SALP 7

SALP BOARD REPORT

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

254/88001; 265/88001
Inspection Report Nos.

Commonwealth Edison Company
Name of Licensee

Quad Cities Nuclear Power Station
Name of Facility

April 1, 1987 through September 30, 1988
Assessment Period

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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. SALP 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 their facility's performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on November 15 and 23, 1988, to review the observations and data on performance, and to assess the 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 Quad Cities Nuclear Power Station for the period April 1, 1987, through September 30, 1988.

SALP Board for Quad Cities Nuclear Power Station was composed of:

Name	Title
*C. E. Norelius	SALP Board Chairman, Director, Division of Radiation Safety and Safeguards (DRSS)
R. L. Hague	Chief, Technical Support Staff (TSS), Division of Reactor Projects (DRP)
D. E. Jones	Project Inspector, DRP
°*T. M. Ross	Project Manager, Office of Nuclear Reactor Regulation, NRR
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A. D. Morrongiello	Quad Cities Resident Inspector
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°M. A. Ring	Chief, Reactor Projects Section 1B, DRP

Name	Title
°*H. J. Miller	Alternate SALP Board Chairman, Director Division of Reactor Safety (DRS)
°E. G. Greenman	Director, DRP
°*R. L. Higgins	Quad Cities Senior Resident Inspector
C. D. Pederson,	Reactor Engineer, TSS, DRP
C. J. Paperiello	Deputy Regional Administrator
L. R. Greger	Chief, Emergency Preparedness, Radiological Protection and Safeguards Branch, DRSS
H. A. Walker	Reactor Inspector, DRS
W. J. Kropp	Reactor Inspector, DRS
F. J. Jablonski	Chief, Maintenance and Outage Section, DRS
T. J. Ploski	Emergency Preparedness Analyst, DRSS
J. R. Kniceley	Safeguards, DRSS
J. R. Creed	Chief, Safeguards, DRSS
J. Holmes	Reactor Inspector, DRS
°B. S. Mallett	Chief, Nuclear Materials Safety Branch, DRSS

*Denotes voting members at November 15 meeting.
°Denotes voting members at November 23 meeting.

II. SUMMARY OF RESULTS

A. Overview

Management involvement was generally evident and good in all areas of plant operation towards the end of the SALP period. For much of the SALP period, however, significant problems existed in the functional areas of Maintenance/Surveillance and Engineering/ Technical Support which involved almost all of the SALP criteria; management involvement, staffing, approach to technical issues, responsiveness to initiatives, and enforcement history. Plant cleanliness, emergency preparedness quality improvements, decrease in the number of scrams as a result of maintenance personnel errors, and a general increase in staffing are areas that exemplify good management involvement. Overall the licensee's responsiveness to NRC initiatives and concerns was good, being generally timely and technically sound. Resolution of technical issues was mixed. A heavy reliance on consultants and contractors for almost all technical and engineering issues involving any level of complexity was noted. A major area of concern is enforcement history which declined in several areas. In addition, several escalated enforcement activities have occurred or are pending. Staffing, which was weak in many areas early in the SALP period, has generally increased in all areas. Technical ability and work ethic of individuals is considered good. Another area of concern involves the number of LERs which has continually increased for the last three SALPs (59 to 73 to 85). This indicator was noted in the cover letter for SALP 6; yet licensee efforts were unsuccessful in reducing events requiring LERs. Repeat Category 1 ratings in Security and Radiological Controls reflect a strong security program and a slightly less strong effort in the area of Radiological Controls.

The performance ratings during the previous assessment period and this assessment period according to functional area and trend, if any, are given below.

Functional Area	Rating Last Period	Rating This Period	Trend
Plant Operations	2	2	
Radiological Controls	1	1	
Maintenance/Surveillance	2/1	2	
Emergency Preparedness	2	2	
Security	1	1	
Engineering/Technical Support	NR	2	
Safety Assessment/Quality Verification	NR	2	

NR - Not Rated

B. Other Areas of Interest

None.

III. CRITERIA

Licensee performance is assessed in selected functional areas. Functional area normally represents 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, analysis of, and corrective actions for).

6. Staffing (including management).

7. Effectiveness of training and qualifications program.

However, the NRC is not limited to these criteria and others 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 definition 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.

Trend: The SALP report may include an appraisal of the performance trend in a functional area for use as a predictive indicator if near-term performance is of interest. Licensee performance during the last quarter of the assessment period should be examined to determine whether a trend exists. Normally, this performance trend should only be used if both a definite trend is discernable and continuation of the trend may result in a change in performance rating.

The trend, if used, is defined as:

Improving: Licensee performance was determined to be improving near the close of the assessment period.

Declining: Licensee performance was determined to be declining near the close of 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 results of two inspections conducted by regional inspectors, nine inspections by the resident inspectors and preliminary findings from the emergency operating procedure (EOP) inspection performed by the Office of Nuclear Reactor Regulation. Unit availabilities for this assessment period were approximately 80.4% for Unit 1 and 70.9% for Unit 2. Both units were affected by unseasonably high river temperatures, operating on Economic Generation Control (EGC), and several problems, such as a condenser air leak (Unit 1) and replacement of a defective main transformer (Unit 2).

During this assessment period, Units 1 and 2 both operated at power for 133 consecutive days, breaking the previous U.S. record for the number of consecutive days during which both units at a dual unit boiling water reactor (BWR) site operated at power. Unit 1 operated at power for 179 consecutive days during the assessment period. At the end of the assessment period both units were operating at power, Unit 1 having operated at power for 104 consecutive days and Unit 2 having operated at power for 48 consecutive days.

Enforcement history in this area remained relatively unchanged from the previous assessment period. During this 18-month assessment period two Severity Level IV violations, two Severity Level V violations, and one deviation were identified. None of these violations had major safety significance. During the previous 18-month assessment period, three Severity Level IV violations were identified.

The plants had a total of nine reactor scrams during the current assessment period, compared with 18 during the previous period, a significant improvement. However, this is still considered more than desired and three of the nine scrams were avoidable. Six scrams occurred from greater than 15% power, three scrams occurred while the reactor was shut down resulting in no rod motion. No scrams from greater than 15% power and one scram while shut down occurred on Unit 1; all six scrams from greater than 15% power and two scrams while shut down occurred on Unit 2. Of the six scrams from greater than 15% power, three were caused by problems with components associated with the main turbine generator that were not easily detectable, one was caused by a problem associated with a feedwater regulating valve that could have been prevented, and two were caused by personnel error (one by operations personnel and one by maintenance personnel). In the previous assessment period,

eight scrams were the result of personnel errors. Operator and management actions during scrams and prior to restart were appropriate. Investigations of the cause and subsequent corrective actions were comprehensive and satisfactory.

During this assessment period, eight Licensee Event Reports (LERs) were attributable to operations compared with ten during the previous assessment period. All eight LERs were caused by personnel errors, one resulted in a reactor scram and five in engineered safety feature (ESF) actuations. There were also eight personnel error LERs during the previous assessment period. The licensee's response and subsequent corrective actions associated with LERs were generally adequate.

Plant operations staffing was adequate. At the end of the assessment period, the operations department was fully staffed to accommodate a five-shift rotation. Staffing is being increased to allow the addition of a sixth shift by the end of March 1989, and the addition of a fourth nuclear station operator (NSO) per shift by the end of September 1989. In general, operations personnel were experienced and knowledgeable of the plant. An exception involves the level of experience of the equipment attendants, which was low because many of the current equipment attendants have been hired within the past year in anticipation of the addition of a sixth shift and a fourth NSO to each shift.

Two instances of overtime in excess of the guidelines of Generic Letter 82-12 occurred during the assessment period: one involved an NSO and one involved a shift foreman (SF). These instances occurred in June 1988 at the end of an outage when staffing requirements were greater than normal and several staff members were not available because of vacation and training commitments. The licensee has strengthened procedural control to preclude a recurrence and there have been no similar instances since then.

Conduct in the control room was businesslike and professional. Non-operations personnel were required to obtain the shift control room engineer's (SCRE) permission prior to entering the control room, and all personnel except the SCRE and shift engineer (SE) must receive permission from the unit NSO before entering the area immediately adjacent to the control boards. To reduce distractions, phone calls are no longer automatically directed to the control room during backshifts, weekends, and holidays; phone calls have been redirected to security personnel in the gate house. To reduce the number of phone calls to the control room from personnel inquiring about plant status, the licensee has provided a phone number that enables the caller to receive a transcribed message giving the status of each unit and the major events during the past 24 hours. To reduce the number of personnel entering the control room or the SE's office to read the logs, a carbon copy of the SE's, SCRE's, and Unit 1

and Unit 2 NSO's logs and the Daily Order Book are maintained in the communications center. Quiet hours are enforced in the control room during shift turnover in order to keep all nonessential personnel out of the control room and thereby minimize distractions.

Operations personnel consistently used the appropriate procedures whenever they performed plant evolutions. During an outage, however, operations personnel attempted to lower the Unit 2 reactor vessel water level using a technique for which there was no procedure; this resulted in an uncontrolled drop in reactor vessel water level. For this event, the licensee was assessed a Severity Level IV violation. The licensee immediately developed a procedure to address the reduction of reactor vessel water level during an outage, and during the remainder of the assessment period no other instances of operations without the appropriate procedure occurred.

An indication of management involvement to assure quality operations was the frequent plant and control room tours by management personnel, especially the production superintendent and the assistant superintendent for operations. The communications center's staff, which has markedly reduced the administrative duties of the shift engineer, is planned to be staffed on a 24 hour per day basis starting in the near future. Two previously licensed reactor operators were recently added to the communication center staff to function as engineering assistants. Technical Specifications are being retyped to improve their clarity and legibility. Positive actions are being taken to upgrade the control room, such as, the control panels for Unit 2 being color coded so that the NSOs can more easily distinguish the controls and meters associated with one system from those associated with another and ventilation and lighting modifications to reduce noise and glare. The control panels for Unit 1 will be repainted during the next outage. Management involvement was also demonstrated by the reduction of distractions in the control room and the effectiveness of the scram reduction program.

The licensee generally keeps control room equipment in extremely good condition. At the end of the assessment period, there were no out-of-service tags and nine deficiency tags on the Unit 1 control room panels, one out-of-service tag and nine deficiency tags on the Unit 2 control room panels, and seven out-of-service tags and five deficiency tags on the common panels in the control room. There were generally very few illuminated annunciators on the annunciator panels of either unit when it was operating at power. "Black board" conditions were obtained at the end of the assessment period for both units.

Plant cleanliness improved markedly over the course of the assessment period. Large areas of the reactor building and turbine building have been painted, and debris or clutter has been removed. Though some areas are yet to be completed, the improvement has been a marked one, demonstrating a strong management commitment to the cleanliness effort. As part of the painting program, the units have been color coded (Unit 1 - blue, Unit 2 - yellow) to minimize personnel errors associated with identifying and operating equipment on the wrong unit. Color coding has also been used to delineate fire walls and secondary containment boundaries. In addition to the painting program, a program is nearing completion to place easily readable tags on valves, to label components such as pumps and pipes, and to affix special labels to equipment to be used in an emergency.

In nearly all cases, the licensee was exceptionally responsive to NRC initiatives. Concerns expressed by the resident inspectors concerning the material condition of the procedure binders, background noise in the control room, and the extent of supervision given by the SCRE to the NSO of the unit undergoing a startup were dealt with promptly and properly. One weakness noted was the licensee's response to Item I.C.6 of NUREG-0737 (independent verification of the return to service). Documentation by a second qualified operator independently verifying the proper return to service of individual valves, breakers, jumpers, etc., was not required. The licensee corrected this problem by revising the return-to-service procedure to require the second qualified operator to initial the position of each valve, breaker, jumper, etc., before returning to service any component in a safety-related system.

The NRC administered replacement examinations to 13 prospective senior reactor operators (SROs) and 2 prospective reactor operators (ROs) during this assessment period. The overall pass rate for license candidates was 87% indicating an effective training program in operator licensing.

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

B. Radiological Controls

1. Analysis

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

The enforcement history during this assessment period was reasonably good, remaining essentially the same as the previous period. One (two-part) Severity Level IV violation was identified during this period compared with two Severity Level IV and one Severity Level V violations during the previous period. The violation did not indicate any major weakness in licensee performance.

The staffing levels and qualifications of radiation protection personnel continue to be good. While several changes in radiation protection and ALARA professional/technical personnel occurred during the assessment period, all replacement personnel were qualified for their new positions and did not appear to impact the effectiveness of the program. The split of the radiation control technician (RCT) group into separate radiation protection and chemistry groups, which is expected in early 1989, is a change which has been encouraged by NRC. In anticipation of this split, the licensee expanded the RCT and radiation protection foreman staffs and divided the lead health physics position into separate (inplant) operational and technical positions. The licensee continues to encourage health physicists, radiation protection foremen, and the ALARA staff to spend an increased amount of time directly observing and overseeing radiological work. While training/qualifications of permanent RCTs is acceptable, the licensee has not developed a formal training or testing program for contract radiation protection technicians used to supplement the staff during maintenance or refueling outages. Also, the licensee has not implemented a policy for limiting hours worked by radiation protection staff members involved in safety-related activities. While the latter two matters are not major program deficiencies, they are matters which should be addressed by the licensee.

Management involvement in ensuring quality was evident and continues to be good. Licensee management's dedication to improving general plant housekeeping and contamination controls was evidenced by increased staffing devoted to this area, including the temporary contract services of a consultant health physicist to review the contamination control program and personnel contamination events, and to supervise general plant decontamination activities. The ALARA program continues to receive strong management support, as demonstrated by the creation of an ALARA maintenance planner position and the continued chemical decontamination of the recirculation system

and hydrolazing of the drywell prior to refueling outages. Corporate radiation protection staff involvement in the plant's routine program and incident investigations continues to be a licensee strength.

Responsiveness to NRC initiatives continues to be generally good. Several previously identified NRC concerns have been addressed in that methods for quantifying beta emitters in liquid radwaste effluents have been changed to correspond to actual sample results, communications between radiation protection personnel and fuel handlers during core fuel manipulations have been better established and formalized, methods for noble gas quantification prior to venting/purging of the drywell and suppression chamber have been implemented, and problems with the radiological confirmatory measurement program have been corrected in a timely manner. On the other hand, the licensee has neither resolved problems associated with the disposal/disposition of contaminated piping and soil resulting from the rupture of a liquid radwaste treatment facility transfer pipe nor implemented necessary improvements to laundry operations.

The licensee's approach to the identification and resolution of radiological technical issues has been good and timely, with some exceptions. The exceptions are not considered major program deficiencies. Computer applications continue to be expanded to enhance the radiation protection program. Although the licensee has devoted additional resources to identify and correct contamination control problems, further improvements are still desirable to reduce the number of personnel contamination events, particularly those attributed to non-radiologically controlled and "clean" radiologically controlled areas. Overall contamination controls in the service building also should be improved.

The total station dose was about 950 person-rem for 1986 and about 720 person-rem for 1987. These collective doses reflect strong ALARA performance. The 1988 station dose is projected to be slightly higher (about 825 person-rem) than 1987 and higher than anticipated because of unexpected work during the Unit 2 maintenance/refueling outage, but continues to be reflective of generally strong ALARA performance. Radioactive gaseous effluent releases were considerably reduced during the assessment period, primarily because of the nearly complete phase-in of "barrier" fuel in both units.

The laboratory quality assurance/quality control program for radiological measurements is being implemented adequately, physical facilities and counting equipment are well-maintained, and cross check results are good. Results of the radiological confirmatory measurements program declined during this

assessment period with 67 agreements in 75 comparisons. The problem was found to be with a gas marinelli calibration and failure to deconvolute multiple peaks; these problems were corrected by the licensee in a timely manner.

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.

C. Maintenance/Surveillance

1. Analysis

Evaluation of this functional area was based on the results of nine inspections conducted by resident inspectors and nine by regional inspectors. Maintenance and surveillance were separate functional areas in the previous assessment period but have been combined as one functional area for this assessment period.

The enforcement history during this assessment period indicated a decline from the previous period. One Severity Level III violation and six Severity Level IV violations were identified as compared with one Severity Level IV violation (none in maintenance and one in surveillance, however, one Severity IV violation in Quality Programs involved maintenance personnel) in the previous assessment period. The Severity Level III pertained to significant weaknesses in several areas including modification control, post-modification testing, and management involvement related to the inadvertent installation of a hard ground and resultant blown fuse that disabled the automatic start capability of the Unit 2 emergency diesel generator. The licensee was assessed a $75,000 Civil Penalty for this violation. Related to this violation was another Severity Level III violation discussed in the Engineering/Technical Support area involving operations with a known ground in the 125-VDC system.

Operational events in this area indicate some weaknesses in the licensee's control of maintenance activities affecting plant operations; for example, problems with the butterfly isolation valves and the emergency diesel generator autostart circuit and 4kv breakers. Of the 85 LERs issued during this period, 32 were assigned to this functional area. Of the 32 LERs, eight were caused by personnel error. This compares with 12 personnel errors in 42 LERs in the previous assessment period. In this

period, there were six at-power scrams, only one of which was associated with a maintenance personnel error. In the previous assessment period there were 18 scrams, six of which were associated with maintenance/surveillance personnel errors. There were eight ESF actuations, only one of which was due to personnel error. This compares with eight ESF actuations due to personnel error in the previous assessment period. In general, licensee efforts to reduce personnel errors were considered successful, however, continued efforts appear warranted. A detailed review of the 32 LERs indicates that at least 15 in the maintenance area could have been avoided with a more comprehensive preventive maintenance program. Also, most of the LERs pertaining to surveillance dealt with containment integrated leak rate tests (ILRTs) or local leak rate tests. Two others assigned to the area of surveillance under the Maintenance/Surveillance Functional Area concerned a surveillance which was performed late, and an improperly-conducted surveillance which resulted in a reactor scram and an ESF actuation. Except for these problems, surveillances during the SALP period were performed properly, in accordance with the appropriate procedure, and within the required timeframe.

During this assessment period, the licensee has demonstrated mixed results in the area of total work request backlog and control room work requests. The total work request backlog has increased significantly from about 2000 to 3500, while the backlog of non-outage corrective work requests has generally decreased. Additionally, positive trends were demonstrated in the decrease of pending control room work requests from 25 to 15 and the general decrease in work requests pending for greater than 3 months.

Staffing in the maintenance area has been increased. These additions included work analysts, degreed engineers in each maintenance discipline to oversee the quality of the work packages, maintenance workers and the planning staff. The planning staff increased from two (which was considered inadequate and covered most of the assessment period) to seven with experience from various areas such as operations, maintenance, radiation chemistry and QA and represents 112 years of experience in the nuclear industry. While average craft experience level may have decreased because of the reassignment of more senior personnel and general staff increases, this was generally offset by a formal training program for the less experienced personnel. Additionally, the licensee has reorganized the technical staff to implement the concept of system engineers. At the corporate level, control of contractors was placed under Projects and Construction Services (PACS) to facilitate control of the various contractor groups. Staffing in the surveillance area, particularly in the inservice inspection/inservice testing (ISI/IST) group has been

increased. Staffing in the chemistry area was adequate to implement the routine chemistry programs. Beginning in 1989, the Radiation/Chemistry Department will split into two separate departments providing essentially full time chemists.

Management involvement to assure quality in this area was mixed. The number of scrams due to maintenance personnel errors decreased significantly during this period in comparison to the previous period, as did personnel errors resulting in ESF actuations, however, the number of LERs relating to component and equipment failures was higher than necessary. In addition, the decline in enforcement history is indicative of inadequate management involvement. Management involvement, in resolution of plant problems for other areas included installation of live load packings to reduce leaks, management oversight and risk tree analysis training for regulatory assurance personnel, computerizing surveillance lists, replacement of reactor water cleanup demineralizers with porous metal elements that have a high ion removal efficiency resulting in better water chemistry, installation of oil skimmers in the turbine building sumps to help reduce total organic contaminants, and adoption of formal controls on the use of funnels to contain various leaks. The extensive management attention devoted to improving water quality resulted in reactor coolant system water conductivity consistently being 100 times less than is required by Technical Specifications (10 vs .10 micro-mhos/cm). However, significant management weaknesses in the maintenance program were demonstrated by the failure to fully implement the formal preventive maintenance program (an example is the 4kv breaker situation for the Unit 2 emergency diesel generator (EDG) where the preventive maintenance had never been performed, resulting in the failure to close of the EDG bus breaker due to sticking trip latch rollers), recognize the significance of noted problems, (an example is a Severity Level III violation which resulted because management was deficient in ensuring proper installation and testing results of a modification on the EDG and subsequent failure to correct a ground on the automatic start circuitry despite an indication that a problem existed during post-modification testing) and in resolving known deficiencies (examples of this weakness included the failure to determine the proper cause and correct the problems with the Unit 2 steam jet air ejector offgas butterfly isolation valves after problems were noted with Unit 1 valves). Subsequent improvements to post modification testing were instrumental in identifying and fixing a problem with MCC 28/29-5 which had existed since initial construction.

With regard to high pressure coolant injection/reactor core isolation cooling (HPCI/RCIC) reliability, these systems had historic difficulties. A primary weakness was management's failure to implement a strong periodic or planned maintenance program. The licensee implemented a new "Conduct of Maintenance at Nuclear Power Stations" program in response to the identified

weaknesses in the maintenance and surveillance program. Full implementation is expected to take about 3 years, however, concentration on the observed HPCI/RCIC problems appears to have improved the reliability of these systems during the last 6 months of the assessment period.

Licensee responsiveness to NRC initiatives was demonstrated by generally timely and technically sound corrective actions on previously identified items. The licensee's responses to inspector concerns were excellent.

The licensee's approach to the identification and resolution of technical problems is also considered to be mixed. The licensee programs were generally effective in identifying and correcting unacceptable results. For example, surveillance and calibration activities were generally adjusted to accommodate equipment performance trends. As noted before, the positive aspects were offset by the emphasis on remedial action (e.g., corrective maintenance) rather than preventive action (e.g., planned or periodic maintenance). Early in the assessment period, the licensee did not do a particularly good job in root cause evaluation as evidenced by the 125-VDC ground and auxiliary contact problems. Licensee actions in this area have resulted in a much improved root cause assessment by the end of the assessment period.

The licensee's staff demonstrated a good understanding of the requirements of 10 CFR 50, Appendix J, and performed an acceptable ILRT in the "as-left" condition. However, the licensee continues to fail the ILRT in the as-found condition because of excessive leakage of containment boundaries and isolation valves.

The condition of plant equipment was consistently monitored and trending was performed for preventive as well as corrective maintenance to ensure continued safe operation. The licensee has reorganized all of its maintenance procedures and has unified the various elements of preventive maintenance into one program. The computerized program has the capability of informing management of the status of preventive maintenance items so that priorities can be set for those items not yet done or overdue. Additionally, the licensee has contracted a consultant to rewrite all procedures. During this time improvements will be made to the preventive maintenance program.

The overall assessment of the functional area of Maintenance/ Surveillance is mixed. The surveillance program is good and demonstrates conscientious management attention. Maintenance personnel and supervisors are conscientious and skilled. The licensee has been responsive to NRC initiatives, especially during the latter part of the assessment period. The program

for controlling and implementing plant modifications is commendable. Both units operated at power at the end of the assessment period with no illuminated annunciators attesting to the conscientiousness and competence of the maintenance staff. Conversely, the facility was found to be barely adequate in the areas of preventive maintenance, maintenance records for plant components, vendor maintenance manuals, and maintenance procedures.

2. Performance Ratings

The licensee's performance is rated Category 2 in this area. The licensee's performance was rated Category 2 in Maintenance and was rated Category 1 in Surveillance in the previous assessment period.

3. Recommendations

Because of the deficiencies noted in the Maintenance portion of this Maintenance/Surveillance functional area, additional licensee and NRC attention is recommended for Maintenance.

D. Emergency Preparedness

1. Analysis

Evaluation of this functional area was based on observations of the 1987 and 1988 emergency preparedness exercises, one routine inspection, and three special inspections conducted to monitor the licensee's progress in correcting the many programmatic problem areas that became clearly defined in the middle of this assessment period. Two meetings were also held to discuss the status of the comprehensive onsite Emergency Preparedness (EP) Improvement Program implemented in January 1988.

Enforcement history declined during this assessment period. Two Severity Level IV violations were identified compared with none during the previous assessment period. One violation was due to the untimely declaration of an Unusual Event in October 1987 and the resulting untimely NRC notification following an emergency core cooling system discharge. The second violation was due to the late issuance of a quarterly update of the onsite emergency organization's callout procedure. Short- and long-term corrective actions in regard to both violations were adequate.

Station and corporate management involvement in assuring quality improved substantially following the November 1987 routine inspection. The root-cause for the program's decline, which began during the previous assessment period, was inadequate management attention. Four persons had served as the only onsite EP coordinator at various times over the 2 year period

ending in late 1987. The three most recent coordinators had neither been adequately prepared nor given adequate supervision when they were given full responsibility for the station's EP program, including the onsite emergency organization's training program. The overburdened and inadequately trained and supervised persons resulted in such basic problems as the 1987 onsite EP training program not being developed as late as November 1987, the discontinuance of a system for choosing and tracking corrective actions on drill critique items, untimely completion of corrective actions on NRC-identified items, staffing shortages in the onsite emergency organization, and untimely issuance of a periodic update of the emergency organization's callout procedure.

Proper management attention to the program has been evident since January 1988. A former EP coordinator was reassigned as a full-time aide to the current coordinator. A corporate training instructor, who had a good understanding of the licensee's EP program, was temporarily assigned to the station. He reestablished the onsite EP training program while a station employee completed instructor training. In March 1988 the station employee began providing training under the guidance of the corporate instructor. A corporate staff assessment of the station's EP program was completed early in 1988, which confirmed and expanded on the findings of the November 1987 routine inspection. An effective tracking system was reestablished to track corrective actions on NRC- and self-identified items. EP coordinators and EP training instructors from the licensee's other nuclear sites, as well as corporate EP staff, were made available to better ensure that the EP Improvement Program's action items were thoroughly addressed.

The licensee's approach to resolution of technical issues from a safety standpoint has improved significantly since the November 1987 routine inspection and now is considered good. A multiphased, professional development program has been implemented for the EP coordinators, with a corporate emergency planning supervisor monitoring their progress. Rather than adopting a piecemeal approach, station management gave a qualified contractor the full-time task of upgrading the station's emergency plan implementing procedures (EPIPs) in response to NRC- and self-identified concerns. Position-specific EPIPs were further refined following extra drills conducted prior to the August 1988 exercise. During that exercise, the onsite emergency organization successfully utilized the upgraded EPIPs. Administrative procedures have been revised to ensure that the EP coordinator will be in the review chain for future EPIP changes.

A long-standing NRC concern was the inadequate facility that had been used as the Joint Public Information Center (JPIC) for the Quad Cities Station. As part of a long-term facility upgrade project, construction of a new JPIC was completed in the spring of 1988. The substantially upgraded JPIC was successfully utilized by the licensee's and two States' staffs during the 1988 exercise. The layout of the Technical Support Center (TSC) was also improved prior to the last exercise.

Responsiveness to other NRC concerns improved during the second half of the assessment period. All commitments made regarding the reestablishment of a quality onsite EP training program were met. Corrective actions were successfully demonstrated during the 1987 and 1988 exercises on all items identified during the previous years' exercises. The onsite emergency organization's staffing levels are now good.

Five items were identified during the August 1988 exercise. Four items related to environmental impact assessment and protective action decisionmaking performed by corporate staff based at the Emergency Operations Facility. The fifth item was an incorrect emergency classification decision by control room personnel. Federal Emergency Management Agency (FEMA) Regions V and VII evaluated the performance of Illinois and Iowa emergency responders, respectively, during the 1988 exercise. A number of deficiencies in exercise performance, which will require offsite remedial drills, were identified by both FEMA regions. The licensee has demonstrated a positive attitude in working with State, county and FEMA officials to resolve the latter's concerns even before the final FEMA reports have been issued. Remedial drills for State and local support organizations in Iowa have been scheduled for November 1988.

Onshift personnel correctly classified and adequately notified State and NRC officials of all classifiable emergencies, with the exception of the untimely declaration and notification of an Unusual Event in October 1987. A significant upgrade of the station's emergency action levels (EALs) was in progress at the end of the assessment period. The revised EALs will be submitted for NRC approval prior to implementation.

The licensee has upgraded the onsite emergency organization's staffing levels, which are now good. More than 12 persons, with various technical backgrounds, have been trained as TSC communicators. Additional personnel have been trained for director-level positions in the TSC organization so that at least three persons are qualified for each of the nine director positions. Administrative procedures have been reinstituted to better ensure that sufficient numbers of personnel remain on the emergency organization's roster despite changes in the normal plant organization.

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

E. Security

1. Analysis

Evaluation of this functional area was based on six security inspections (three routine and three special) by regional inspectors and routine observations of security force activities by the resident inspectors.

The licensee's enforcement history is good. Early in the assessment period, one Severity Level III violation pertaining to the failure to control access to a vital area was identified. The civil penalty for this violation was totally mitigated because of the licensee's self-identification and prompt reporting of the event, prompt and extensive corrective action, and past excellent performance in the area of security. No violations had been cited during the previous assessment period. Two of the three special inspections conducted during this assessment period were a result of allegations received that were labor/management related and did not affect the overall effectiveness of the security organization. When requested, the licensee provided timely and comprehensive assistance in the review of these allegations.

Management's role in assuring quality was good. Corporate and plant management was supportive of the security program as evidenced by the allocation of additional personnel and material resources such as those needed to upgrade the protected area detection system, conduct engineering walkdowns of the protected and vital areas with contractor assistance, and conduct an extensive assessment of the protected area barrier and intrusion alarm with the assistance of a security consultant. The site security administrator analyzes security data to determine program performance trends. The analysis has resulted in the early identification of potential problems and a highly proactive security program. The Nuclear Security Administrator actively and aggressively participates in resolving issues and allegations. He also maintains a close liaison with the site security management and effective communications with the NRC Region III security section.

The licensee's approach to the resolution of technical issues was good. The licensee's responsiveness to NRC initiatives was excellent. Security management is responsive to all findings that can strengthen its program. Site management, up to the plant manager level, is cognizant of and responsive to security findings. A high level of security awareness exists within the plant workforce. This is evidenced by a security violation notice program that documents personnel-related security violations to an individual's supervisor and upper station management and documents action taken by the supervisor.

Security event reporting was good. Six security event reports (SERs) were issued during this assessment period as compared with seven during the previous assessment period. Five of the SERs occurred during the first 3 months of the assessment period. The low number of SERs is due, in part, to the effectiveness of the security program and, in part, to the licensee's narrow interpretation of the NRC security event reporting rule. None of the SERs were of a specific repetitive nature. SERs were submitted in a timely manner, and corrective actions were effective and technically sound.

Overall staffing levels increased slightly during the assessment period. A full time administrative assistant was added to the security staff and an additional full-time training position was added to the training department. The security training and qualification program is good. Security personnel were knowledgeable and competent in the execution of their duties. Site security management continues to be aggressive and high standards of performance and demeanor are expected and achieved.

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

This is a new functional area and consequently was not rated in previous SALPs. Evaluation of this functional area was based on the results of ten inspections conducted by regional inspectors, several inspections by the resident inspectors, an NRR team inspection, a review by RES and preliminary findings from the EOP inspection.

Enforcement history during this assessment period was poor: two Severity Level III violations with associated Civil Penalties, one Severity Level III violation without an associated Civil Penalty (CP), five Severity Level IV violations, and one Severity Level V violation were issued. One Severity Level III violation which resulted in a CP involved failure to perform a safety evaluation for various grounds that existed on the ESS Division 1 125-VDC battery system. Those unanalyzed grounds could have resulted in spurious operation or inoperability of 125-VDC safety circuits. Contributing factors to this violation were inadequate control of design drawings and inadequate correction of electrical relay problems, which were included in two of the Severity Level IV violations. The second Severity Level III violation resulting in a CP was issued after the assessment period and involved environmental qualification (EQ) issues which more appropriately reflects performance before this period. The Severity Level III violation without a Civil Penalty involved a wiring error that would have prevented the automatic transfer of the AC feed for motor control center (MCC) 28/29-5 to Bus 28 on the loss of power from Bus 29. This problem could have potentially resulted in the loss of LPCI capability under specific circumstances. This violation represents a problem from initial construction which was identified by the licensee's improved modification testing program. Since this area was not rated during the previous assessment period, no enforcement history is available for comparison.

Twenty-four LERs issued during the assessment period were related to this functional area. Of these, 12 were related to design deficiencies and 10 were related to inadequate procedures. Of the 12 design deficiencies, most were related to items dating back to the original design of the plant. These items were indicative of a more aggressive licensee program for identifying and correcting design and engineering deficiencies.

The level of management involvement to ensure quality in this area was mixed. In response to the identification of control room heating, ventilation, and air-conditioning (HVAC) design installation errors at the licensee's Zion Station in late 1986, the licensee contracted for a reanalysis of the control room emergency filtration system (CREFS). The reanalysis identified significant discrepancies between the CREFS/Standby Gas Treatment System (SGTS) Technical Specification and the design bases requirements. Initial corrective actions were prompt and appropriate. Other examples of good management involvement, that evolved toward the end of the assessment period were the program for ensuring that technical and staff personnel were qualified to perform their assigned tasks, the program for functional and post-maintenance testing of safety-related components, and the aggressiveness of site QA audit and surveillance programs. Management provided support to the fire

protection staff and the development of the safe shutdown analysis and procedures. Based on licensee evaluation of historical problems and concurrent NRC emphasis, a task force was formed to perform a comprehensive system audit of the HPCI and RCIC systems with resolution of the problems with the reliability of these systems included in the station goals presented to corporate management. However, this is somewhat offset by the lack of timeliness, as the history of problems with these systems dates back to at least 1984. An example of lack of management involvement was the development and maintenance of Emergency Operating Procedures (EOP). Although the knowledge and dedication of the individuals responsible for development of the procedures was high, the lack of management overview and support resulted in numerous deficiencies. The more significant deficiencies included; failure to implement an effective verification and validation program, failure to keep the Plant Specific Technical Guidelines (PSTGs) current, failure to adequately address human factor aspects of NUREG-0899, and failure to appropriately evaluate containment venting pathways.

For work performed relatively recently, engineering evaluations were technically adequate, complete, and well maintained. The corrective action efforts were sufficiently extensive to identify all of the deficiencies in most areas of concern, however, some NRC involvement was required to define these actions. During this assessment period, four significant corrective action efforts pertaining to deficiencies in drywell structural steel connections, embedded plate anchor straps, piping configuration verification, and flued head anchor structures were started or concluded by the licensee. All of these efforts were initiated by events at the Dresden station and were addressed at Quad Cities because of the similarities in construction and design. Two of these efforts were associated with deficiencies stemming from original construction. The other two efforts were associated with engineering efforts completed 3 to 6 years ago. In all four cases, the deficiencies that initiated these efforts were identified by the licensee. After the discovery of the initial discrepancies, management was closely involved in delineating the subsequent investigation and corrective action programs. However, some effort was required on the part of the NRC to help define an adequate scope for these corrective programs. Well-defined procedures with coordinated priorities were established to control all of the subsequent activities. For the most part, the efforts were performed in an expeditious manner and corrections are being completed as allowed by outage schedules. Another good example of the licensee's aggressive pursuit of potentially safety significant issues involved the separation/degradation of the Boraflex poison material within the stainless steel structure of the spent fuel racks. The licensee learned of this issue from another Region III plant

and promptly embarked on a program to determine the degree of degradation in their spent fuel racks, causal mechanisms, potential effects on spent fuel pool criticality control and long term monitoring and corrective actions. This activity demonstrated aggressive management involvement, effective use of contractors and good resolution of a technical issue with potential safety significance.

Results of the EQ inspection indicated a need for increased management attention in that the licensee failed to perform an adequate technical review of the qualifications of AMP nylon splices used in EQ applications. These splices were subsequently tested and determined not to be qualified. This resulted in a Severity Level III violation. The licensee replaced the splices in the numerous safety-related circuits in which they had been installed.

Decontamination of the primary coolant recirculation system (PCRS) using the low oxidation state metal ion (LOMI) process, was conducted smoothly without any significant complications. The licensee's performance was indicative of a well planned, controlled, and monitored event. They and their contractors demonstrated sound technical judgement and understanding of this complex and potentially hazardous process. Management's commitments to decontaminate the PCRS each refueling outage has been indicative of their aggressive ALARA program. However, CECo experienced difficulties with the solidification of the low-level radwaste resulting from the LOMI process when it failed to properly oversee the activities of its contractor.

The approach to resolution of technical issues from a safety standpoint was mixed. The erosion/corrosion monitoring program more than met the intent of the Nuclear Utility Management and Resources Council (NUMARC) guidelines for monitoring pipe wall thinning in single-phase lines. The licensee's strong initiatives in this area resulted in one of the best programs found to date. However, administrative and implementing procedures were determined to be incomplete. Since the station was very dependent upon contractors for developing this program, comprehensive procedures are considered particularly important. Resolution of EQ issues has been generally sound and viable, as evidenced by the performance of tests, engineering analysis, and evaluations to resolve EQ concerns. In regard to most of the design issues reviewed by regional inspectors, there was a clear understanding of the technical aspects pertaining to each issue. In most cases, the licensee used conservative approaches to resolve potentially safety significant problems. For the issues pertaining to drywell structural steel, embedded plates, and flued head anchors, discrepancies were comprehensively reviewed to evaluate their significance. Deficiencies were all reported in a timely manner, information was complete and accurate, and updated when necessary. With regard to the CREFS,

licensee performance was generally good after the event that could inhibit system performance was identified; however, the apparent lack of understanding of this system's design requirements in the past allowed inadequate Technical Specification surveillance requirements to go undetected for an extensive period. With regard to EOPs the licensee initiated prompt and extensive corrective action to resolve the deficiencies identified by the NRC team inspection.

In contrast, there were several examples of the licensee's failure to perform adequate root-cause analyses and focus corrective actions on preventing recurrence. Typical of this problem was the repacking of a leaking valve as a corrective action without addressing the inclusion of valve repacking in the preventive maintenance program to eliminate inservice failures. The lack of a fully implemented trending program also hampered the identification of potential problem areas. In the area of fire protection, the licensee's review of the safe shutdown procedures did not identify weaknesses such as inadequate procedures to provide isolation of safe shutdown equipment from associated non-safety circuits in the event of a disabling fire when offsite power was available. Responsiveness to NRC questions during the fire protection audit regarding emergency lighting, revising carbon dioxide and fire pump surveillance procedures, and other items related to 10 CFR 50, Appendix R, was generally very good. While the responses were generally very good, questions regarding the RCIC steam supply isolation valve were not treated in a timely fashion, possibly because of the complexities of the issue.

The licensee had made efforts to resolve the weaknesses in the area of root-cause analyses by implementing a training program. Also, a fairly comprehensive maintenance history record was being compiled; however, the use of this history for trending purposes had not matured.

The licensee's responsiveness to previous NRC-identified concerns or weaknesses was good in most cases, with some exceptions. Weaknesses involving procedures for racking out circuit breakers were promptly corrected. Although the licensee's decision to reanalyze the acceptability of the CREFS was responsive to NRC findings, the responses were not always thorough and timely. Responsiveness to previous NRC-identified concerns was extremely poor as related to EOPs. The licensee had not followed the guidance provided for developing the EOPs, they had not followed through on evaluating two information notices addressing EOP deficiencies and they were only marginally responsive to deficiencies identified in an EOP inspection at Dresden.

Staffing in this functional area was mixed. The licensee's onsite engineering and technical support staff was increased by the addition of 10 staff personnel, with significant additions to the regulatory assurance (from 3 to 9), work planning (from 3 to 7), and technical staffs. These increases were not fully implemented until mid-SALP, however. Prior to this time, the average experience level of electrical technical staff engineers was less than one year, which appeared to have a significant effect on the poor analysis of technical problems and inadequate corrective actions associated with the NRC's maintenance team inspection. The increase in the size of the technical staff has allowed the licensee to implement a system engineer concept. This provides a cognizant engineer who is responsible for the review and tracking of activities affecting an assigned system, including modifications, maintenance, repair, and functional or post-maintenance testing to ensure that the activities are promptly and correctly performed. In the area of EOPs, the technical adequacy of the individuals assigned to write, validate, and maintain the EOPs was acceptable. The level of staffing to effect a quality product was lacking. This failing is considered to be one of the prime contributors to the poor condition of the EOP program and procedures.

The licensee continues to rely almost exclusively on outside consultants to provide technical expertise in all aspects of design and analysis of plant modifications. Shortcomings with this practice may have contributed to some of the previous problems associated with the piping configuration verification work. Lack of technical expertise also may have contributed to a 4 month delay in recognizing deficiencies in the modification of the flued head anchor structures. There appears to be a lack of technical coordination between the licensee's BWR engineering staff and consultants performing the design and analysis work. This was evidenced by the technical efforts undertaken during the drywell structural steel connections, embedded plate anchor straps, piping configuration verification, and flued head anchor structures corrective actions.

The preliminary findings of the EOP team inspection identified several deficiencies in the EOP development and implementation. Examples included poor usability of the EOPs, lack of a quality verification and validation program and performance deficiencies during the simulator portion of the inspection. The NRC monitored three licensee-administered simulator examinations to further investigate problems noted by the EOP inspection team concerning the use of EOPs. No problems were found, except for one individual who did not perform adequately. This problem was independently documented by licensee personnel and the individual was given remedial training. The NRC considered the licensee's response to be adequate.

Training and qualifications of onsite personnel performing engineering and technical support functions have been improved during the assessment period. Many technical staff personnel underwent training to improve the quality of event reviews. With the exception of the quality of root-cause analyses, all personnel appeared to be well trained and qualified.

2. Performance Rating

The licensee's performance is rated Category 2 in this area. Because this is a new area, no rating is available for the previous assessment period.

3. Recommendations

Although this area was rated Category 2, several attributes were noted as weak and continued close attention by the licensee and the NRC is warranted.

G. Safety Assessment and Quality Verification

1. Analysis

This is a new functional area and consequently was not rated in previous SALPs. Evaluation of this functional area was based on the results of routine inspections conducted by resident and regional inspectors and the licensee's performance in support of significant licensing actions. This area incorporated many of the activities reported under the functional area of Quality Programs and Administrative Controls Affecting Quality and the functional area of Licensing Activities in previous SALPs.

Enforcement history declined slightly and consisted of five violations (four Severity Level IV and one Severity Level V) during this assessment period compared with three violations (two Severity Level IV and one Severity Level V) during the previous assessment period in the areas of Quality Programs and Licensing Activities. None of the violations were of major safety significance.

Eight LERs were assigned to this functional area, all of which related to deficiencies in the licensee's verification of as built configurations. Again this is indicative of a more aggressive licensee program for identifying and correcting past deficiencies.

Corporate management was frequently involved in licensing activities, particularly for the more complex and difficult issues which necessitated additional follow-up communication and/or meetings with NRC staff. Decision making was consistently at a level that indicated good management awareness and ensured proper oversight was occurring. Overall quality of technical content was good in most evaluations of

complex engineering issues. However, greater attention is warranted for Technical Specification amendment applications where there was a tendency to oversimplify the analyses for "no significant hazards considerations" (e.g. low-low reactor water level setpoint, recirculation jet pump instrumentation, and HPCI/RCIC discharge piping fill). Also several amendment applications were incomplete or exhibited errors which required subsequent resubmittal to correct, clarify, or supplement the original (e.g., Unit 1 reload report, HPCI/RCIC steamline instrumentation, standby liquid control system (SBLCS), and Technical Specification retype).

The licensee and its contractors consistently demonstrated a clear understanding of the complex technical and/or safety issues associated with many of the licensing and regulatory actions. Although the technical approaches used were generally sound and comprehensive, they frequently were not described in a thorough enough manner for the NRR review staff to evaluate without requiring additional information (e.g., Appendix R exemption requests, recirculation jet pump instrumentation, piping configuration control, and embedment plate verification). Furthermore, written response to staff requests for additional information, and written resolutions to staff concerns, were often delayed (e.g., combustible gas control, Regulatory Guide 1.97, ATWS rule, embedment plate, and Appendix R exemptions). Ultimately, the licensee did provide adequate information to demonstrate conservative approaches.

License responsiveness to NRC initiatives was cooperative, prompt, and timely for bulletins, generic letters, special inspections, and nonobligatory surveys and studies. The corporate office and station characteristically made their most knowledgeable people available to assist NRC staff and contractors. Only a few long-standing regulatory issues remain that can be attributable to the licensee. Although the licensee has on occasion requested time extensions for responding to regulatory actions, it was generally to allow for the opportunity to produce a better product than the original schedule provided. However, on at least two occasions, the licensee failed to meet important commitments related to IE Bulletin 85-03, "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings," which was cited as a deviation. To preclude a recurrence of untimely responses the licensee has instituted a formal station commitments list that is kept current daily by the regulatory assurance staff and distributed to the supervisors of the various plant sections on a daily basis. This list includes not only commitments to the NRC, but also commitments to plant organizations, QA, and nonlicensee organizations such as the Institute of Nuclear Power Operations. Since the adoption

of the station commitments list, to which the Plant Manager personally gives considerable attention, no commitments to the NRC and very few other commitments have been late. The licensing corporate office has not as yet effected implementation of this commitment tracking list.

During the assessment period, the regulatory assurance staff was significantly increased from three to nine members indicating strong plant management involvement. These individuals are skilled and experienced, having accumulated an aggregate 98 years of experience at Quad Cities in various functions such as technical staff, foremen, SCREs, and maintenance, QA, and security staff.

Regulatory assurance personnel have been cooperative and responsive when dealing with NRC personnel. Meetings between the resident inspectors and the regulatory assurance staff took place on a daily basis. Concerns that the resident inspectors expressed to this staff were handled promptly and professionally. Communications between the resident inspectors and the regulatory assurance staff have been open and unencumbered.

Quality Assurance (QA) personnel closely monitored plant personnel and plant performance. They monitored all major plant evolutions (startups, shutdowns, etc.). The concerns noted by the QA staff were placed on the station commitments list by regulatory assurance personnel and were adequately addressed by the plant's staff. Several Quality Assurance audits were monitored by the resident staff during the inspection period, as well as QA coverage of reactor shutdowns, reactor startups, and scram recoveries. The QA activities observed were thorough and performance-oriented.

During the assessment period staffing in the QA section has increased from 10 to 12 members. Three staff members hold or have held SRO licenses and one is currently undergoing licensed training. Five are mechanical engineers, one is a nuclear engineer, and several have nuclear Navy experience.

In some cases, the licensee's own assessment of activities was ineffective. For example, the licensee's self-assessment in maintenance was ineffective; causes of problems were not properly investigated as a result of the narrow scope and shallow depth of audits. In some cases, investigations were not conducted and others were not thorough. A training program has been developed to correct this problem; however, the management mandated five day limitation on audits will continue to hamper an adequate assessment of all areas. Effective and significant management emphasis is needed to improve in this area.

Open, effective, and frequent personal communication channels existed between NRR licensing and station personnel. Conference calls and meetings to discuss technical issues or administrative problems occur in a proactive environment. Although licensing personnel and management staffing was limited early in the assessment period; this has been substantially corrected by increases in staffing levels of licensing administrators, licensing supervisors, and general support staff. Staffing at the Quad Cities Station has also improved to support corporate and NRC licensing actions. Experience and competence levels of the Licensing Administrator, licensing supervisors, and corporate managers (technical and licensing) continue to remain high. As for technical and engineering support staff, the licensee continues to rely predominately upon consultants and contractors for almost all safety and technical problems, or issues, involving any level of complexity. There appears to be a limited amount of in-house technical expertise available. Most technical personnel perform primarily as coordinators of contractor/ consultant services, rarely conducting the detailed engineering or analysis tasks themselves.

The licensing administrator and corporate licensing-related management at all levels have developed a broad competence and high degree of control over the many, varied, and complicated licensing issues by virtue of their broad multi-discipline exposure and active participation in Owner's Groups, NUMARC, and professional organization activities. Licensing procedures and policies were consistently and closely followed during the entire assessment period with only one significant exception (failure to incorporate several approved Technical Specification amendments into station controlled copies). This appeared to be the result of a communication breakdown between responsible station and corporate personnel and NRC staff, and a lack of management involvement.

The QA organization performed their own safety system functional inspection (SSFI) on the HPCI system during this assessment period. This effort, along with responses to the NRC HPCI team inspection, resulted in the identification of several deficiencies (many resulting in LERs) with the HPCI system or its associated procedures and operating practices. HPCI performance subsequent to the corrective actions taken for many of these deficiencies (approximately May 1988) has been excellent. Consequently, while the performance of the HPCI system for the first portion of the assessment period is considered poor, the licensee's self improvement program in conjunction with response to NRC initiatives is considered good for the last portion of the assessment period.

The licensee's corporate office has also developed a self assessment program termed the Technical Services Performance Assessment. The first efforts by this group involved the radiation protection area and are believed to have contributed significantly to the overall improved radiation protection program (from the 1984 to 1985 timeframe) at Quad Cities and at the other Commonwealth Edison Company (CECo) stations as well. This performance assessment has been extended to other areas of plant operation, however, effectiveness has yet to be determined.

The licensee's root-cause analyses of plant events are considered to have improved considerably over the course of the assessment period, which contributed to the reduced numbers of personnel errors and scrams. In addition, the communications among CECo stations (particularly Dresden) has improved regarding plant events such that analyses and potential actions for events at other CECo stations are rapidly acted on at Quad Cities. However, in some cases, notably the ground in the emergency diesel generator automatic start circuit discussed in the Maintenance/Surveillance section and the inadequate corrective actions for core spray system problems, the licensee's root-cause analysis of plant events was less than adequate.

Several instances of inadequate control of contractor activities by licensee personnel were observed, specifically the placing of plastic sheeting over the Unit 2 core spray pumps in such a way that cooling air could be blocked, and the attachment of scaffolding to instrument air lines and electrical conduit. In response to these events, the licensee has established the PACS organization to more closely follow contractor activities companywide and has developed a new procedure for controlling the installation of scaffolding. These actions resulted in noticeable improvements in the control of contractor activities including scaffolding and a reduction in errors related to scaffolding activities.

2. Conclusion

The licensee's performance is rated Category 2 in this area. Because this is a new area, no rating is available for the previous assessment period.

3. Recommendations

None.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

1. Unit 1

Quad Cities, Unit 1, began this assessment period operating routinely at full power. It continued with full power operation or EGC until September 11, 1987, when Unit 1 was shutdown for its refueling outage (Cycle 9). Refueling activities continued through December 29, 1987. Unit 1 experienced a few shutdowns, short outages, or power reductions during the first half of 1988. Unit 1 was operating frequently at low power throughout July 1988 because of high river temperatures. Unit 1 operated at routine power levels for the remainder of the assessment period.

The licensee reported 12 ESF actuations (6 were the result of personnel error). One automatic reactor trip with no rod motion was reported and was caused by an equipment failure. Significant outages/major events are discussed below:

Significant Outages/Major Events

a. During August 3-4, 1987, Unit 1 had to reduce load to avoid exceeding the Illinois Environmental Protection Agency (EPA) environmental limits on Mississippi River temperature.

b. During September 11 - December 29, 1987, Unit 1 was shutdown for its scheduled refueling outage (Cycle 9).

c. On January 3, 1988, Unit 1 was shutdown because of an electro hydraulic control (EHC) system leak.

d. During April 8-10, 1988, Unit 1 main generator was shutdown (reactor remained critical) because of an EHC line oil leak.

e. During May 7-15, 1988, Unit 1 was shutdown for a scheduled maintenance outage.

f. During June 7-12, 1988, Unit 1 main generator was shutdown (reactor remained critical) when a condenser air leak was discovered. Repairs were made to a hole in the bellows of the extraction steamline.

g. During June 13-17, 1988, Unit 1 was shutdown after the condenser air leak recurred on June 13, 1988. The condenser was repaired, and the post-accident drywell temperature monitor splices that did not meet environmental qualification requirements were replaced.

h. During July 1 - August 19, 1988, Unit 1 was required to significantly reduce power on several occasions in order to avoid exceeding Illinois EPA restrictions on Mississippi River temperature. On August 17, 1988, the plant needed special relief from the Illinois EPA in order to avoid shutting down due to exceeding Illinois EPA restrictions on Mississippi River temperature.

2. Unit 2

Quad Cities, Unit 2, began this assessment period operating routinely at full power or EGC. On August 1, 1987, Unit 2 experienced a forced outage because of failure of the main generator transformer; the unit remained shutdown until early September. The unit then operated routinely (with the exception of several short forced outages and power reductions) until April 10, 1988, when Unit 2 began its scheduled refueling outage (Cycle 9). The unit was restarted on June 24, 1988, and frequently reduced power levels because of high river temperatures until it was shutdown on July 25, 1988, to investigate the main generator ground. Unit 2 returned to power on August 15 and operated at routine power levels for the remainder of the assessment period.

The licensee reported 22 ESF actuations (11 ESFs were the result of personnel errors and 4 were the result of equipment failures). Eight automatic reactor trips were reported. Six trips occurred when the plant was operating above 15% power, and two occurred while shutdown with no rod movement. Two trips were the result of personnel errors, three were caused by equipment failures, one related to a design deficiency, one was related to a procedural deficiency, and one was cause was undetermined. Significant outages/major events are discussed below:

Significant Outages/Major Events

a. During August 1 - September 5, 1987, Unit 2 was tripped because of a fault in the main generator transformer. Unit 2 and Unit 1 had operated at power for 133 consecutive days, breaking the record for the number of continuous days of power operation for two BWR plants at the same site. The unit remained shutdown for several weeks to replace the main transformer.

b. On September 27, 1988, Unit 2 scrammed because of a personnel error by an instrument technician.

c. During October 19 - November 2, 1987, Unit 2 was in an outage following a trip when an operator racked out the wrong circuit breaker damaging Bus 23.

d. During December 10 - 11, 1987, Unit 2 tripped because of a failed master trip solenoid on the turbine generator.

e. During January 11-15, 1988, Unit 2 was in an unplanned outage when a scram occurred because of a ground on the main generator. Unit 2 was returned to normal operation after extensive investigation failed to determine the cause of the ground.

f. During March 19-21, 1988, Unit 2 tripped because of a packing leak on the '2B' feedwater regulating valve.

g. During April 10 - June 24, 1988, Unit 2 was shutdown for a scheduled refueling outage. Activities performed during the outage included refueling with extended burnup fuel, upgrading the reactor limits computer program, overhauling the 1/2 diesel generator, test discharge of the 125-volt and 250-volt batteries, and remodeling the unit's drywell ventilation system.

h. During July 1-10, 1988, Unit 2 was required to significantly reduce power on several occasions in order to avoid exceeding Illinois EPA restrictions on Mississippi River temperature.

i. During July 24 - August 15, 1988, Unit 2 was shutdown because of a ground on the rotor of the main generator. Insulation improperly installed during manufacturing was repaired.

j. During August 15-19, 1988, Unit 2 was required to significantly reduce power on several occasions in order to avoid exceeding Illinois EPA restrictions on Mississippi River temperature. On August 17, 1988, the plant needed special relief from the Illinois EPA in order to avoid shutting down due to exceeding Illinois EPA restrictions on Mississippi River temperature.

B. Inspection Activities

Fifty inspection reports are discussed in this SALP report (April 1, 1987 through September 30, 1988) and are listed by unit in

Paragraph 1 of this section, Inspection Data. Table 1 lists the violations per functional area and severity level. Significant inspection activities are listed in Paragraph 2 of this section, Special Inspection Summary.

1. Inspection Data

a. Unit 1

Facility:	Quad Cities
Docket No:	50-254
Inspection Report Nos:	87007 through 87015, 87017 through 87033, 88002 through 88022, and 88024 through 88025.

b. Unit 2

Facility:	Quad Cities
Docket No:	50-265
Inspection Report Nos:	87007 through 87015, 87017 through 87033, 88002 through 88022, and 88024 through 88026.

TABLE 1

Number of Violations in Each Severity Level

Functional Areas	Unit 1			Unit 2			Common		
	III	IV	V	III	IV	V	III	IV	V
A. Plant Operations		1	2		1				
B. Radiological Controls								1	
C. Maintenance/Surveillance					2		1	4	
D. Emergency Preparedness					1			1	
E. Security							1		
F. Engineering/Technical Support*					1		#3	4	1
G. Safety Assessment/Quality Verification								4	1
TOTALS	III 0	IV 1	V 2	III 0	IV 5	V 0	III 5	IV 14	V 2

*One violation was identified in Inspection Report No. 254/88021; No. 265/88021, but a severity level is yet to be determined

#Two of the violations were issued subsequent to the end of the assessment period.

2. Special Inspection Summary

Significant inspections that were conducted during this assessment period are listed below:

a. A special inspection of environment qualifications was conducted during June 8 - July 28 1987 (Inspection Report No. 254/87011; 265/87011).

b. Two emergency preparedness exercises were conducted during July 13 - 16, 1987 and August 30 - September 2 1988 (Inspection Reports No. 254/87012; 265/87012 and No. 254/88019; 265/88019).

c. A special inspection of the RCIC and HPCI systems was conducted during March 28 - April 7, 1988 (Inspection Report No. 254/88007; 265/88008).

d. A special inspection team from EG&G Idaho, under contract to the Office of Nuclear Reactor Research, obtained pre- and post-decontamination radiation levels in the Unit 2 drywell and took liquid waste solidification samples, during April 20 - May 18, 1988. The results of the inspection are summarized in SWD-36-88, a letter from EG&G Idaho to the NRC dated June 24, 1988. The inspection results will be included in NUREG/CR 4445, Supplement 1, which is to be issued in 1989.

e. A special inspection of the licensee's emergency operating procedures was conducted by a team that was led by personnel from NRC headquarters during July 18-29, 1988.

f. A special inspection of the licensee's inspection program for identifying erosion/corrosion damage of piping was conducted by a team from NRC headquarters during August 9-10, 1988 (Inspection Report No. 254/88020; 265/88020).

C. Escalated Enforcement Actions

1. One Severity Level III violation was issued on September 1, 1987, for failure to control access at a vital area door; however, escalated enforcement actions were not pursued because of the facility's previous performance in the security functional area.

2. A Civil Penalty of $125,000 was assessed against Quad Cities for 2 Severity Level III violations for operating for 6 months with

the Unit 2 emergency diesel generator incapable of automatically performing its intended safety function because of an undetected failure in the automatic start relay, and for failing to perform a safety evaluation for various grounds that existed on the ESS DIV 1 125-volt battery system. The licensee was notified of the fine on September 15, 1988.

3. One Severity Level III violation was issued on October 21, 1988, based on a wiring error that would have prevented the automatic transfer of the AC feed for MCC 28/29-5 to Bus 28 upon the loss of Bus 29. No civil penalty was issued.

4. One Severity Level III violation was issued on October 20, 1988, based on the use of nonenvironmentally qualified AMP splices. A Civil Penalty of $150,000 was assessed against Quad Cities.

5. Possible escalated enforcement may be forthcoming based on deficient fire protection/breaker coordination. The enforcement board met on September 7 and 29, 1988.

6. Possible escalated enforcement may be forthcoming based on a design deficiency that would have prevented the reenergization of MCC 18/19-5 if a loss of offsite power occurred coincident with a failure of the Unit 2 125-VDC bus.

D. Confirmatory Action Letters

No confirmatory action letters were issued.

E. Licensee Amendments Issued

Amendment No.	Description	Date
102(99)	4kv X-TIE Operability	08/06/87
103	Cycle 10 Reload	12/15/87
104(100)	HPCI/RCIC Discharge Pipe Fill	02/03/88
105(101)	Drywell Pressure Instrumentation	02/17/88
106	Standby Liquid Control System	03/28/88
107(102)	HPCI/RCIC HI Steam Flow Isolation	05/10/88
108(103)	Physical Security Plan	06/09/88
(104)	Cycle 10 Reload	06/17/88
109(105)	Reactor Low-Low Water Level Trip Setpoint	06/23/88
110(106)	Refueling Floor Rad Monitor Setpoint	06/30/88

F. Review of Licensee Events Reports Submitted by the Licensee

Unit 1 LER Nos: 87005 through 87033 and 88001 through 88014.

Unit 2 LER Nos: 87005 through 87021 and 88001 through 88025.

There were 43 LERs issued for Unit 1 and 42 LERs issued for Unit 2 during this assessment period. Table 2 shows a cause code comparison of each unit.

Table 2

Cause Areas	Unit 1	Unit 2
Personnel Errors	12	12
Design Deficiencies	8	9
External	1	1
Procedure Inadequacies	3	4
Equipment/Component	15	14
Other/Unknown	4	2
Totals	43	42

Collectively, 85 LERs were issued in accordance with NUREG-1022 guidelines during this assessment period. Table 3 shows a cause code comparison of SALP 6 and SALP 7 cycles.

Table 3

Cause Areas	(18 MO) SALP 6	(18 MO) SALP 7
	No. (Percent)	No. (Percent)
Personnel Errors	34 (43.6%)	24 (28.2%)
Design Problems	3 (3.8%)	17 (20.0%)
External Causes	1 (1.4%)	2 (2.4%)
Procedure Inadequacies	6 (7.7%)	7 (8.2%)
Equipment/Component	14 (17.9%)	29 (34.1%)
Other/Unknown	20 (25.6%)	6 (7.1%)
TOTALS	78	85
FREQUENCY (LERs/MO)	4.3	4.7

NOTE: The above LER information was derived from a review of LERs performed by NRC staff and may not completely coincide with the licensee's cause code assignments.