Control room personnel generally displayed a high degree of attentiveness, good knowledge of plant status (configuration) and regulatory requirements, and have positive safety attitudes. Morale continued to improve. However, while vertical communications have improved, control room communications among operators still are not formal. The licensee is not consistently implementing its procedures governing control room communications at the first line supervisor level and below.

Control room activities were not well managed during the refueling outage as evidenced by numerous operational events such as the draining of the refueling canal, overfilling of the steam generator, and the inadvertent stopping of a makeup pump. Most of these events could be attributed to inattention to detail and poor inter- and intra-organizational communications. During an outage the operators appear to assume a secondary role; this attitude manifests itself in reduced operator involvement and overview. The NRC discussed its concerns relating to the safety significance of the breakdown of task management with the licensee. The licensee identified several causal factors for the recent outage related events, which were similar to those identified for the feedwater transient that also occurred during the assessment period. Subsequent review determined that numerous events in the previous assessment period had similar causal factors. The large number of events during the refueling outage indicate that the corrective actions taken for previous events were not effective.

The licensed staff is ample. There are 22 reactor operators (ROs) and 55 senior reactor operators (SROs). The licensee has a 6-shift rotation with an SRO licensed shift manager on each shift and several of the shifts have two assistant shift supervisors. Overtime was not excessive; the operations staff averaged 51.5 hours a week during the refueling outage. No one exceeded the NRC guidance on overtime. Two RO and 10 SRO initial examinations were administered and all candidates passed. A requalification examination was administered to 20 candidates and 16 of the candidates passed (4 of 7 ROs and 12 of 13 SROs). Both the operations manager and operations superintendent positions were vacated during the assessment period. The designated operations manager is currently in SRO training and a contractor is filling the position. The operations superintendent position was filled from the shift supervisor ranks.

Once identified, management addressed safety problems aggressively and conservatively. For example, the licensee cooled the plant down after the last operations event that occurred during the restart activities. The licensee evaluated the recent operational events and discussed them with all operations personnel. In addition, startup retraining was given to all appropriate personnel and, an offsite peer group from other utilities was brought in to review the operations department.

The licensee's efforts in the area of plant procedures was mixed. After discussions with the resident inspectors, the licensee performed a surveillance of plant procedures which resulted in a finding that operations and fire protection procedures were deficient. The NRC considered this to be a significant finding.

As a result of the surveillance, a dedicated task force was created to improve plant procedures and established priorities. The task force has made significant gains in both quality and quantity. The licensee expects that this effort will be completed about midway into the next assessment period.

The licensee's fire protection program has made significant progress over the previous assessment period, as demonstrated by the large reduction in violations related to fire watches. An inspection near the end of the assessment period determined that the licensee was controlling this area better and that the amount of inoperable fire protection equipment requiring fire watch patrols was significantly reduced. The licensee's response to NRC fire protection initiatives was very good. It promptly addressed such concerns raised by the NRC as the use of wooden planking in scaffolding, potentially obstructing the spray pattern of a sprinkler head. The concerns were resolved by improving the administrative controls on scaffolding. Housekeeping conditions within the plant were good. The principal housekeeping issue that still needs to be addressed is the control of boron deposits in limited areas that result from leaking valves, pipes, and pumps in primary coolant components.

Material condition of the plant was good during the operational phase, as evidenced by the reliability of equipment during plant operation.

Although management involvement in operations was significant, it was not always effective. As noted previously in this section, operations personnel performance during the refueling outage was weak. The major cause for this weakness was inattention to detail and poor communications. The effectiveness of management action during the restart delay at the end of the assessment period will be evaluated in the next assessment period.

2. Performance Rating

The licensee's performance is rated Category 2 with a declining trend in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

The licensee needs to improve the effectiveness of its task management activities. The NRC will inspect this area and its effectiveness during the next refueling outage.

B. Radiological Controls

1. Analysis

Evaluation of this functional area was based on the results of seven inspections by regional inspectors and observations made by resident inspectors.

Enforcement history in this area showed a decline. There were two Severity Level IV violations and one Severity Level V violation issued. Two additional violations were identified related to the core support assembly move but have not yet been issued. Although the violations did not constitute a programmatic breakdown in licensee radiological controls, the movement of the core support assembly was considered a significant problem and had the potential to cause an overexposure. This event was discussed in an enforcement conference held in Region III on June 1, 1990.

Staffing levels, qualifications, and training of radiation protection personnel were good. Staff turnover rate for the radiation protection, chemistry, and environmental groups was very low. One weakness noted was the lack of a permanent ALARA (as low as reasonably achievable) staff which is just now being formed as a result of lessons learned from the 1990 refueling outage. An ALARA staffing strength is the assignment of an ALARA person to the planning/scheduling staff.

Management involvement in ensuring quality was adequate in this functional area. In response to audit and assessment findings, the licensee further formalized and standardized responsibilities in the radiological controls program. The licensee effectively used its radiological awareness reporting system to record, investigate, and initiate corrective actions on radiological problems identified by station personnel. However, management controls were weak in the core support assembly event and to a lesser extent for failure to sample and report an effluent release and for an incomplete annual environmental monitoring report. As observed during the refueling outage, radiological work planning efforts still have not significantly improved from the previous assessment. For example, as a result of MWO's still not containing tool lists, workers must make additional entries and exits in radiological control work areas [illegible] order to complete their task. An improvement was noted [illegible] the control of maintenance workers in radiological areas [illegible]rough the efforts of radiological controls personnel rather [illegible]han through improved programmatic controls. These efforts [illegible]esulted in limiting personnel exposure during the refueling [illegible]utage.

Responsiveness to identified concerns was good as evidenced by such improvements as reducing the number of required radiological liquid catchments, increasing the reliability of

radiation monitors, installation of a standup whole-body counter, initiation of advanced radworker training for plant and semipermanent contract maintenance workers, improvements in laboratory QA/QC (quality assurance/quality control), and improved trending of water chemistry parameters. Also, the licensee has plans to expand the laboratory space to correct present crowded conditions.

The licensee's approach to the identification and correction of technical issues was generally good. Total station dose in 1989, a non-outage year, was low at about 37 person-rem; however, it will be much higher in 1990 inasmuch as 475 person-rem accumulated in the refueling outage, significantly more than the original dose projections for the outage owing to greatly increased inservice inspection (ISI) and emergent work. Also, some additional dose resulted from the loss of normal system cleanup capability when the cleanup system letdown valve (MU-2B) failed to open after the reactor tripped to begin the outage. This caused higher than projected dose rates from coolant piping and pumps.

Liquid and gaseous radioactive effluent releases were a small fraction of Technical Specifications limits and the volume of solid radioactive waste was low. Licensee performance in nonradiological confirmatory measurements was fair (21 agreements in 30 comparisons); the disagreements, which were attributed to problems in procedures and instrument calibrations, were mainly resolved during the period. No transportation incidents were identified.

The implementation of an advanced radiological training course with hands-on laboratory for maintenance personnel has been an effective training tool. An increase in radiation work practice infractions noted previously has been corrected. Personnel contaminations were low.

2. Performance Rating

The licensee's performance is rated Category 2 in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

C. Maintenance/Surveillance

1. Analysis

Evaluation of this functional area was based on 10 routine inspections performed by the resident inspectors, 2 inspections performed by regional inspectors, and 1 special team inspection performed by regional specialists.

Enforcement history in the maintenance/surveillance area has improved. One Severity Level IV and one Severity Level V violation were identified.

Eleven events connected with activities in this functional area required the submittal of LERs. Six of the LERs were a result of personnel error, three were a result of equipment problems, and two others were a result of procedural inadequacies. One of the personnel errors resulted in the first reactor trip. The event resulted from an improperly made balance-of-plant electrical splice during the previous refueling outage. Overall, even though there was an increase in the number of LERs issued in the maintenance/surveillance area from the previous assessment period, a review of the events did not indicate any trends.

Maintenance management again experienced change during this assessment period. The mechanical maintenance superintendent's position was filled early in the assessment period and both the instrument and control (I&C) superintendent and the maintenance manager's positions were filled during the latter part of the assessment period. It is too early to determine the effects of these changes, though preliminary indications are positive.

Management involvement was evident in the reduction of safety-related corrective and potential condition adverse to quality (PCAQ) maintenance work orders (MWOs) from 445 to 256. The licensee reduced its dependency on immediate action maintenance (IAM), reducing the number of IAMs issued from 164 (the previous assessment) to 28 during this period. The licensee maintained work lists and packages for forced outages of varying duration. This enabled maintenance to preplan work schedules in the event of a forced outage. Management involvement was also visible in the predictive and preventive maintenance (PM) programs. The licensee aggressively developed techniques and tools to strengthen its maintenance program. These include the development of air-operated valve diagnostic equipment, expanded analysis of motor-operated valves utilizing expanded valve testing equipment, use of thermography to detect deteriorating equipment, expanded use of data acquisition and analysis system (DAAS) equipment to monitor plant equipment, and use of lubrication analysis. These tools helped the licensee achieve a low forced outage rate. The licensee received its valve repair (VR) stamp from the National Safety Valve Repair Board during the assessment period and is the first utility to have received the VR stamp. The presence of system engineers in the plant continues to have a significant positive influence on the maintenance program, as evidenced by the the evaluation of the PMs and the increased usage of reliability centered maintenance.

Management involvement in the maintenance program was effective as demonstrated by only 8 of 3500 PM items not being completed. The percentage of total maintenance hours spent on PM increased from 41.9 to 51.8 percent. The number of deficient control room instruments and annunciators decreased over the assessment period.

The licensee continued to have an excellent surveillance program. Surveillances are tracked by computer; early and late dates as well as scheduled dates are tracked. Management attention is evident in this area as demonstrated by the fact that only two surveillances were missed. Neither missed surveillance was safety significant.

The licensee completed a 5-month refueling outage during the assessment period. Major work accomplished was the 10-year ISI program; completion of the 10 CFR Part 50, Appendix R requirements; feed and bleed enhancements; replacement of core barrel bolts; high-pressure injection (HPI) nozzle and thermal sleeve inspections; reactor vessel inspection; steam generator eddy current inspection; and control room modifications.

The licensee reprioritized scheduled outage work as emergent work was introduced. Management involvement was evident in the work prioritization process as no required work was deleted from the outage.

The licensee's management of contractors was mixed. While in general, the licensee did an adequate job of managing contractor activities, the lifting of the core support assembly, insufficient time for pre-outage planning, and poor work staging or task planning were examples of less-than-adequate contractor management.

An interfacing system loss-of-coolant accident (ISLOCA) inspection was performed by the NRC. Concerns were raised regarding check valve corrective and preventive maintenance. The licensee is developing a check valve maintenance program which emphasizes valves judged most likely to fail. However, the NRC inspection determined that the program as presently constructed did not adequately consider the valves of greatest safety significance. The implementation of the check valve maintenance program should be completed during the next assessment period.

The ISI program was adequately planned, has appropriate priorities, and has adequate procedures. Records were complete, well maintained, and accessible. As a result of the implementation problems encountered in the use of acoustical emission monitoring, the licensee is accelerating the implementation of the next 10-year ISI program.

Management efforts were effective in reducing the backlog of MWOs held for lack of material. They were reduced from 20.5 to 9 percent during the assessment period. The spare parts program was completed and the implementation stage continues.

Communications between the licensee and NRC personnel were excellent. The resident inspector staff was notified when maintenance or surveillance problems arose. Maintenance staffing was acceptable, as evidenced by the decline in the MWO backlog. The licensee readily supplemented its maintenance staff to maintain a reasonable backlog. The licensee was able to accomplish its work in this functional area utilizing 9 percent overtime during the operating cycle and 35.7 percent overtime during the outage. Maintenance training continued to be excellent. The licensee continued to give maintenance training a high priority.

Several engineered safety features (ESF) actuations occurred during the outage and were caused by personnel error. They included inappropriate use of electrical jumpers and personnel bumping into plant equipment. Additionally, door maintenance was weak during the assessment period and resulted in implementation of a large number of compensatory measures for fire and security doors. However, the licensee's responsiveness to these issues in the latter part of the assessment period was effective and the number of door problems was significantly reduced.

2. Performance Rating

The licensee's performance is rated Category 2 with an improving trend in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

D. Emergency Preparedness

1. Analysis

Evaluation of this functional area was based on three inspections conducted by regional inspectors, and resident inspector observations of drills. Regional inspections included a routine inspection in mid-1989, observation of the 1989 annual emergency preparedness exercise, and a routine inspection during early 1990. Region-based staff also met with licensee representatives to discuss current program activities.

Enforcement history was good during this assessment period; no violations were identified.

Management involvement in ensuring quality was evident throughout the assessment period, as evidenced by management's participation in exit meetings following each inspection and the adequacy with which the licensee addressed NRC-identified concerns. One actual activation (unusual event) of the licensee's emergency plan occurred during the assessment period. The licensee classified the event properly and responded to it per procedures. The subsequent review of response actions was comprehensive.

The licensee's approach to the resolution of technical issues has been very good. An example of this is the thoroughness with which the licensee is approaching resolution of two items related to dose calculation (lakebreeze effects and software validation). Emergency plan revisions were well prepared, and adequate justification was given for each change.

The 1989 emergency exercise was considered successful and challenging, and all significant aspects of the emergency plan were adequately exercised. This was the first ingestion pathway exercise for the State of Ohio. No exercise weaknesses were identified during the 1989 annual exercise, and overall performance was very good. In addition to the exercise, the licensee's meteorological monitoring and dose calculation and assessment programs were evaluated and found acceptable. Inspection results from both the 1989 and 1990 routine inspections were very positive, with only one open item being identified, and several open items being closed. The resident inspector's observations of scheduled emergency drills indicated professional attitudes by drill participants.

The licensee has been responsive to NRC concerns, and when resolving weaknesses from a safety standpoint, the licensee has demonstrated a clear understanding of the issues involved. The licensee has volunteered to be one of the initial plants to implement the emergency response data system (ERDS), and to provide computerized plant system parameter information to an NRC data link.

Staffing of emergency response positions was adequate; the authorities and responsibilities of personnel were well defined. Knowledge and capability of personnel to carry out their emergency response duties and responsibilities were well demonstrated during annual emergency preparedness exercises, as well as in walkthroughs during the routine inspection. This indicated that the licensee's training program had adequately prepared personnel for their emergency response assignments.

As in the previous assessment period, licensee management has strongly supported liaison with offsite State and county officials and has provided considerable resources for offsite training.

2. Performance Rating

The licensee's performance is rated Category 1 in this area. The licensee's performance was Category 1 in the previous assessment period.

3. Recommendations

None.

E. Security

1. Analysis

Evaluation of this functional area was based on the results of two inspections performed by regional inspectors and observations made by resident inspectors.

Enforcement-related performance has essentially remained the same and is considered good. Two Severity Level IV violations were identified. These violations were not indicative of a programmatic breakdown.

The licensee's assurance of quality was good. Management's involvement in assuring quality was readily evident and is a program strength. This was evidenced by the licensee implementing a violation tracking system that requires supervisors of employees who have committed security violations to respond in writing, and to detail corrective actions. As a result, the security awareness of both supervisors and employees has increased notably. A compliance program was established internally within the security organization to assist management in evaluating and improving the effectiveness of the security program.

The training and qualification program is acceptable and meets program commitments. In response to inspection findings, the licensee conducted research regarding the effectiveness of its program for testing the agility of guards. Subsequently, the licensee improved its program for evaluating the ability of security officers to perform their critical response role. The licensee has incorporated within the security training program a plant systems overview class which provides a general overview of how the station operates. This is intended to give members of the security organization a better understanding of the significance of components they protect. The licensee also has a good Fitness-For-Duty training program.

The licensee's approach to the identification and resolution of technical issues was excellent and a program strength. It was sound, timely, and conservative. The licensee took an aggressive approach to upgrade equipment before it became non-functional. This was indicated by the scope of equipment upgrades such as a total upgrade of the card-reader system and the completion of upgrading all search equipment with state-of-the-art equipment. The licensee also took actions to resolve a problem involving intrusion-detection equipment and has reduced the number of nuisance alarms. The coordination and working relationship between security and maintenance was excellent.

The licensee's program for reporting required security events and keeping the NRC informed of security-related events was good. Required reports were accurate and timely. The licensee's program for logging security events utilized NRC guidance, was implemented in a conservative manner, and ensured good monitoring of potential equipment problems. In general, security-related records were complete, well maintained, and readily available.

Licensee staff resources dedicated to the security organization are ample and a program strength. They are effectively utilized so that a high level of personnel performance is achieved. The positions were identified, and authorities and responsibilities were well defined. Security personnel were knowledgeable about their role and competent in the execution of their duties.

The licensee's responsiveness to security issues was excellent and is a program strength. Security management aggressively pursued and evaluated all issues that could strengthen the overall security program. The licensee improved its Fitness-For-Duty training to meet the upgraded NRC requirements. Licensee response to NRC findings has been comprehensive. The licensee has maintained positive relations with the NRC through periodic meetings at the Region III office and regular discussions with resident inspectors.

2. Performance Rating

The licensee's performance is rated Category 1 in this area. The licensee's performance was rated Category 1 in the previous assessment period.

3. Recommendations

None.

F. Engineering/Technical Support

1. Analysis

Evaluation of this functional area was based on the results of 3 team inspections by regional inspectors, 10 inspections by the resident inspectors, a special inspection (ISLOCA) by NRR, and interactions between the licensee and the NRR staff.

Enforcement history improved slightly as four Severity Level IV violations were issued. Two were design problems and two were inadequate procedures.

Four events connected with activities in this functional area required the submittal of LERs. Two were due to design errors, one due to procedural deficiency, and one resulted from a personnel error. None of the events indicated a programmatic weakness.

Management involvement to ensure quality in this functional area has improved and is adequate. Proactive attitudes toward self-assessment and improvement were evident as demonstrated by the work of the Independent Safety Engineering and the Engineering Assurance Departments. The assignment of priorities and planning of activities were consistent with the safety significance of the issues. Essentially, all engineering work on the outage modification packages was completed prior to the start of the outage compared to approximately 50 percent for the previous outage. To improve the quality of the modification packages, the licensee involved the modification coordinators early in the design process and required that system walkdowns be performed in preparing the design package. This resulted in a significant reduction in the number of field changes during the outage.

Examples of positive management involvement included the decision to replace fire wrap material that was difficult to maintain with a more durable fire wrap material, the fire damper upgrade program, installation of an improved design service water valve on the component cooling water heat exchanger, and support of the first requalification examination and initial operator licensing, as demonstrated by the quality of the material submitted and the degree of facility staff preparation and participation. Root-cause analyses were good as evidenced by the determination of a poor cable splice causing the first trip and the failure mechanism of the cleanup system letdown valve MU-2B preventing reactor coolant cleanup during the last reactor trip. Management involvement was evident in the area of engineering support of maintenance as exemplified by performance engineering developing techniques and tools to detect equipment degradation. Additionally, system engineering was involved in the diagnosis and solution of equipment problems as well as reviewing equipment preventive maintenance requirements to allow the licensee to implement a reliability centered maintenance program.

The number of errors cited in engineering evaluations raised a concern regarding checking or verification of design activities. Although the individual errors did not by themselves cause significant concerns, collectively they indicate insufficient attention to detail. However, in one area technical reviews of the contractors' procedures that implemented the NRC-approved alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI hydrostatic pressure testing of plant systems were inadequate.

The licensee's approach to the identification and resolution of technical issues was adequate. Most of the design calculations reviewed indicated that personnel had a clear understanding of the issues involved and exhibited conservatism. For the most part, the technical approaches used were appropriate and 10 CFR 50.59 reviews were well documented and sound. The analysis submitted for licensing actions, such as for fuel Cycle 7 operation, the support of TMI action items, and for increasing the response time for the reactor protection system "high flux/number of reactor coolant pumps" trip circuit, showed a clear understanding of the technical issues. The final resolution of the post-fire safe-shutdown capability issues was technically sound; however, initial engineering approaches were not well thought out requiring reinspection by the Appendix R team and resubmittal of fire protection documentation as noted in the Safety Assessment/Quality Verification Section. The licensee's evaluation of the technical merits of the testing, as implemented, were not satisfactory. Performance Engineering's involvement in the contractor's activities was weak in that the technical adequacy of the testing was inadequately addressed.

Staffing and experience levels were good. Generally, the licensee staff's submittals to the NRC demonstrated good understanding of technical issues, exhibiting thoughtful and innovative solutions. Training and qualification effectiveness was also good.

2. Performance Rating

The licensee's performance is rated Category 2 in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

G. Safety Assessment/Quality Verification

1. Analysis

Evaluation of this functional area was based on the results of 10 routine inspections performed by the resident inspectors,

1 inspection by a regional inspector, and 1 special inspection by the resident inspectors relating to an allegation.

Enforcement history improved over the previous assessment period. The licensee received one Severity Level IV violation for failure to submit an LER for a low level condensate demineralizer backwash radioactive release.

The licensee's response to NRC initiatives and concerns improved over the previous assessment period. Submittals reviewed by the NRC for licensing actions, generic letters, bulletins, and other requests for information amounted to 52 action items. In general, the submittals were of high quality and for those cases that needed additional information, the priority and timeliness applied indicated good involvement by management and awareness of the appropriate safety significance.

Other significant action included conformance to the anticipated transient without scram (ATWS) rule (10 CFR 50.62). Actions taken by the licensee to propose an acceptable ATWS design indicated management involvement, sound approach to problem resolution and cooperation with the staff to achieve satisfactory resolution. Another significant action was the licensee's effort in the B&W Owners Group's safety and performance improvement program (SPIP). NRC conducted an audit of the programmatic aspects of this program. As a result of that programmatic audit, the staff found that licensee corporate and site management was adequately involved and committed to the SPIP implementation. A formal proceduralized process was established for SPIP recommendation disposition. Its personnel appeared to be knowledgeable of the duties and responsibilities associated with the SPIP recommendation disposition process. There appeared to be good communication among personnel involved in the SPIP process. The SPIP recommendations were properly prioritized for implementation, and the documentation was properly maintained and adequately supported the decision regarding technical recommendation disposition. The licensee has an excellent SPIP implementation program that reflects excellent management involvement, oversight, and commitment to excellence in operation.

The NRC has evaluated the licensee's detailed control room design review (DCRDR) including an onsite audit. The licensee conducted a rigorous DCRDR. The modifications resulting from this review, such as new steam and feedwater line rupture control panels, new labeling, [illegible] demarcation and mimics, and annunciator improvements, represent real improvement in the operator/system interface. The NRC also evaluated the licensee's response to Generic Letter 88-05 regarding prevention of boric acid corrosion and conducted an onsite audit. The initial response indicated that boric acid contamination of components was satisfactorily controlled by the various procedures associated with those components. However, subsequent review by

a licensee's review committee concluded that a comprehensive program could only be ensured by having a separate program. Therefore, the licensee prepared a comprehensive program (NG-EN-00324), "Boric Acid Corrosion Control," and the NRC found it acceptable. This self-initiated activity is evidence of responsible management involvement.

There were exceptions to the licensee's good response to NRC initiatives. One notable exception involved fire protection and Appendix R issues. After many years of evolution and discourse with the staff, some oper items still existed. Additionally, the fire protection documentation and approach (e.g., fire area optimization), were changed without the licensee making the NRC Appendix R inspection team aware of the effects of these items. As a result, a reinspection was needed and the issuance of the fire protection safety evaluation report and final resolution of fire protection issues were delayed. Also, the licensee's response to issues involving acoustic emission testing to meet ASME Section XI requirements represented poor response to NRC concerns. Even after the NRC withdrew approval for the topical report governing this testing, the licensee was slow to acknowledge and accept specific deficiencies identified in the process at the Davis-Besse site.

The licensee's response to the procedures issue identified during the previous assessment period was inadequate in the areas of operations and fire protection procedures. The licensee performed a procedure surveillance as a result of NRC concerns and found that significant weaknesses still existed. A dedicated task force was established to upgrade these procedures. Fire protection procedures have been upgraded and significant progress has been made in the area of operations procedures.

With regard to other issues, management's involvement is evident. There has been steady improvement in this area. The licensee maintains a team that investigates all trips and other transients at management's request. This team is composed of a small pool of individuals who are able to respond within 30 minutes. This group (the transient assessment team) has been very effective and allowed the licensee to readily identify causal factors and implement corrective and remedial actions. This group's findings related to a power transient resulted in management requesting a task force to look into causal factors of previous events. The task force determined that communication deficiencies within and between organizations, SRO overview, and corrective action program inadequacies were principal causes for previous events. The task force noted that approximately 35 percent of corrective actions for deficiencies identified in transient assessment program reports since December 1986 remained open. The licensee became aware that it did not have a program to track corrective actions that originated outside of the

structured corrective action programs. A program was initiated to track all actions and appears to be effective.

A management corrective action report (MCAR) was issued to the Operations Department late in the previous assessment period for resolving operational problems. Three responses to QA were required before an acceptable reply was received. An operations improvement program was developed approximately 10 months after the MCAR was issued. In addition, many of the causal factors for the events that occurred during the outage were the same as those that had been identified for other events during the assessment period. These events indicate weakness in the licensee's corrective action program. Another weakness was the late submittal of post-fire safe-shutdown capability documentation. For a licensee that has been working on resolving these 10 CFR Part 50, Appendix R issues since 1983, the last-minute submittals reflected a weakness in management's involvement to ensure quality.

The licensee's safety review functions, station review board (SRB), corporate nuclear review board (CNRB), and independent safety engineering group (ISEG) provide both comprehensive and critical self-assessments. The CNRB increased its involvement in events and issues. The ISEG performed comprehensive causal evaluations and performed a safety system outage modifications inspection (SSOMI) of two facility change requests (FCRs), two modifications, and two simple configuration changes (SCCs).

The SSOMI was very effective in identifying deficiencies. This included that some circuits fed through containment electrical penetrations did not have backup electrical protection and that a replacement service water valve was not evaluated for its effect on system flow balance and insufficient post-modification test requirements were specified. The licensee's root-cause analysis program continues to be good. The licensee has a comprehensive training program that personnel have to attend prior to performing root-cause analysis.

Management's support of QA activities was evident. The QA organization is professional and well staffed. QA management/ supervision stabilized and a new QA director was appointed. One supervisory position is held by a contractor, in an acting capacity. It is planned that the position will be filled by a licensee employee early in the next assessment period. QA management organization continues to ensure that it has SRO-licensed individuals on its staff. The QA audit and surveillance programs were well defined and effectively implemented. The QA staff provided extensive coverage during the outage and restart activities. QA was functionally independent and assertive and was generally effective in the identification and resolution of quality concerns. Examples of QA's effectiveness were the surveillance of the quality of

operations and fire protection procedures, onshift overview coverage during restart, and expanded overview in the area of fire protection.

The scope and quality of the audits and surveillances were generally good and, for the most part, adequate to assess technical performance, compliance with NRC requirements, and training and qualifications. Licensee responses to the QA findings were thorough, timely, and technically sound. The auditors involved were qualified to perform the audits and surveillances.

As a result of the changes made in the QA organization, audits are more performance and less programmatic based, audit findings and assessments are more clearly communicated, and responsibilities are better delineated. The surveillance program is more aggressive and surveillances are performed more frequently which results in better real time information. The QA organization is more responsive and productive than in previous assessment periods. QA communications with the NRC resident staff continues to be open and forthright.

During the assessment period there were numerous management changes such as the Engineering and QA directors, the Operations, Maintenance, System Engineering, and ISEG managers, and the Operations, Mechanical Maintenance and I&C superintendents. As a result of some of the changes, management appears to function more as a team and to be more introspective. In other cases, some loss of continuity in direction was noted.

Management demonstrated increased safety awareness as shown by its actions at the end of the assessment period when, after a series of events, the restart effort was stopped and the plant was cooled down. Previous events were assessed and discussed with the operations staff, and operators were retrained on startup procedures. Additionally, an outside unbiased peer review group with representatives from three other utilities was brought in to review the events before plant restart continued. The licensee action to stop work and initiate an independent review of control of plant operations is viewed very positively by the NRC.

2. Performance Rating

The licensee's performance is rated Category 2 in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Davis-Besse began the assessment period on March 1, 1989, at 100 percent power. Except for reactor trips, there were no forced outages during the assessment period. The unit operated at 100 percent power level for most of the first 11 months of the appraisal period. Power was restricted to 72 percent on January 22, 1990, when reactor coolant pump 2-2 was stopped because of high vibrations. A plant trip on January 26, 1990 started the sixth refueling outage a week earlier than anticipated. Major modifications completed during the sixth refueling outage included Appendix R modifications, 10-year in-service inspection, replacement of core barrel bolts, and the addition of a diverse scram system. The licensee was still in the refueling outage at the end of the assessment period, June 30, 1990, with the unit in Mode 2. Reactor criticality was achieved on July 1, 1990.

Davis-Besse experienced 11 ESF actuations (including 1 water injection), and 4 reactor trips (2 of those trips occurred without rod movement). Two reactor trips above 15 percent power were the result of equipment problems and 2 reactor trips that occurred during the refueling outage were a result of personnel error. One safety system failure was identified when the licensee found that the Safety Features Actuation System (SFAS) circuitry for the high-pressure injection valves did not include a required seal-in feature.

Significant Outage/Major Events

a. On March 11, 1989, the unit was shut down for a 4-day maintenance outage.

b. On April 11, 1989, the licensee confirmed that 2 design deficiencies found by the resident inspectors on February 6, 1989, could have resulted in the loss of all service water in response to a single circulating water line break. Loss of all service water is a condition beyond the plant licensing design. Upon discovering this plant deficiency, the licensee took appropriate corrective action.

c. On May 27, 1989, the licensee lowered reactor power to 6 percent, removed the main generator from service, and performed maintenance on the condenser and inside containment. The generator was returned to service the same day and power was escalated to 100 percent by May 29, 1989.

d. On May 30, 1989, the reactor tripped on an anticipatory reactor trip system (ARTS) signal caused by a main turbine trip on low

condenser vacuum. The low condenser vacuum was a result of the loss of two circulating water pumps when their breakers tripped on high phase differential current caused by an electrical fault (shorting of a splice in the cable feed for a 480-V transformer).

e. On June 29, 1989, the licensee discovered that HPI system valves in both HPI trains would not fully open within 30 seconds when responding to a safety features actuation system signal in conjunction with a loss of offsite power. The licensee modified the valve circuitry to ensure response time compliance.

f. On January 26, 1990, the reactor tripped on a reactor protection system (RPS) signal caused by an electrical transient during the performance of a surveillance test.

g. On March 14, 1990, the licensee found that some class 1E circuits did not have adequate fault protection. Subsequently, the licensee initiated activities to correct those deficiencies.

h. On June 9, 1990, the reactor trip breakers were opened by an ARTS signal. The plant was in cold shutdown with all control rods fully inserted when this spurious trip occurred. This event appears to have been caused by equipment failure.

i. On June 11, 1990, the reactor trip breakers were manually opened by the operators in anticipation of a spurious ARTS trip. The plant was in cold shutdown with all control rods fully inserted when this spurious trip occurred. This event was caused by personnel error.

B. Inspection Activities

In this SALP report (March 1, 1989, through June 30, 1990), 32 inspection reports are discussed and they are listed in Paragraph 1 of this section, "Inspection Data." Table 1 lists the violations by functional areas and severity levels. Significant inspection activities are listed in Paragraph 2 of this section, "Special Inspection Summary."

1. Inspection Data

Facility: Davis-Besse Nuclear Power Station

Docket Number: 050-346

Inspection Report Numbers: 89011 through 89027, 89201, and 90001 through 90014

TABLE 1

Number of Violations in Each Severity Level

	FUNCTIONAL AREAS	III	IV	V
A.	Plant Operations	1*	7	1
B.	Radiological Controls	-	2	1
C.	Maintenance/Surveillance	-	1	1
D.	Emergency Preparedness	-	-	-
E.	Security	-	2	-
F.	Engineering/Technical Support	-	4	-
G.	Safety Assessment/Quality Verification	-	1	-
	TOTALS	1	17	3

*Violation identified in the previous assessment period, but not issued until this assessment period.

2. Special Inspection Summary

Significant inspections conducted during the Davis-Besse SALP 8 assessment period are listed below:

a. During June 5-9, 1989, a special inspection was conducted to review an allegation (Inspection Report 89015).

b. During August 11 to September 5, 1989, a team inspection was conducted to monitor the annual emergency preparedness drill (Inspection Report 89018).

c. During August 23 to October 19, 1989, a special team inspection was conducted regarding alternate methods of ASME Section XI testing (Inspection Report 89021).

d. During October 30 to November 9, 1989, a special team inspection was conducted to examine the safety significance of potential intersystem loss-of-coolant events (Inspection Report 89201).

e. During April 9-12 and May 14-16, 1990, a team inspection was conducted to assess the ability to prevent and mitigate a fire at the facility (Inspection Report 90007).

f. During May 1-17, 1990, an enforcement inspection was conducted to investigate the circumstances surrounding the refueling canal draining incident and the transport of the core support assembly (Inspection Report 90-012).

C. Escalated Enforcement Actions

A Severity Level III violation and an imposition of civil penalty in the amount of $50,000 was issued during this assessment period for a control rod withdrawal event that occurred during the previous assessment period. This event is discussed in the previous SALP report.

A potential escalated enforcement action is pending on the basis of licensee performance in operations during the refueling outage.

D. Confirmatory Action Letters

On March 10, 1989, a confirmatory action letter (CAL) was issued relating to the rod pull incident of December 19, 1988. The licensee has provided the NRC with a written response to the CAL. (CAL-RIII-89008)

E. Review of Licensee Event Reports

During this SALP assessment period 25 LERs were issued in accordance with NUREG-1022 guidelines.

LER Numbers: 89-004 through 89-018, and 90-001 through 90-010

Table 3 below shows an LER cause code comparison for the SALP 7 and SALP 8 assessment periods.

TABLE 2

LER Cause Comparison

CAUSE AREAS	SALP 7 (14 mos.) NO.	SALP 7 (14 mos.) PERCENT	SALP 8 (16 mos.) NO.	SALP 8 (16 mos.) PERCENT
Personnel Errors	15	47	12	48
Design Deficiencies	7	22	3	12
Procedural Inadequacies	6	19	4	16
Equipment/Component	3	9	6	24
Other/Unknown	1	3	0	0
TOTALS	32		25	
FREQUENCY (LERs/Mo.)	2.3		1.6	

NOTE: This cause code analysis was derived from an NRC staff review of LERs and may not completely coincide with the licensee's cause assignments.