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February 8, 1991


Docket No. 50-461

Mr. A. B. Davis
Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Summary of Clinton Power Station Performance

Dear Mr. Davis:

During the past year, Illinois Power Company (IP) and Nuclear Regulatory Commission (NRC) personnel have held several meetings to discuss the performance of the Clinton Power Station (CPS). In these meetings, IP's efforts to improve CPS performance, and to address various operational and equipment issues, have been reviewed. The purpose of this letter is to summarize CPS performance improvement since October 31, 1989 (the end of the Systematic Assessment of Licensee Performance (SALP) 9 period) and to present a brief description of IP's 1991 Initiatives for further improvement of CPS performance.

Improvement has occurred in a number of important areas of CPS performance, including ones that have been of concern to the NRC. Among the most significant results achieved during the SALP 10 period are:

- The numbers of Licensee Event Reports (LERs), NRC violations, scrams, and Engineered Safety Feature (ESF) actuations during the SALP 10 period all declined significantly when compared to the SALP 9 period.

- IP has demonstrated its ability to better plan and execute outage work, as shown by performance during the spring 1990 planned maintenance outage (PO-3) and the second CPS refueling outage (RF-2).

- Despite substantial outage work during the SALP 10 period and a relatively high plant source term, CPS personnel radiation exposure and the number of contamination events have remained below or similar to the levels experienced at comparable plants.



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- Overall, compliance with procedures, the adequacy of procedures, and the effectiveness of corrective actions have been improved.

- The plant's corrective maintenance backlog has been reduced and is continuing to decline.

- In the area of Engineering, personnel changes have been made to provide more experience and expertise and several program enhancements have been completed or are underway.

- A stronger sense of responsibility and teamwork among CPS personnel has emerged.

While IP clearly recognizes that CPS performance can further improve, and is committed to achieving that improvement, IP also believes that substantial progress has been made. A more detailed description of CPS performance during the SALP 10 period is provided in Attachment A to this letter.

A core feature of IP's improvement efforts has been the aggressive monitoring and assessment of performance at CPS. In December 1989, CPS managers conducted an intensive self-assessment to identify areas of performance at CPS most in need of improvement and to select actions to achieve better performance in those areas. The results of that effort were the CPS 1990 Initiatives, which were the keystone of CPS improvement efforts during 1990. The initiatives addressed five areas: improve Corrective Action Program effectiveness; reduce the corrective maintenance backlog; improve procedure compliance; instill a greater sense of responsibility and accomplishment among site personnel; and expand the capabilities of the Nuclear Program Assessment Group (NPAG). Performance measures were selected to gauge the effectiveness of the initiatives. As described to the NRC in management meetings during the course of the SALP 10 period, these initiatives resulted in measurable improvement in the targeted areas.

During the course of 1990, IP's self-assessment activities continued. The performance measures for the 1990 Initiatives were issued and monitored on a monthly basis. In accordance with the initiative to expand the capabilities of the NPAG, the organization was enlarged and changed to a department, the Nuclear Projects and Assessment Department. The reporting level was elevated from that of director to manager. A senior individual was appointed as the manager of the department. Three new assessor positions were authorized and two positions, the Nuclear Program Assessor and the Radiological Assessor, were filled.

In October 1990, IP also performed an assessment of the effectiveness with which issues identified in the SALP 9 report had been addressed, and directed follow-up actions in cases where further effort was determined to be required. In December 1990, as a prelude to the 1990 end-of-year self-assessment by managers, a group of IP director and supervisory level individuals, with the assistance of an experienced consultant, performed a detailed review of the CPS regulatory record to determine what strengths and areas for improvement were indicated.

On December 26-28, 1990, the CPS Vice President, managers, and selected directors and supervisors performed a thorough self-assessment of CPS performance during 1990. Inputs to this assessment included the results of the review of responses to SALP 9 issues, the results of the review of the regulatory record, the performance measures selected for the 1990 Initiatives, and the managers', directors' and supervisors' own evaluations of performance. The assessment was conducted by having managers, key directors, and supervisors present their conclusions regarding strengths and weaknesses in their areas of responsibility to the CPS Vice President and managers. The Vice President and the managers then reviewed and integrated this information to identify strengths, weaknesses, and areas needing improvement.

Based on the results of the December 1990 self-assessment, IP is developing its 1991 Initiatives for improvement of CPS performance during 1991. The 1991 Initiatives will cover four areas:

- Working Together - Continue efforts to effectively use each person's skills and abilities to grow in professionalism and sense of accountability, and to foster a cooperative work environment aimed at correct, efficient and improving performance.

- Develop In-House Design Capability - Develop the in-house capability to perform design engineering tasks to improve ownership of design products, enhance quality and suitability of design packages for field installation and testing, increase design productivity, reduce reliance on contractors, and reduce costs.

- Reduce Site Man-Rem Due to Source Term - Prepare short and long term plans to reduce personnel exposure due to the source term.

- Spare Parts - Improve the availability of spare parts to support corrective and preventive maintenance.

IP has identified and documented the specific actions to be taken to accomplish each of the 1991 Initiatives and the performance measures for use in determining the effectiveness of these actions. In 1991, we will continue to take actions relative to the 1990 Initiatives to further enhance and monitor the corrective action and procedure compliance programs and to meet the stated goals for reducing the corrective maintenance backlog. Actions to address these areas have been included in the 1991 Initiatives. We expect to discuss the 1991 Initiatives with the NRC during the management meeting scheduled in early March 1991.

As we have discussed in several management meetings held during the SALP 10 period, and as described in Attachment A to this letter, I believe that CPS performance has generally improved. However, IP recognizes that further improvement is necessary to achieve sustained strong performance, and we remain committed to providing the effort and resources required for this improvement.

Please call or write me should you have any questions or comments concerning these matters.

Sincerely,

for

J. S. Perry
Vice President

WEB/alh

Attachment

cc: NRC Clinton Licensing Project Manager
NRC Clinton Resident Office
NRC Document Control Desk
Illinois Department of Nuclear Safety

Attachment A

This Attachment describes highlights of CPS performance since October 31, 1989 in each of the functional areas that were evaluated in the SALP 9 report. (NRC Inspection Report 89-001). Unless otherwise noted, all page references in this Attachment are to that report. The descriptions in this Attachment of actions being taken or to be taken are based upon IP's current plans and activities; some of these may change as warranted by future circumstances.

I. Operations

A number of CPS operating performance indicators showed significant improvement during the SALP 10 period. Key indicators that showed improvement include:

| | SALP 9 (14 months) | SALP 10 (15 months) |
|---|---|---|
| Scrams | 6 (4 manual) | 2 (1 manual) |
| ESF Actuations | 12 | 7 |
| LERs | 45 | 27 |
| Personnel Error LERs | 26 | 12 |

The reductions in the number of scrams from six to two and the number of Licensee Event Reports from 45 to 27 (particularly the reduction by more than 50% in personnel error LERs) are perhaps the most significant indicators of improved CPS operational performance.

Improvement also occurred between early in the SALP period and later in the SALP period. Approximately 80% of the LERs occurred in the first half of the SALP 10 period. Although there were two escalated enforcement actions by the NRC during the SALP 10 period, the violations that led to these enforcement actions also were identified in the first half of the period (two of these violations were due to errors which occurred several years ago).

Operator Performance/Adherence to Technical Specifications and Procedures (pp. 3, 7, 9)

IP has taken a number of actions to improve operator performance during operational transition periods, to enhance the quality of operating procedures, and to increase operator understanding of, and attention to detail in complying with, plant Technical Specifications and procedures. Several of these actions were part of overall efforts at CPS to improve procedure quality and compliance with procedures in connection with IP's 1990 Initiatives. A number of additional actions were taken in response to the April 11, 1990 rod pull event. These actions included:

- A review of Operations procedures was performed to ensure that they accurately reflect the Technical Specification requirements. This review was completed in June 1990. No procedure problems requiring immediate correction were noted. Recommendations for improvements to procedures noted during this review have been

recorded on procedure Comment Control Forms (CCFs) and are being incorporated in: procedures during each procedure's biennial review.

- CPS procedures and practices governing the preparation and review of procedures (including Operations procedures) have been compared to the good practices established by the Institute of Nuclear Power Operations (INPO). CPS procedure 1005.01, "Preparation, Review, Approval and Implementation of and Adherence to Station Procedures and Documents" was revised on February 22, 1990 to incorporate practices determined to be beneficial for CPS as a result of this comparison.

- The training provided to procedure writers has been reviewed for adequacy to ensure that future procedure revisions are clear and accurate. The revision to Procedure 1005.01 discussed in item (b) above incorporates the recommendations resulting from this review.

- In October 1989, a dedicated Procedures group, comprised of experienced personnel, was established. The group reports to the Director-Plant Support Services. This group is implementing a program to reduce the backlog of CCFs. Under this program, CCFs are resolved during the biennial review of each procedure. However, comments indicating a need for an immediate procedure change, including procedure inadequacies which result in failure to comply, are handled on a priority basis without waiting for biennial review. This program has been in place since April 1990.

- A formal training seminar was developed and presented to personnel concerning the need for procedural compliance. Plant operators attended this seminar during April 1990.

- Surveys of plant personnel to identify causes of plant procedure compliance problems were performed in November 1989 and March 1990. CCFs were prepared to resolve procedure inadequacies identified during this survey as causing failure to comply with procedures. These CCFs are being resolved pursuant to the program described in (d) above.

- In a number of cases where noncompliance with the CPS Technical Specifications or CPS procedures has occurred, Human Performance Enhancement System (HPES) evaluations have been performed to identify the root cause of the noncompliance and to determine what actions should be taken to prevent recurrence. The HPES evaluation program has been in place since March 31, 1990. HPES evaluations are detailed and systematic, and are designed to identify both primary and contributing causes of performance issues.

- To enhance control of the plant during transitional periods, Operations Standing Order (OSO)-72, "Dedicated Turnover Time" was issued on April 12, 1990. This OSO requires that shift turnover occur when the plant is stable and not during periods when power

or reactivity changes are in progress. Also, to assure that the overview functions of the Line Assistant Shift Supervisor, the Nuclear Engineer, and the Shift Technical Advisor are not impaired, the use of these personnel to verify control rod position is no longer permitted. Other personnel are now assigned this task.

- During April 12 to 21, 1990, active licensed operators, Shift Supervisors, and Shift Technical Advisors received approximately twelve hours of retraining on reactivity management procedures; the importance of procedural compliance; and the importance of closely monitoring available equipment and performing thorough equipment status checks during shift turnover. Finally, each crew member was required to take and pass a written examination on the principles of reactivity management and related issues.

- A number of procedures have been revised to limit activities in the main control room during planned manipulations of reactivity controls and to provide additional guidance to operators on the appropriate plant parameters to be monitored prior to and during manipulation of reactivity controls. These include CPS procedures: 1401.01, "Conduct of Operations"; 3001.01, "Approach to Critical"; 3002.01, "Heatup and Pressurization; and 3005.01, "Unit Power Changes". The revised procedures were implemented in April, 1990.

These actions have improved operator performance. Although CPS experienced some operational problems during the first six months of 1990, operational performance during the last several months has been relatively smooth. As noted above, the number of LERs at Clinton has declined from 45 during the SALP 9 period to 27 during the SALP 10 period; the number of personnel error-related LERs dropped from 26 to 12. Of these 12, six were the result of operator error, compared with 13 LERs due to operator error during the SALP 9 period.

Operator Staffing and Overtime (p. 8)

To assure that sufficient numbers of operators are available to staff a total of six shift crews, a goal of 36 operators (exclusive of personnel in supervisory positions) has been set. At least 12 of these operators should hold a Reactor Operator (RO) or Senior Reactor Operator (SRO) License. Currently there are 28 licensed operators on shift; 16 are SROs in supervisory positions and 12 are ROs performing main control room operations. To achieve the 36 operator goal, taking into account personnel transfers, attrition, and time in training, and to make other staffing improvements by February, 1992, the following actions have been taken:

- Nine Non-Licensed Operators were trained and placed on-shift in September 1990.

- A Licensed Operator Training Class was recently completed, for two new RO Licensees, three SRO upgrades, and one "one-step" SRO licensee. Examination results have not yet been received.

- A Non-Licensed Operator Training Class for six new operators is in progress and is expected to be completed in the fourth quarter of 1991.

- A Licensed Operator Training Class has recently begun for six new on-shift RO Licensees. They are scheduled to take their license examinations in January 1992.

With an increased number of operators resulting from the completion of license training, Operations intends to reestablish a six crew rotation following completion of the outage and reduce the level of overtime to between 10 and 20%.

Balance of Plant (BOP) Equipment and Control Room Instrumentation (pp. 3,8,14)

Significant efforts have been made to improve the condition of BOP equipment and reduce the amount of control room instrumentation and annunciators out of service. With respect to BOP equipment, within the last 12 months IP has taken action to eliminate several recurring or long standing problems including:

a. Motor Driven Feed Pump seal replacement;
b. Electrohydraulic control and seal oil skid refurbishment;
c. Condensate booster pump seal and leak repairs; and
d. Fire Protection pump common check valve leakage repairs.

IP has also initiated systematic plant material condition walkdowns which include BOP areas of the plant. During these walkdowns, unsatisfactory conditions are noted and recorded so that corrective action can be taken. IP's success in reducing the corrective maintenance backlog (much of which involves BOP equipment) has also improved the overall condition of BOP equipment. For example, this can be seen by the increase in Radwaste system availability (from 50% in 1989 to nearly 100% in the latter part of 1990).

Management's commitment to improved material condition is also reflected by the planned maintenance outages performed in November and December 1989 to improve the overall material condition of the plant. Long standing deficiencies in the feedwater heater drain system were repaired in November 1989, and additional repairs were completed on leaking feedwater valves in December 1989. Both of these outages were completed on schedule, and smooth returns to power were achieved. A third planned maintenance outage (PO-3) began on February 21, 1990, and was completed on April 10, 1990. Several plant material condition upgrades were completed during that outage. The second refueling outage (RF-2), during which additional significant material condition upgrades have been made, is nearing completion.

NRC Inspection Report 90-002 describes the results of a BOP maintenance team inspection conducted during February-March 1990. The team determined that:

> "Overall the programs for corrective, predictive, and preventative maintenance on BOP equipment appear to be acceptable. Operations Department activities in support of BOP equipment maintenance, the operation of BOP systems, management controls and the utilization of prior industry events also appear to be acceptable."

Of the 27 LERs in the SALP 10 period, only five have involved equipment failures and just one of these involved BOP equipment.

Progress has also been made in reducing the number of out-of-service instrumentation and annunciators at CPS. The number of control room equipment items out of service has declined from 29 on December 31, 1989 to 11 on January 29, 1991.

In addition, new Source Range Monitor (SRM) drawers have been installed. These new drawers minimize "noise" and provide a more accurate indication of power levels in the source range.

Plant Housekeeping (p. 10)

IP has taken the following actions to improve plant housekeeping and overall material condition:

- Since February 1990, systematic plant material condition walkdowns have been performed by an interdepartmental team at least every six months. During these walkdowns, material deficiencies noted are recorded. Recorded deficiencies are then assigned to the appropriate site organization for resolution. To date, two of these walkdowns have been performed. The next walkdown is scheduled for March 1991.

- The non-outage corrective maintenance backlog was reduced by 31% from during May to September 1990. The backlog has increased slightly, as expected, during the second refueling outage due to the redistribution of manpower and the identification of new work during the outage, but is expected to resume its downward trend following return to power.

- Each of the three Maintenance group supervisors and the Supervisor-Plant Maintenance performs and documents a weekly housekeeping tour. Personnel are assigned to correct unsatisfactory conditions noted during the tours.

- The Supervisor-Plant Maintenance presented a seminar on housekeeping to permanent maintenance personnel. This seminar included a discussion on procedural compliance and the expectations of management on standards for cleanliness.

- Staffing levels were increased in the CPS Facilities Group to support several decontaminations and housekeeping, thereby reducing inaccessible areas.

- CPS Procedures 1019.04 "Control of Transient Equipment/Material and Foreign Material Exclusion Areas" and 1019.01 "Housekeeping" were revised to be easier to understand and to more clearly specify departmental responsibilities for housekeeping and plant walkdowns.

- A ten-year maintenance plan to paint the plant has been established. Extensive painting pursuant to this plan was done in 1990, and continues at an increased pace in 1991.

Conservative Operating Philosophy

CPS was operated pursuant to a conservative operating philosophy during the SALP 10 period. Although some operational events did occur during the SALP 10 period, IP management was involved in determining the actions to be taken in response to those events. IP also analyzed and responded to events occurring at plants other than CPS. IP's actions in response to a rod pull event in April 1990, decisions to shut down until certain technical issues had been resolved, and the decision to proceed cautiously with outage work during refueling activities (see section VIII below) exemplify this conservative philosophy.

Application of Lessons Learned

Events occurring at CPS and other facilities are reviewed to ensure that adequate corrective actions are taken to prevent their occurrence or recurrence at CPS. Particular actions in this regard include the commencement of the use of the Human Performance Enhancement System (HPES) at CPS in March 1990. HPES evaluations are being performed to identify the root causes of selected events and develop corrective actions to prevent recurrence. The Independent Safety Engineering Group (ISEG) has also reviewed significant events and the Licensee Event Reports (LERs) which have occurred at other plants. One notable event reviewed was the Vogtle Loss of Offsite Power. The ISEG reviewed the refueling schedule with that event in mind to ensure that sufficient Emergency Core Cooling System (ECCS) sources and Alternating Current (AC) power sources were available during Modes 4 (COLD SHUTDOWN) and 5 (REFUELING). Additional recommendations regarding control of vehicles and controls for transferring power to safety buses were also factored into refueling outage planning.

The Licensing Administration group additionally provides information transmitted via the Institute for Nuclear Power Operations (INPO) Nuclear Network to appropriate organizations for their review. This organization, along with Quality Assurance, the Nuclear Projects and Assessment Department, the Facility Review Group, the Nuclear Review and Audit Group and the Corrective Action Board ensures that lessons learned from significant events at CPS and other plants are evaluated to determine whether action should be taken at CPS. The NRC noted in Inspection Report 90-021 that these assessment activities are excellent and are producing results.

Emergency Operating Procedures (pp. 21-22)

The rewriting of the Emergency Operating Procedures (EOPs) is complete. The EOP flowcharts and support documentation have been revised, verified, and validated. Licensed operators were trained on the revised EOPs between June and October 1990. This training identified the need for additional flow chart improvements which were incorporated in December 1990. The program and process governing the EOPs have been improved and directions on writing, verification and validation, and plant specific guidelines have been provided. The revised EOPs were implemented in January 1991.

II. Radiological Controls

Personnel Exposure

At the end of November 1990 the total personnel exposure at CPS was 399 man-rem, and the end-of-year exposures were estimated to be 570 man-rem. This exceeded IP's goal of 470 man-rem for 1990, but was still good performance compared to similar Boiling Water Reactors (BWRs). The As-Low-As-Reasonably-Acheivable (ALARA) group efforts, discussed below, contributed to maintaining this exposure low. The extra exposure which led to the goal being exceeded was due to expanded outage work. The increased scope of outage work, included 700 additional work activities than estimated at the time the exposure goals were set, and approximately two hundred more contractors than originally planned on site to perform outage work. Prior to the commencement of RF-2, exposure was maintained at or near goals. Key jobs during RF-2 were generally completed with exposures near or below estimated levels. As part of its 1991 Initiatives, IP is developing a source term reduction plan which should help reduce personnel exposure over the life of CPS operation.

Personnel Contamination Events

In 1989 the total number of personnel contaminations was 101, consisting of 33 skin contaminations and 68 clothing contaminations. During 1990, this number was reduced to 96 contaminations, consisting of 36 skin and 60 clothing. Both the 1989 and 1990 figures are well below nuclear industry averages. This reduction is significant considering that two large outages took place during 1990.

Improvements in Technology

IP has made an aggressive effort to improve the equipment and technology applied to radiation protection at CPS. Particular improvements include:

- Modification SR-31 was installed and implemented in 1990. This modification installed a computer system with software modules to support computer controlled Radiologically Controlled Area (RCA) access, dose entry, respirator issuance and reporting functions. This has resulted in increased efficiency and accuracy in tracking personnel radiation exposure and providing personnel access to RCAs.

- IP has purchased equipment and is in the process of installing its own Thermoluminescent Dosimetry (TLD) processing system. On-site TLD evaluations will allow IP to more accurately determine the type and energy levels of radiation to which personnel are exposed, and will permit more rapid processing than the current off-site contractor system. It is expected that the on-site TLD processing system will be acceptable and ready for use in reading TLDs in 1991.

- New porous metal septa were installed in the Reactor Water Cleanup System (RWCU) demineralizers. The new septa minimize the carryover of resin and improve reactor chemistry.

- A new whole body counter was purchased, which has significantly decreased the time required to process incoming and outgoing personnel, and has decreased overall preparation time for outages.

Staffing, Organization and Training

IP has added several individuals and created new positions to improve the effectiveness of the RP organization.

- A radiological project engineer, experienced in Area/Process Radiation (AR/PR) monitors, was hired in the radiological environmental group to increase the knowledge and understanding of this equipment.

- Two additional positions have been added to the ALARA group.

- A sixth Radiation Protection Shift Supervisor (RPSS) position was added to Radiological Operations and was filled by an experienced technician. A Dosimetry Specialist position was also created and filled to improve the timeliness and thoroughness of investigations of contamination events and high exposures, as well as to assist with other numerous ongoing program initiatives.

- A radiological assessor was added to the Nuclear Projects and Assessments department to assist in assessing and making recommendations for improvements to radiological operations.

- The NRC indicated in Inspection Report 90-020 that the organizational structure of the Chemistry organization, which includes two chemical engineering specialists who report to the Assistant Supervisor responsible for Laboratory Support, is a good management practice.

- An AR/PR Monitor project team was established to determine the appropriate priority to be placed on the maintenance of various pieces of radiation monitoring equipment. This project team is comprised of representatives from Radiation Protection, Maintenance, Scheduling and Outage Management, and Nuclear Station Engineering. The team's mission is to ensure that equipment problems resulting in significant downtime of radiation monitoring equipment are resolved quickly and that corrective action is sufficient to preclude recurrence.

IP has also upgraded RP training. An advanced radiation worker training course was established and implemented. This course is designed for personnel performing work in radiation/contamination areas, giving them experience in using glove bags, drop cloths, and contaminated tools prior to performing work in the field.

Nine chemistry technicians have attended an Institute of Nuclear Power Operations (INPO)-certified training course on nuclear chemistry, and were awarded National Academy of Nuclear Training certificates.

In addition, prior to fully implementing the computerized high-radiation area access system installed via modification SR-31, personnel with RCA access were trained on its use.

In response to an NRC suggestion, specific training program acceptance criteria were added to CPS procedure 6000.01, "Quality of Chemistry Activities".

Radwaste System Availability

Significant improvements have been made in radwaste system availability. During 1989, system availability was approximately 50%. To improve availability, a maintenance team was established which is dedicated to the performance of corrective and preventive maintenance on radwaste system equipment. The position of Radwaste Shift Supervisor (RWSS) was established. The RWSS is responsible for the coordination of work and operations in the radwaste group. Additionally, regular meetings are held between Radwaste, Maintenance, and the Nuclear Station Engineering Department (NSED) to discuss, prioritize, and schedule Maintenance of radwaste equipment. As a result, by the end of 1990 the availability of the radwaste system was increased to nearly 100%.

ALARA Efforts

Implementation of ALARA techniques and methods in preplanning maintenance activities continued to be effective and has reduced radiation exposure on a number of jobs, including work on a reactor water cleanup valve, inspection of welds on the feedwater nozzle thermal sleeves, and replacement of two demineralizer plenums. As a result of ALARA efforts, radiation exposures for key jobs during PO-3 and RF-2 have generally been completed at, or under, the estimated exposure levels, even in cases where the work became complicated by emergent conditions. In Inspection Report 90-022 the NRC noted good coordination between outage management and the ALARA group in planning for scheduled and emergent work that requires an ALARA review prior to and during outages.

The majority of personnel exposure to ionizing radiation is the result of activated isotopes deposited on the internal surface of systems/components. CPS exposure levels have been below levels at comparable plants despite a relatively high source term at the plant. IP is taking action to reduce the amount of these activated isotopes by implementation of a source term reduction program which is under development as one of the 1991 Initiatives for CPS.

Contaminated Floor Space

IP has succeeded in reducing the amount of contaminated floor space at CPS. In December 1989, there were 16,754 square feet of contaminated floor space, which was above the CPS goal of 15,000 square feet. A lower goal of 10,000 square feet was set for 1990. As of the end of December 1990, there were 6,824 square feet of contaminated floor space at CPS (NOTE - These figures refer to accessible contaminated floor space, not to areas permanently designated High and Restricted Radiation areas or areas set up as routine contamination areas).

Radionuclide Assessment Committee

A Radionuclide Assessment Committee was established in 1990. It includes representatives from Radiological Environmental, Radiation Protection Engineering, NSED, Chemistry and Radwaste. The purpose of the committee is to review sampling results and document the radionuclide mix in the plant. The radionuclide mix affects radiological decisions in the day-to-day operation of the plant. The charter for the committee is currently in draft form and will be presented to management for approval in the near future.

Access to Radiologically Controlled Areas

IP has taken several actions, especially during the latter part of the SALP 10 period, in response to a small number of instances of personnel failure to fully follow radiological protection procedures, including issues relating to use of proper dosimetry and access to radiologically controlled areas (RCA). These actions include:

- Hiring a consultant to provide recommendations on how to better control work in and access to radiological control areas, and implementing a number of the consultant's recommendations.

- Training and briefing appropriate groups to reinforce their knowledge of and adherence to radiological protection requirements.

- Repairing high radiation area doors with latching problems.

- Improving posted notices aimed at reminding personnel of dosimetry requirements at the RCA entrance.

In addition, the new SR-31 access system described above prevents access authorization to the RCA unless proper dosimetry has been issued.

III. Maintenance/Surveillance

CPS Maintenance and Surveillance performance has improved during the SALP 10 period. As discussed below, significant maintenance performance indicators, including a decreasing backlog of Maintenance Work Requests (MWRs), the ratio of preventive to total maintenance, the low number of overdue preventive maintenance tasks, and the low number of missed surveillances indicate that actions taken by IP to improve Maintenance performance have been effective. Actions to address the maintenance/surveillance concerns identified by IP management and in the SALP 9 report, and to achieve additional improvement in this area include:

Corrective Maintenance Backlog

In accordance with the CPS 1990 Initiatives, a corrective maintenance (CM) backlog reduction plan was approved and was put into place immediately following completion of the spring 1990 planned maintenance outage (PO-3). The goal of this plan is to reduce the backlog of CM MWRs from the January 1990 level of approximately seven months worth of work to a level of approximately three months of work by April 1991. Contractor staffing in planning, engineering, radiation protection, quality assurance, and maintenance which supplemented normal CPS staffing for PO-3 was retained to implement the backlog reduction plan. Permanent staffing levels were evaluated to determine if changes were required to prevent recurrence of the backlog and an additional 38 positions were added. As a result of these efforts, the CM backlog declined from 880 non-outage CM MWRs in December 1989 to 612 in September 1990, a decrease of 30.5%. Since September, 1990, the backlog rose to 715 non-outage CM MWRs in December 1990. This increase is primarily attributable to the diversion of maintenance resources to outage work during RF-2 and the identification of new work during the outage. Once RF-2 is completed, the declining trend in the number of MWRs is expected to resume. In addition, the training provided to personnel on root cause and corrective action determination discussed in the Corrective Action Program subsection of section VII below should, among other things, assist in developing effective corrective actions for long term equipment problems, thus reducing the number of corrective maintenance MWRs over the long term. While reducing the CM backlog, IP has continued to complete preventive maintenance on time. The percentage of late preventive maintenance tasks during 1990 was 0.08%, well below the 1989 industry average of 4.3%.

Reliability Centered Preventive Maintenance Review

As the first step in a series of reviews of preventive maintenance for selected CPS systems, a contractor was hired to assist in performing a review of the scope of preventive maintenance for the feedwater system. The review employed Reliability Centered Maintenance concepts to identify functionally significant components and their failure modes, and to establish maintenance priorities. The review of the feedwater system was completed in June 1990. The review resulted in 300 recommendations for improvements in preventive maintenance for the feedwater system. These recommendations have been reviewed and requests have been submitted to initiate 85 new preventive maintenance tasks (PMs), to decrease the frequency of 34 PMs, to increase the frequency of 38 PMs, and to change the scope of six PMs. Based on the results of this review, reviews of other Balance of Plant (BOP) systems will be

performed, extending through 1993. Reviews of the condensate, condensate booster, and condensate polisher systems are now being completed.

Maintenance Process Improvement

A Maintenance Process Improvement Team was established to review the maintenance process at CPS. In December 1989, the team concluded that the maintenance process at CPS is relatively advanced in its concept and definition with especially strong areas in computer capability, preventive maintenance, master equipment listing, and equipment history. The team noted during their review of the maintenance process at other plants that effective programs were characterized by positive personnel attitudes and a high level of cooperation. Actions to achieve improvements in these areas have been taken as part of the CPS 1990 Initiatives to improve accountability and responsibility among CPS personnel. Further efforts will be made as part of the CPS 1991 Initiative on "Working Together". Other recommendations made by the team have also been evaluated. Improvements are being made in the areas of training, documentation, and coordination in the maintenance process including: reducing the number of MWRs required to be reviewed by NSED, improving system impact matrices; establishing planner/specialist positions; and simplifying MWRs.

Maintenance Responsiveness to Operational Needs

To assure that plant operators are informed of actions to resolve material condition problems of concern to them and to increase the focus on correcting these problems, the Manager-CPS, with input from the shift supervisors, created a list of the material problems which the operators consider to be most significant. This list, which is periodically updated, notes the name of the individual responsible for the resolution of each deficiency, and provides the status of action to correct the deficiency. The list is made highly visible to personnel. Progress in resolving these material problems is tracked and discussed at periodic management meetings.

Previously, the assignment of priorities to proposed modifications was performed by the Modification Review Committee which was chaired by the Manager-Nuclear Station Engineering and attended by the Manager-CPS and Manager-Scheduling and Outage Management. To make modification selection more responsive to operational needs, the modification review process has been revised to require a review and approval of proposed modifications by the Modification Authorization Committee (MAC), among whose members are the Supervisor-Plant Operations and the Supervisor-Maintenance Planning. The MAC assigns priority to the modifications based on overall plant needs. The MAC also schedules the modifications for implementation and ensures that sufficient funds are in the budget. The name and role of the Modification Review Committee has also been changed. The new Modification Oversight Committee (MOC) no longer approves and prioritizes each modification, but provides guidance and oversight to the MAC and ensures that the MAC and CPS goals are met.

Control Room Deficiencies (pp. 13, 14)

Significant efforts have been made to reduce the amount of control room equipment that is out of service. The number of control room instruments and annunciators out of service has decreased overall during 1990 and has decreased from 29 in December 1989, to 11 in January 1991.

BOP Maintenance (pp. 13, 14)

Concerns with BOP material condition were noted during the Operational Safety Team Inspection (OSTI), which was conducted from September 25, 1989 through October 3, 1989, and in the SALP 9 report. IP had recognized prior to the issuance of the reports that problems were repeating and accumulating in the plant.

IP actions to address the BOP material condition included: the effort to reduce the Maintenance Work Request backlog and upgrade the material condition of equipment; improved procedural compliance; and improved root cause identification and corrective action. Each of these efforts was part of the CPS 1990 Initiatives.

As discussed above in the subsection on Corrective Maintenance, the amount of outstanding non-outage corrective maintenance MWRs has decreased substantially; this includes MWRs associated with BOP equipment. Particular focus has been given to improving the material condition of radwaste system equipment; previously, this equipment had recurring problems. Radwaste system equipment availability has risen from approximately 50% in 1989 to nearly 100% in the latter part of 1990.

A BOP team inspection was conducted by the NRC in February and March 1990, as documented in NRC Inspection Report 90-002. The NRC determined that the programs for corrective, predictive, and preventive maintenance of BOP equipment were adequate and non-safety-related maintenance activities were generally performed and documented in the same manner as safety-related work.

Procedure Compliance and Communications (pp. 9, 13, 14)

As described in the cover letter and Section I above, IP's 1990 Initiatives and other efforts have included substantial action to improve procedure compliance among CPS personnel. As previously discussed, Maintenance Department directors and supervisors perform and document weekly walkdowns during which they observe and provide guidance to personnel performing maintenance activities.

The number of procedure compliance problems attributable to CPS Maintenance personnel has consistently decreased since May of 1990. Although certain procedural noncompliances among maintenance personnel contributed to an escalated enforcement action during the SALP 10 period, the number of procedure noncompliances identified during QA problem trending that are

attributable to the maintenance department has declined from five in March 1990 to two in June, and one or none during the remaining months of 1990. The relatively smooth performance of outage work during RF-2 indicates that efforts to improve communication and procedural compliance among maintenance personnel are succeeding.

Review of Safety System Preventive Maintenance Requirements (p. 14)

An ongoing activity during the SALP 9 and 10 periods was a review of equipment and components in each system to determine if additions to the preventive maintenance (PM) program were required.

This review consisted of two phases. Phase I involved a review of the PMs in the program to determine if the PMs were adequate for each piece of equipment which had a PM associated with it. Recommended PM revisions and additions were completed as determined appropriate.

Phase II was to consist of a review of all systems to identify those components for which no PMs existed. Reliability engineers performed a review of nine systems (Residual Heat Removal, Low Pressure Core Spray, High Pressure Core Spray, Reactor Core Isolation Cooling, Containment Monitoring, Reactor Recirculation, Control Rod Drive Fuel Pool Cooling and Cleanup, Electro-hydraulic Control, and Feedwater) in conjunction with the system engineers. The system engineers identified components, excluding control and instrumentation, for review to determine if new PMs were required or if existing PMs required revision.

No significant safety related components were found improperly omitted from the PM program during this review. All PM improvements noted were associated with non-safety components. Because these findings were generally favorable and because this methodology does not include a systematic evaluation and prioritization of total PM requirements, this phase of the program was suspended. However, PMs continue to be reviewed as part of the Reliability Centered Preventive Maintenance review discussed above.

IV. Emergency Preparedness

On July 25, 1990, IP successfully completed the annual emergency preparedness exercise, which tests the CPS and offsite agencies' capability to respond to a simulated accident scenario. The simulated accident scenario for the exercise included multiple equipment failures with the potential to result in a major release of radioactive effluent. No violations, deficiencies or deviations were identified.

On August 10, 1990, an evacuation/accountability drill was held. During this drill, certain concerns with the length of time required to account for plant personnel were identified. On September 13, 1990, a second evacuation/accountability drill was held at CPS. The drill was fully successful, with accountability acceptably demonstrated within the goal time frames. The issues which led to concerns during the August 10, 1990 drill were successfully handled during the September 13, 1990 drill.

The SALP 9 report (p. 15) discussed two open items identified during the 1989 emergency exercise. To address these open items, procedures were revised to more clearly define appropriate emergency action levels, and additional training was provided to the Shift Supervisors and Shift Technical Advisors on the precise information that should be given to the NRC when making emergency plan notifications. The satisfactory resolution of these items was demonstrated by the July exercise and both of these items have been closed by the NRC.

One weakness, regarding the lack of timeliness of notifying the State of the reclassification of an emergency action level, identified during the July 1990 exercise has been corrected. Personnel responsible for completing and sending the Nuclear Accident Reporting System (NARS) form became involved in scenario events and allowed the fifteen-minute notification period to lapse before the notification of the reclassification was made (the notification was made within 28 minutes). A training session was developed on the time requirements for notification of changes in emergency action levels and other notifications. This training has been provided to personnel filling the following positions: Technical Support Center (TSC) and Emergency Operating Facility (EOF) Communicator, the TSC Administrative Supervisor, the Station Emergency Director, and the Emergency Action Level Protective Action Evaluator.

In addition, a "TSC Emergency Advisor" position has once again been added to the TSC staff. The person filling the position is responsible for overseeing notification activities and advising the Station Emergency Director on notification requirements associated with implementing the CPS emergency plan. The creation of this new position will help assure that notifications are made on time. The position was filled in August 1990.

V. Security (pp. 17-18)

IP has expanded management efforts to improve the quality of Security at CPS, resulting in an increasingly experienced staff and updated security equipment. IP has also achieved target levels of staffing and stabilized the attrition rate. Despite two significant outages during 1990 (PO-3 and RF-2), each of which involved a significant number of contractors, the number of reportable security events declined from two during the SALP 9 period to one in the SALP 10 period. Overall, NRC Inspection Report 90-010 recognized IP management's effective involvement in assuring quality of Security performance and the timeliness of IP's corrective actions. During the exit interview for the recent NRC inspection, which was performed January 14-18, 1991, the NRC acknowledged that IP has resolved all five open items from previous inspections and has made progress in the Security area. IP is committed to maintaining the improving trend in the area of Security at CPS. IP management continues to be involved in: performing critical self assessments and other root cause identification and analysis; providing staff training; addressing open Security issues; and enhancing the quality and availability of security equipment.

Staffing and Training

The SALP 9 Report noted that Security personnel performed well despite the increased demands that resulted from the February 1989 Security force strike, yet also identified the need to increase the overall experience level of the Security Personnel (pp. 18-19). IP has achieved target Security staffing levels and stabilized the attrition rate, accomplishments recognized by the NRC (NRC Inspection Report 89-031). In addition, the experience level of the Security staff continues to grow, and is enhanced, by regularly scheduled training sessions which include tactical response drills, practice shoots, management tours and remedial training. IP provides remedial training to individual officers on the access control program when room for improvement is indicated by a Security incident or independent IP observation. In certain situations, IP will provide remedial training to a larger group of security staff when management determines that particular training deserves reinforcement. For instance, a QA audit identified warehouse package searches as an area for improvement. IP retrained the entire Security staff on how to better conduct these searches.

The additional demands on Security personnel due to the February 1989 strike were reflected in part by increased overtime for the remaining staff. IP has since decreased the Security staff's overtime rate so that the rate is within the original bounds of personnel guidelines established by IP.

During the SALP 9 period, IP received a Notice of Violation regarding training provided to certain unarmed Security guards in light of their assigned duties (p. 17). IP reviewed and modified the Physical Security Plan to assure that staff training is adequate for assigned Security tasks. Certain responsibilities were removed from the functions of unarmed Security force memebers and a new, unarmed Security position was expressly created with limited duties.

Contractor Screening

The SALP 9 report cited concerns regarding IP control of contractor screening as one exception to otherwise good management involvement (p. 17). IP has taken several steps to improve screening of contractors prior to granting them access to CPS. IP revised the methods for reviewing background information on security clearance applicants. To further assure accuracy in the personnel screening process, IP now independently reviews the accuracy of contractor screenings on a random sampling basis. In addition, IP has replaced the contractor responsible for the inadequate screening process identified in the SALP 9 period. IP supervisory personnel have also received root cause analysis training on how to more effectively develop and verify corrective action after identifying a performance shortcoming.

On January 13, 1990, IP's revised review process identified one falsification by a security screening vendor. IP determined that the falsification did not have any effect on the integrity of CPS security and helped the contractor correct its management program. In addition to IP's independent review of screenings performed by contractors, the particular contractor now performs a quality re-verification on a percentage of its completed background investigations. Since this incident, no other screening deficiencies have been identified during the SALP 10 period.

Security Equipment Upgrade (p. 18)

IP management has undertaken security equipment upgrades, including actions to upgrade specific equipment identified by the SALP 9 report. For instance, the report identified one intrusion alarm zone characterized by operational limitations which required extensive compensatory actions by personnel (p. 18). Prior to PO-3, IP corrected the intrusion alarm zone through system upgrades. The number of spurious alarms in the zone has substantially decreased and this zone now has the lowest number of alarms.

IP has also reviewed the CCTV system and determined that exterior routed cables were the cause of periodic resolution problems (p. 18). IP has enhanced the clarity and dependability of the system by replacing the exterior routed cables for seven cameras with fiber optic cables. IP also expanded the scope of its original modification and will complete similar upgrades for all cameras with exterior routed cables throughout 1991. For those cameras with completed upgrades, no further distortion problems have been identified.

IP has upgraded the effectiveness of its X-ray machines, replacing several older machines with newer models. IP performed this upgrade of X-ray machines after completing its own independent review.

Numbers of Loggable and Reportable Events (pp. 17, 18)

During 1990 and January 1991, two major outages were conducted at CPS. Due to the large number of contractor employees on site during PO-3 and RF-2, the responsibilities of the Security personnel at Clinton were significantly increased. Despite the extra activity associated with these outages, IP's performance in this area generally improved, as the number of reportable security events declined from two events in the SALP 9 period to one event in

the SALP 10 period. IP believes that the additional training of Security staff, increased attention to procedure compliance and other management efforts should lead to continued improvement in this area.

Fitness for Duty (p. 17)

IP has made continued progress in implementing an effective Fitness-for-Duty (FFD) program at Clinton. An NRC inspection of the program produced generally positive results (NRC Inspection Report No. 90-017, p. 4) citing the high level of dedication and qualification of the FFD staff and the thoroughness of a Quality Assurance (QA) audit. IP management has taken steps to address certain areas where the QA audit, which the NRC Inspection Report notes and expands upon, indicated room for improvement. For example, the QA audit identified certain anomalies with the random testing procedures. These sampling procedures were comprehensively reviewed and IP personnel have developed and implemented appropriate testing procedure modifications. IP also hired an additional FFD employee to help with the testing and to ensure better compliance with testing procedures.

IP's self assessment also noted the existence of a random sampling backlog. In response to this issue, IP hired a laboratory certified by the Department of Health and Human Services to perform some of the testing, finished constructing an on-site testing facility in the fall of 1990, and increased the rate of random testing. As of January 23, 1991, IP has eliminated the random testing backlog.

NRC Inspection Report No. 90-017 identified one other area for IP attention. The report noted that IP provided sufficient training and documentation of the FFD program to educate its personnel (pp. 5-6). Yet the NRC believes information on the FFD program might be made more accessible to personnel if it was contained in one single document (p. 5). In response to this concern, in November 1990, IP developed and issued a policy statement describing the overall FFD program at CPS. The statement sets forth the objectives of the FFD program, IP's expectations and the consequences for noncompliance. This policy statement has been made available to all CPS personnel.

Security Doors (p. 18)

IP has undertaken equipment enhancements to assure that security doors are properly secured. For example, IP identified high traffic security doors by repainting them for easier recognition by personnel. Additional instructions were also provided on the doors to reinforce proper methods of securing the doors. IP also retrained personnel on how to properly secure security doors and on the importance of following the procedures. A significant decrease in false alarms is one expected benefit of the equipment upgrade.

Criteria for Responding to False Alarms (p. 18)

The SALP 9 Report noted that despite reductions in spurious alarm rates made since the prior SALP period, the interior spurious alarm rate was still three to four times higher than exterior alarm points exposed to the environment (p. 18). IP identified several root causes of false alarms and has taken corrective action to address each contributing factor. IP revised the administrative controls used to evaluate the validity of an alarm. Additionally, IP concluded that a number of interior doors were not part of the Security system and could be removed from the alarm computer. IP also focused on physically repairing those doors which activated false alarms and on upgrading the door system. As a result of these actions, the false alarm rate has decreased during the SALP 10 period compared to the SALP 9 period. The false alarm rate is now within IP's established guidelines.

VI. Engineering/Technical Support

IP has taken several actions to improve the performance of its Engineering organization as a whole as well as to address specific issues noted in the SALP 9 report. As described below, a number of IP's actions are showing positive results. Others have been implemented more recently, or are still underway, and are being monitored to assure that desired performance goals are achieved.

Management Involvement and Organizational Changes

Changes have been made in the Nuclear Station Engineering Department (NSED) organization which have increased management involvement in engineering/technical support. The NSED organization was simplified by eliminating the Operations and Maintenance Support (O&MS) Engineering division (which included the O&MS Group (Field Engineering) and the Procurement/ Materials Engineering Group) and integrating the groups of that division into other parts of the NSED organization. The O&MS Group was placed under the Director-Systems and Reliability Engineering, and the Procurement/Materials Engineering Group was placed under the Director-Design and Analysis Engineering. These changes place these groups within the same divisions as other groups having similar responsibilities, shortening the management chains between them, and simplifying coordination and communication.

In addition, four new positions were added to the NSED organization: the Assistant Manager - NSED, the Assistant Director - Systems and Reliability Engineering, the Assistant Director - Design and Analysis Engineering, and the Project Manager - Design Interface. The Assistant Manager-Engineering position was created to provide additional management involvement in the implementation and monitoring of planned engineering improvements. This position was filled in January 1991 by an individual on loan from the Institute of Nuclear Power Operations (INPO). The remaining three positions are discussed in appropriate sections below.

Oversight of Design Contractors

To provide better oversight of contractors and to better control the quality of contractor engineering work, IP has:

- Established and filled a Project Manager - Design Interface position. This position serves as the focal point for management interactions between IP engineering personnel and engineering contractors, and should facilitate prompt, consistent and authoritative feedback on any quality of work, teamwork, cost, or schedule issues.

- Initiated regular meetings with Architect/Engineer (A/E) management to discuss and evaluate product quality, budget, schedule, and teamwork.

- Requested that the CPS NSSS supplier formally evaluate recent problems with supplied hardware and services and provide IP with a description of actions being taken to preclude such problems in the future. On January 4, 1991, the NSSS vendor identified programmatic improvements undertaken to correct the problems. IP

is monitoring the progress of their implementation and the results achieved.

- Initiated preparation of a design interface procedure which will provide a greater degree of IP engineering involvement in designs developed by design contractors.

As a 1991 Initiative, IP will develop the in-house capability to perform design engineering tasks to improve ownership of design products, enhance quality and suitability of design packages for field installation and testing, increase design productivity, reduce reliance on contractors, and reduce costs. This effort will continue through 1993.

An Assistant Director-Design and Analysis Engineering position has been established and was filled in September 1990. This position was created to provide increased focus on inter-disciplinary design activities and to improve the teamwork among internal organizations and with contractors. An added goal of this position is to allow the Director to maintain overall management involvement in equipment qualification, procurement engineering, and nuclear engineering.

System Engineering

The system engineering program at CPS has matured during the SALP 10 period. The IP system engineering program has been formalized through the development and issuance of procedures which provide specific guidance to the system engineers on their functions, responsibilities, and proper methods for completing their work. The system engineers have received additional training in the operation and operational bases for their systems. The role of the system engineer has been discussed with various department managers and the Vice President to heighten understanding of the system engineering organization. As a result of this increased emphasis on the system engineering program, the system engineers' efforts have been achieving results. Examples include:

- During a walkdown, the system engineer noted that a feedwater heater drain valve was indicating 90% open. When he checked the valve position the following day he noted the valve position was unstable and the heater level was fluctuating. The engineer notified the Shift Supervisor of a potential problem with the valve and initiated a Maintenance Work Request to rework the valve. Later that day, a feedwater transient occurred in the feedwater heating system. Based on the Shift Supervisor log entry of the engineer's concern, the operators were able to identify the drain valve as the cause of the transient and to stabilize the feedwater heater levels. Repairs were completed and normal heater drain control was restored.

- In May 1990, a system engineer identified that one of the bellows on the Division I diesel generator (DG) had a small leak. During preparations to repair the leak, an engineer noted that the bellows was longer than the length specified, and that tie rods were not installed as required, on the vendor's drawing. Based on the uncertainty of DG operability during a seismic event, IP management decided to shut down the plant. NRC Inspection Report

90-012 noted that engineering support in determining the correct configuration of the bellows and in identifying the cause and significance of the missing tie rods was good and that management involvement was evident.

- The main turbine system engineer assumed responsibility for the turbine inspections conducted during the current refueling outage. Maintenance and operations personnel indicated that this enabled IP to improve the overall control and effectiveness of the inspections and identify appropriate actions to correct problems.

- System engineers, working with the reliability engineering group, identified improvements in the reliability of reactor water cleanup pump bearings through the use of synthetic oil. As a result of the switch to the synthetic oil, improvements in bearing wear have been achieved.

An Assistant Director-Systems and Reliability Engineering position has been established and was filled in September 1990. The Assistant Director's responsibilities are focused on further improving the system engineering program and on integrating multi-system issues. This allows the Director to focus more attention on improvements in reliability engineering and field engineering.

Engineering Support of Operations, Maintenance, and Outages

Engineering has increased and improved its support of Operations, Maintenance, and Outages in the SALP 10 period. The roles of field engineering and system engineering have been expanded and clarified. NSED has provided outage support on weekends and backshifts to assist in resolving maintenance problems. Examples of engineering accomplishments and support are discussed below.

- NSED provided the design and support for installation and implementation of Modification SR-31 in 1990. This modification installed a computer system with software modules to control Radiologically Controlled Area (RCA) access, dose entry, respirator issuance, and reporting functions. This has resulted in increased efficiency and accuracy in tracking personnel exposure and providing personnel access to RCAs.

- A system engineer was assigned to resolve reliability problems experienced during the first refueling outage with fuel handling equipment. The system engineer coordinated the efforts of the design engineering division and the NSSS supplier, to design and implement modifications to the fuel handling equipment. The performance of the fuel handling equipment during the current refueling outage has been much improved, with minimal equipment reliability delays.

- A number of emergent issues have been identified, coordinated, and resolved by NSED during the SALP 10 period and more recently in the second refueling outage (RF-2).

- Containment penetrations were identified which did not meet 10CFR50 Appendix J leak testing requirements. NSED provided thorough reviews, analyses, and corrective actions to resolve this issue.

- It was discovered that one feedwater line was not adequately supported; NSED performed walkdowns, reviews, analyses, and design modifications and directed efforts to ensure neither the reactor vessel nor the feedwater line was damaged and to provide adequate support of the line in the future.

- During the performance of in-service inspections of component supports, minor discrepancies were noted with Residual Heat Removal (RHR) shutdown cooling suction line (RH-09) supports. While resolving these discrepancies, personnel identified additional discrepancies which placed the RH-09 subsystem outside its design. Engineering has performed a thorough investigation, review, and evaluation of the discrepancies, and has coordinated the subsystem walkdowns and repairs.

- A process computer upgrade study was completed in 1989 that resulted in the identification of computer upgrades that will greatly improve system performance and reliability. During 1990, obsolete drum memory units and terminals were replaced with new, state-of-the-art equipment. Software upgrades were installed to improve the NSSS computer performance. A modification was installed to provide computer annunciation of the turbine bypass valve position as the low power set point is approached.

The engineering projects division of NSED will manage the site-wide 1991 Initiative to reduce personnel exposures caused by high source term. This effort is expected to involve a multi-departmental task team to identify possible improvements and evaluate them from a cost and relative benefit standpoint. The project manager for this effort will maintain responsibility for managing the identification, evaluation, and implementation of improvements over the next two to three years.

Reliability Engineering

The IP reliability engineering program includes activities in three functional areas: predictive maintenance (including thermography, oil analysis, and vibration monitoring), plant thermal performance monitoring, and reliability-centered maintenance activities. Examples of improvements resulting from these reliability engineering activities are discussed below.

Predictive Maintenance

- Thermographic measurements were used to identify a potential main power transformer bushing problem and "hot spots" in the iso-phase bus ducts. NSED has also been utilizing this technology at other IP power plants to identify potential problems.

- The oil analysis program has identified specific wear points of some components, permitting changes to equipment or to maintenance

practices to eliminate potential equipment problems associated with wear. For example, possible piston pin or cylinder wear and possible piston pin bushing wear in the Division III "B" diesel generator starting air compressor were identified. Based on the oil analysis results and other maintenance data, modifications are being evaluated to replace the existing compressor with a more reliable model.

- Vibration monitoring has prevented some unnecessary corrective maintenance activities when bearing noises were shown to be characteristic of normal bearing performance. Vibration monitoring equipment has temporarily been installed on the Reactor Recirculation system pumps to monitor pump and seal performance and predict and prevent seal failure.

Thermal Performance Monitoring

- As a result of thermal performance monitoring efforts, maintenance of plant heat cycle equipment has been better prioritized and modifications have been identified. For example, the turbine controls have been modified during the current refueling outage to allow partial arc steam admission, rather than full arc steam admission, to improve overall plant efficiency and electrical capacity.

- A pilot potential loss program was implemented to detect leaking valves that have the potential to reduce plant capacity and reliability. The eight valves that were chosen for the pilot program are those that have the greatest probability of leaking or will have the greatest impact on plant performance if they were to leak. Remote temperature sensors were installed on these valves, in support of the As-Low-As-Reasonably-Achievable program, since the valves are in high radiation areas. During the functional testing of the remote temperature sensors during RF-2, a previously undetected leak was identified on the minimum flow valve on the discharge side of a feedwater pump. Rework of the minimum flow valve is expected to be completed during RF-2.

- A heat exchanger monitoring program was developed and implemented to ensure the operability and performance of safety-related heat exchangers. Baseline performance values and conditions were documented for each heat exchanger as the result of internal inspections and the analysis of test data. Acceptance criteria for the action levels have been developed for periodic monitoring.

Reliability Centered Maintenance

In the area of reliability-centered maintenance, the reliability engineering group has performed a pilot project to review the components in ten systems associated with feedwater delivery. As a result of this review:

- Eighty-five new preventive maintenance activities were identified; the frequency of 34 preventive maintenance activities was reduced; the frequency of 38 preventive maintenance activities was

increased; and the preventive maintenance scope of six preventive maintenance procedures was changed.

- The review of components and their trip functions resulted in the identification and initiation of several preventive maintenance changes and design changes. These changes will decrease unnecessary component trips and increase reliability.

Equipment Qualification (EQ) Program (pp. 3, 19, 20, 21)

IP has taken extensive action to improve its EQ program. This has included:

- Hiring additional personnel with EQ experience;
- Verifying the adequacy of the EQ baseline;
- Providing additional training to personnel involved in the EQ program in NSED, Quality Assurance, Maintenance, and other organizations.

Particular focus has been placed on upgrading the EQ staff. Four individuals with EQ experience were hired to improve IP's ability to effectively implement the EQ program. Each of the four individuals had a minimum of five years EQ experience prior to being employed at CPS. The EQ group has also been trained on the EQ modules developed by consultants hired by IP and on revised EQ procedures which provide additional details on how technical reviews of EQ packages should be performed.

As committed to the NRC in IP letter U-601477, dated June 30, 1989, a walkdown of select EQ equipment was completed during the second refueling outage. Ten percent of the EQ equipment, excluding snubbers, totaling 350 pieces of equipment, were walked down and inspected. The results of the walkdown reinforced IP's high level of confidence that the as-installed configuration accurately reflects the qualified configuration of the equipment at CPS.

In September 1990, while performing a walkdown of the Control Room Heating, Ventilating and Air Conditioning System (VC) chillers a seismic qualification engineer identified that the as-found configuration of the VC chillers and the vendor design document did not match the seismic qualification document. IP then performed an extensive review of the VC system documentation and equipment to ensure that equipment in the VC was seismically qualified. A similar review was completed on the Essential Switchgear Heat Removal (VX) system (The VC and VX systems were supplied by the same vendor). Although discrepancies were noted between EQ packages, the qualified configuration and the as-installed configuration, none were found which affected component operability.

The improvements to the CPS EQ program were noted by the NRC in Inspection Report 90-007. Although certain EQ issues have arisen during the SALP 10 period, these have not generally been due to problems with IP's current EQ program.

Resolution of Recurring Equipment Problems (pp. 3, 21)

The three specific items cited in the SALP 9 report as exemplifying apparent delays in resolving programmatic issues have been corrected. With respect to the generic concern regarding identification and resolution of programmatic problems, these have been addressed through the CPS 1990 Initiative to improve the effectiveness of the Corrective Action Program which is discussed in Section VII below.

Examples of actions taken during the SALP 10 period to resolve recurring equipment problems, in addition to those taken to reduce the corrective maintenance backlog, include:

- Due to a past condenser to turbine boot failure, NSED performed an extensive walkdown and evaluation of the condenser during RF-2. The evaluation led to extensive improvements and modifications to the boot involving strengthened protective cover plates, increased boot ply rating, custom sizing, and addition of sealant to the boot mating surfaces. These design changes are expected to provide a decreased need for maintenance during outages, decreased condenser inleakage and increased power generation

- To eliminate problems experienced with electro-magnetic interference, "noise," on the source range monitors (SRMs) during the first refueling outage, a modification was initiated to replace the SRM electronics with an improved design. The new electronics reduce noise problems. A by-product of this modification is a more accurate indication of reactor period, which is used to determine reactor criticality.

- Two DG jacket water cooling heat exchanger tube failures occurred within approximately a two week period. Engineering identified the cause of the DG heat exchanger tube failures as microbiologically induced corrosion (MIC). Four DG heat exchangers were retubed and the SX system was chemically treated to mitigate the MIC damage. All raw water heat exchangers were inspected to determine the extent of other MIC damage.

- As noted in Section V, security equipment upgrades have been implemented in the SALP 10 period. An intrusion alarm zone, characterized by operational limitations which required extensive compensatory actions by personnel, was corrected by a system upgrade. The clarity and dependability of the closed circuit television system was enhanced by replacing the exterior routed cables for seven cameras with fiber optic cable. The effectiveness of x-ray machines was upgraded by replacing several older machines with newer models.

- The Moisture Separator Reheaters (MSRs) could not be put into service in the automatic mode due to problems associated with high and low steam load valves and their corresponding control circuits. The control loop was restored by replacing worn valve internals and by using a different range spring for the high load valve positioners. Following completion of these repairs, the MSRs operated successfully in the automatic mode.

- Steam Jet Air Ejector (SJAE) 'B' could not be put into serv[illegible] a long period of time. Troubleshooting identified a modificat[illegible] to the system was required. Since implementation of that modification, SJAE 'B' has functioned properly.

- The safety-related VX chillers often tripped on low suction pressure and thus put the plant in a Limiting Condition for Operation. Oil pressure control repairs and periodic performance runs have resolved the low suction pressure trip problems.

Correction of Procedure Adequacy Issues (p. 20)

Actions taken and [illegible]sults achieved through IP's efforts to ensure that procedure inadequacies are corrected in a timely manner are discussed in Section I above.

Emergency Operating Procedures (pp. 21-22)

The effort to reformat and rewrite the CPS Emergency Operating Procedures is complete. See the discussion of this issue in Section I above.

Operator Training Examinations (p. 20)

The Nuclear Training Department has taken significant action to improve the quality of operator licensing examinations. Prior to the January 22-23, 1990 requalification examinations, the examination question and scenario bank was reworked, [illegible]he staffing of Operations training instructors was improved by adding individuals with operating experience, and representatives from the CPS Operations Department and the Nuclear Training Department reviewed the replacement examination before it was administered to license candidates. As a result of these efforts, the examination quality improved. As noted by the NRC in Examination Report OL-90-02,

> "The test materials submitted for [the January 1990] requalification examination were markedly improved compared to those supplied for the September 1989. Minimal or no modifications were needed for the questions submitted. Your Training Staff's achievement is commended."

Another set of requalification examinations was administered in June 1990. The NRC noted in Examination Report OL-90-03 that the quality of the examination material was generally good, and that in cases where deficiencies were noted, the CPS training department was very receptive to correcting them.

Operator Training Results

During the SALP 10 period, the following license and operator requalification examinations were conducted:

| Exam Type | Date | Took Exam | Passed | Passed |
|---|---|---|---|---|
| SRO | 1/90 | 5 | 4 | 80% |
| Requalification Reexamination | 1/90 | 4 | 4 | 100% |
| Requalification | 6/90 | 16 | 12 | 75% |

The January 1990 requalification examination involved four operators who had failed a September 1989 requalification examination. In the June 1990 requalification examination, two of three crews passed. Each examination resulted in a determination that the CPS training program is satisfactory.

Another requalification examination was administered in January 1991 to those individuals who did not pass the June 1990 requalification examination. The report describing the results of that examination has not yet been issued by the NRC. Plans for additional operator training are described in the Operator Staffing and Overtime subsection of section I above.

VII. Safety Assessment/Quality Verification

Performance Indicators

Several indicators provide evidence that overall, CPS safety and quality efforts have improved in their effectiveness and resulted in better performance from a safety perspective. These include:

| | SALP 9 (14 months) | SALP 10 (15 months) |
|---|---|---|
| Number of LERs | 45 | 27 |
| Personnel Error LERs | 26 | 12 |
| Number of Violations Issued | 28 | 15 |
| ESF Actuations | 12 | 7 |

Although there were two escalated enforcement actions by the NRC during the SALP 10 period, the violations that led to these enforcement actions were identified in the first half of the period (two of these violations were due to errors which occurred several years ago).

Self Assessment

In its efforts to improve CPS performance, IP has aggressively employed self-assessment to identify problem areas and means for achieving better performance. In late December 1989 and early January 1990, CPS managers conducted a detailed self-assessment of CPS performance. Based upon the results of this assessment, five areas were targeted for improvement through the CPS 1990 Initiatives. These areas were: (1) improve Corrective Action Program effectiveness; (2) reduce the corrective maintenance backlog; (3) improve at all levels adherence to the policy of procedure compliance; (4) instill an increased sense of responsibility and accomplishment among CPS personnel; and (5) expand the capabilities of the Nuclear Program Assessment Group. The issues and causes relative to each area were identified and specific corrective actions were developed and assigned to appropriate personnel for implementation pursuant to an overall schedule. Also, indicators were selected to provide a measurement of the effectiveness of the corrective actions associated with each initiative. These indicators were formally reviewed monthly during meetings attended by the Vice President and all department managers. The status of progress was also provided to senior IP management monthly in the Monthly Performance Monitoring Management Report. Both the 1990 Initiatives indicators and the CPS Monthly Performance Management Monitoring Report were provided to the NRC. As shown by the indicators, the 1990 Initiatives were generally effective.

As a follow-up to the 1990 Initiatives, and to prepare for activities during 1991, CPS department managers conducted another in-depth self-assessment in late December 1990 and in January 1991. In preparation for this self-assessment, a detailed review of the regulatory record during the SALP 10 period was performed, as well as a separate review of the effectiveness of actions taken by IP in response to areas for improvement noted in the SALP 9 report. In addition, managers and key supervisors prepared their own assessments of performance in their areas of responsibility, along with suggestions for improvement. These assessments were than presented to the CPS Vice President and the other managers during the assessment process.

Using all of this information, the CPS Vice President and managers have preliminarily selected four areas to be addressed by Initiatives in 1991. These are:

1. Working Together - Continue efforts to effectively use every person's skills and abilities, to grow in professionalism and sense of accountability, and to foster a cooperative work environment with the aim of correct, efficient, and improving performance. This initiative will include actions to continue enhancements of the Corrective Action and the procedure compliance programs, and to reduce the CM MWR backlog, which are being carried over from the CPS 1990 Initiatives.

2. Spare Parts - Improve availability of spare parts to support corrective and preventive maintenance.

3. Develop In-House Design Capability - Develop the in-house capability to perform design engineering tasks to improve ownership of design products, enhance quality and suitability of design packages for installation and testing, and increase productivity, as well as reduce reliance on contractors, and reduce costs.

4. Reduce Site Man-Rem Due to High Source Term - Prepare short and long term plans to reduce personnel exposure to the source term.

IP is still in the process of finalizing the details of the 1991 Initiatives; once completed, they will be presented to the NRC.

Standing Assessment Groups at CPS

A number of organizations monitor and evaluate plant and personnel performance, provide assessments and findings, and follow-up on corrective action recommendations.

The Nuclear Review and Audit Group (NRAG) (the CPS offsite review committee) the Facility Review Group (FRG) (the onsite review committee), and the Independent Safety Engineering Group (ISEG) (the independent technical review group) together with the Nuclear Projects and Assessment Department and Quality Assurance perform in-depth evaluations of plant performance, review CPS policies and procedures for safety and technical adequacy, evaluate nuclear plant operating experiences and industry events for applicability to CPS, and recommend actions to management to improve CPS safety and performance. In Inspection Report 90-021, the NRC noted that the CPS self-assessment program (particularly these standing self-assessment groups) was excellent and was producing results. Noteworthy efforts of these groups include the review of the Vogtle event to assure that precautions are being taken to preclude a similar event at CPS and a review of the handling of light loads (less than 1000 pounds) over irradiated fuel which resulted in procedure changes being made to minimize the possibility of offsite dose consequences.

Corrective Action Program

As discussed previously, one of the 1990 Initiatives was to improve the effectiveness of the Corrective Action Program. Actions taken to improve the effectiveness of identification of root causes and the specification of corrective actions to address those root causes include: revisions to Procedure 1016.01, "CPS Condition Reports," to achieve more rapid and accurate response to problems and verification that corrective action is complete; revision of the Quality Assurance corrective action trend analysis program to incorporate INPO good practices; implementation of the Human Performance Evaluation System to perform in-depth evaluations of the causes of adverse events at CPS; establishment of a Corrective Action Board to review the root cause and corrective actions for selected significant issues and presentation of "Root Cause Correction and Verification" training to departmental managers, directors, and supervisors, and other personnel involved in developing, implementing, and verifying corrective actions.

The Corrective Action Program has also been revised to require that managers review the corrective action plans for significant conditions within their areas of responsibility prior to implementation.

In December 1989, a Corrective Action Task Force (CATF) was established to review the effectiveness of the actions taken for conditions adverse to quality closed between January 1989 and February 21, 1990. In cases where the task force determined that effective corrective actions had not been implemented, either the original corrective action document was reopened or a new corrective action document was initiated. The CATF issued a listing of lessons learned during its review. Based upon these lessons learned, several actions were taken to enhance the Corrective Action Program. These actions included: strengthening "ownership" of Condition Report (CR) resolutions by assigning the CR to one department, which is then responsible for ensuring corrective action is being taken by other departments involved; strengthening CR action tracking and reporting through the use of Centralized Commitment Tracking forms (CCTs); and verifying the completion of corrective actions for quality-related CRs prior to closure and the effectiveness of corrective actions for selected closed CRs.

In addition to these efforts, IP management determined that creation of an interdepartmental team, the Corrective Action Enhancement Team, would be the most effective approach to further strengthen the Corrective Action Program. To accomplish this, management developed a three-phase plan. Phase one of the plan, which has been implemented, included establishment of a Project Manager within the CPS Nuclear Projects and Assessment Group to coordinate the plan implementation and establishment of a Corrective Action Review Board (CARB). The CARB is currently comprised of management representatives from key departments including Plant Staff and Engineering. The CARB reviews CRs as they are initiated and reviews the root cause and corrective action plans for significant CRs. The CARB review of new CRs includes a review of the adequacy of problem definition, immediate actions, assignment and due dates.

Phase two of the plan will be implemented in 1991 following the completion of the second refueling outage (RF-2). Phase two will include: (1) revising the CR format to allow for more thorough problem descriptions and uniformity of problem resolution definition; (2) reviewing the CR corrective action verification process to see how it can be made more effective; (3) reviewing

the "ownership" of CRs to assure the CR system provides a mechanism so the right individuals understand their responsibilities and are held accountable for effective response to CRs; (4) evaluating incorporation of audit findings and Requests for Corrective Action into the CR system; (5) evaluating the need for additional root cause analysis methods; and (6) evaluating the concept of designating specific personnel to perform root cause analyses.

Phase three of the plan involves enhancing the corrective action tracking system at CPS and will be implemented in 1992.

In August 1990, a Corrective Action Program Audit was conducted by contract personnel. This audit was to determine the effectiveness of the Corrective Action Program. Overall results indicate that acceptable progress has been made.

Another indication of improvement in CPS Corrective Action Program is the decrease in recurring problems in recent months. The December 1990 monthly trend analysis report, which includes an evaluation of recurring problems, shows an improving trend in the most frequent recurring problem category, procedural problems. Improving the quality of procedures and compliance with procedures was a focus of the CPS 1990 Initiatives. Procedure problems (including both procedure adequacy and compliance) during the last half of 1990 declined 37% from levels experienced during the first half of the year, despite a large number of additional personnel on site to perform work during RF-2.

In April 1990, an independent verification team was established to review Condition Reports prior to closure. This review includes a check for correspondence between root cause and corrective action, and verification of the completion of corrective actions. Additionally, for select closed CRs, a follow-up review is performed to verify the effectiveness of the completed corrective actions.

Continued improvement in corrective action effectiveness is also indicated by the results of QA reviews and monthly surveillances of CRs and in the areas of root cause identification, corrective action effectiveness, and proper implementation of corrective actions as indicated by the decrease in the number of recurring events.

In sum, IP believes that the quality of the specification and implementation of corrective actions has improved. NRC Inspection Report 90-01, dated April 6, 1990, noted improvements in the quality of recent CPS Condition Reports:

> "Most of the reports contained immediate corrective actions to correct the condition or prevent recurrence event before a detailed evaluation was completed. In addition, more of the Condition Reports were evaluated for generic implications and the scope of the corrective actions was expanded where appropriate. Departments demonstrated an improved sense of "ownership" of the Condition Reports and were more informed about the status of corrective actions. In addition, personnel were observed to be doing a more complete job of verifying that corrective actions were complete before closing the Condition Reports."

Quality Assurance (QA) Personnel Expertise

IP has added personnel and taken other actions to improve QA expertise in the areas of equipment qualification (EQ) and refueling.

An individual with more than five years EQ experience was hired and assigned to the QA Department. During the year he spent in QA, he provided training to other personnel in QA on EQ and thereby increased overall the expertise of QA in EQ. This individual has recently transferred to the EQ group in NSED. The open position in QA will be filled by another EQ specialist hired from outside the organization or through a promotion within QA.

Actions taken to improve the expertise and involvement of QA in refueling activities included: retaining the services of a refueling technical specialist for oversight of the refueling contractor, and sending QA personnel involved in oversight of refueling activities to refueling training seminars. QA used personnel experienced in the first refueling for performing surveillance in the second refueling thereby building upon and developing experience.

As noted in section VIII below, the second refueling outage has progressed relatively well, with no recurrence of events similar to those experienced in the first refueling outage. Although technical issues have arisen, these have generally not been caused by the quality or coordination of the performance of outage work itself. No findings were issued at the completion of the QA audit of the refueling. Overall audit results indicate that refueling activities addressed during the audit were effectively implemented.

Timeliness of Submittals

During the SALP 10 period, CPS LERs, responses to Notices of Violation, and required responses to inspection reports were submitted within the prescribed time periods. Responses to Generic Letters, Inspection and Enforcement (I&E) Bulletins, and I&E Information Notices have also been submitted on time.

VIII. Outages

IP has taken significant steps in the SALP 10 period to improve CPS performance during plant outages. While continuing to identify and apply lessons learned during outage work, the implementation of activities during the spring 1990 planned outage (PO-3) and the second CPS refueling outage (RF-2) was substantially improved over previous major outages. Significant plant material condition upgrades (described in Section I above) were completed during each of these outages. Particular steps taken by IP are summarized below.

Improvement of Outage Management and Coordination (pp. 25-26)

To provide closer and more IP management involvement in the oversight of outage tasks, IP established the Outage Execution Organization (OEO) to coordinate and control overall management of Clinton outages. The Outage Manager, head of the OEO, reports directly to the Manager-CPS and is responsible for ensuring adequate horizontal and vertical communication among CPS organizations and with outage contractors on outage-related matters. Among specific steps taken by the OEO to enhance outage work control is the creation and maintenance of significantly more detailed outage schedules than were previously utilized. To assure the effective functioning of the OEO, IP created an Outage Control Center (OCC). The OCC serves as a physical focal point for all outage activities, providing a work area for the OEO, a site for daily outage status meetings, and a communication center for identifying and resolving outage issues as they arise.

At the field work level of outage activities, IP has enhanced the effectiveness of the outage organization by restating the responsibilities of the Work Activities group. During outages, the group's duties focus on controlling and coordinating field work activities, including tagout coordination, coordination of post-maintenance testing and resolution of issues potentially affecting the outage schedule. The group refers issues it is unable to resolve to the OCC.

Other actions, specifically addressed toward improving IP's management and control of outage contractors are described separately below.

Training (p. 27)

IP has taken action to improve the familiarity of management and outage personnel with procedures and to ensure adequate planning for complex or first-time evolutions during refueling (pp. 26-27). For instance, IP staff has improved its ability to manage contractor personnel as a result of training provided to selected IP supervisors and directors by an industry specialist on contractor management techniques. Furthermore, IP has revised and supplemented the procedures governing the management of outage contractor personnel, increasing the clarity and usefulness of the information contained in them.

In preparation for RF-2, IP conducted extensive pre-outage training for all appropriate personnel. This training included general training sessions to provide overall familiarity with outage plans as well as more specific training for individuals assigned to particular phases of outage work. The general training included information on the outage schedule, major tasks to be completed during the outage, the functions of the OEO, proper methods for interface among IP organizations and with contractors, and appropriate means for elevating and resolving issues arising during the outage. The training was reinforced by the preparation and issuance of an Outage Handbook. The handbook provides information on the duties and functions of the OEO, lists the goals, objectives and key milestones of the outage, and provides other general information on the CPS plant, procedures, and practices.

IP has also trained operations and maintenance personnel on the performance of complex and first-time outage evolutions. The outage planning process helped IP identify complex evolutions and develop detailed work plans and mockups to familiarize personnel involved in the work. Practicing outage tasks on the mockups supplemented walk throughs, seminars and other orientation of personnel on first-time evolutions and complex tasks. In addition, observation of personnel performance and problems encountered during mock-up practice allowed IP to establish more accurate schedules and anticipate and resolve potential work problems before they arose in the field. IP also used the CPS simulator to prepare operations personnel for non-routine evolutions and first-time evolutions. The value of the simulator and cumulative training efforts was demonstrated by the smooth return to power following the planned maintenance outages in November and December 1989.

IP has also provided extensive pre-outage training to contractor personnel, including a review of experience from previous outages, a description of organizational interfaces and allocation of outage tasks. IP has had outage contractors participate in walk throughs and seminars to familiarize themselves with outage tasks and evolutions and acquaint themselves with the plant prior to the commencement of actual outage work. In addition to these training and familiarization efforts, IP has focused attention on its relationship with the refueling contractor and entered into a long term contract. Both IP and the refueling contractor have benefited from the increased interaction and resulting knowledge of each other's organization and operating procedures. To gain familiarity with plant specifics, the refueling contractor site representative arrived at Clinton several months prior to the second refueling outage and was able to play an active role in planning and scheduling that outage. No fuel handling errors or mistakes occurred during RF-2.

Communication (p. 25)

As noted above, IP has centralized management and communication related to outage activities through the formation of the OEO and OCC. The Outage Manager, head of the OEO, is responsible for maintaining adequate vertical and horizontal communication on outage related matters and for the overall management of outages. The OCC enhances communication and management of outages by serving as a central contact area and a clearinghouse for identifying and resolving outage issues. Daily meetings are conducted in the OCC, updating personnel on the status of outage activities, issues requiring action, and key events or milestones. To further enhance the communication of outage status and other issues to involved personnel, a Daily Outage Report is

published which lists events completed, issues to be resolved and upcoming activities. IP's combined efforts in this area helped to achieve a high level of awareness by outage personnel of outage status and related activities, and increased management's capability to coordinate and control outage activities.

Actions to Improve Management of Contractors (pp. 25-27)

During the SALP 10 period, IP has thoroughly reviewed and revised its management of contractors during CPS outages, starting with the careful selection of management personnel who were to be involved in the refueling outage. IP personnel have been selected to supervise contractors only if they demonstrated a conservative approach to safety and procedure compliance, and possessed the ability to ensure contractor adherence to such an approach. Prior to RF-2, the selected IP outage contractor management personnel were also provided with training on contractor management techniques by an industry expert. To provide further guidance to its managers, IP has continued to revise, supplement, and provide training on procedures relating to contractor supervision.

Management of contractors was also improved by establishing management oversight teams for the maintenance and refueling contractors. These oversight teams facilitate teamwork between IP and contractor personnel by serving as an IP/contractor interface. In addition, the management oversight teams reinforce contractor understanding of IP's standards of performance, objectives and expectations. Topics addressed in IP training sessions involving contractor employees included the need for a conservative approach, the need for procedural compliance, and the appropriate means for elevating and resolving issues. IP also maintains regular supervision over contractor activities through its weekly review of contractor performance by the Outage Maintenance Support group. This regular review and monitoring of outage contractors is reinforced at the weekly discussions of the Production and Performance Meeting which is attended by the IP and contractor management personnel responsible for the performance of outage work. IP believes that regular management review of contractor performance, greater contractor familiarity with CPS specifics, and contractor responsibilities due to IP sponsored training have improved IP's control of contractor personnel.

Outage Performance

While recognizing that further improvement can be achieved, IP believes that the PO-3 and RF-2 outages generally demonstrate that CPS outage performance has been substantially better during the SALP 10 period than in earlier planned outages. Outage personnel effectively applied lessons learned from previous outages; for instance, developing and utilizing the OEO and OCC to manage outage activities. IP first fully implemented the OEO and OCC during PO-3, markedly improving communication quality and dissemination of outage-related information to all personnel during the planned outages. Due to the enhanced communications, IP achieved better coordination and management of outage activities. Lessons learned from PO-3 were applied during planning and training for RF-2. This resulted, for example, in the preparation of more detailed schedules and more extensive use of mock-ups.

IP's improved control over outage activities was characterized by the lack of fuel handling problems during RF-2 and increased procedure compliance by IP and contractor outage personnel. As discussed in Section III above, IP also demonstrated the increased effectiveness of the ALARA program, stemming directly from the strong efforts of Operations and Radiation Protection personnel. In addition, management involvement in all phases of outages led to performance improvements by minimizing the effect of major emergent issues on other outage activities. For example, emergent work requests were channeled to the OCC where the work requests could be distributed and their progress tracked by computer. The smooth functioning of the OCC process and continuous strategy and scheduling meetings resolved the Shutdown Service Water System (SX) testing and solenoid operated valve (SOV) qualification work requests before they could interfere with other outage activities. Although technical issues arose which have impacted the RF-2 outage schedule, these have not in general been due to problems with the planning or execution of outage work.

Outage LERs

IP has significantly reduced the number of LERs during RF-2 as compared to prior planned outages. Approximately one LER occurred per week during the RF-1 period with 77% being attributed to personnel error (p.25). Outage personnel began to improve their performance during PO-3; though the rate of LERs remained at one per week, personnel errors caused only 43% of the events. Dramatic improvement has occurred in RF-2, during which five LERs have been generated to date (one for every three weeks of outage time).

Refueling Activities

During RF-2, IP has focused on the correct and thorough completion of necessary outage activities. IP concentrated on several activities, particularly environmental qualification of splices, work performed on the Residual Heat Removal System (RHR) heat exchanger and work related to containment penetrations. Examples of IP's conservative approach are the postponement of entry into the drywell area until adequate shielding was installed, replacement of the fuel handling grapple upon identifying design problems, the postponement of refueling activities until management was confident that work would be performed correctly, and completion of an ISEG review of the Vogtle Event and implementation of precautions to preclude a similar event from occurring during CPS outage activities.