

December 1983  
Construction Project Evaluation

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Clinton Power  
Station  
Illinois Power  
Company



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EVALUATION  
of  
CLINTON NUCLEAR PLANT  
Construction Project

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Illinois Power Company

December 1983

## SUMMARY

### INTRODUCTION

The Institute of Nuclear Power Operations (INPO) conducted an evaluation of the Illinois Power Company's Clinton Power Station construction project and the Sargent & Lundy design offices during the weeks of November 28 and December 5, 1983. The project is located near Clinton, Illinois, approximately 25 miles northeast of Decatur, Illinois. The project has one 950-Mwe General Electric boiling water reactor. The station is scheduled to load fuel in January 1986.

### PURPOSE AND SCOPE

INPO conducted an evaluation at the site and the principal design office, Sargent and Lundy in Chicago, Illinois, to evaluate the control of design and construction processes and to identify areas needing improvement. Information was assembled from discussions, interviews, observations, and reviews of documentation.

The INPO evaluation team examined organization and administration, design control, construction control, project support, training, quality, and test control. The team observed actual work performance and test performance. A portion of the evaluation focused on a detailed vertical path examination through the design and construction of the project, combined with a horizontal examination at several points. The team at the design office reviewed the design control, and the team at the project site examined, in some detail, the installed equipment.

INPO's goal is to assist member utilities in achieving the highest standards of excellence in nuclear plant construction. The findings in each area are based on best practices, rather than minimum acceptable standards or requirements. Accordingly, areas identified for improvements are not necessarily indicative of unsatisfactory performance.

### DETERMINATION

Within the scope of this evaluation, the team found, except as indicated by the findings, that the systems in place to control the quality of design and construction are being implemented effectively.

The following beneficial practices and accomplishments were noted:

Supervisors and managers in the architect-engineer design office are competent and knowledgeable.

The site radiography program is excellent. Both the technique and quality of radiographs was evaluated to be quite good.

There is an effective program in effect for acquiring, maintaining, utilizing, and disposing of construction equipment.

A diverse program has been implemented to receive quality concern feedback from site personnel. The program includes written suggestions as well as a telephone hotline.

Improvements are needed in a number of areas. The following are considered to be among the most important:

- Training of workers needs improvement. Some workers and craft supervisors exhibit a lack of knowledge in specific work tasks.

- Improvement is needed in construction planning and scheduling. The coordination and effectiveness of detailed planning for recovery from identified problems needs strengthening.

- The work control (traveler) system is hindering effective control of work.

- The Quality Assurance (QA) Program could be improved by decreasing the reliance on review of paperwork, improving the performance of QA personnel in identifying substantive problems, and upgrading some procedures.

- Some managers have not always taken effective actions to ensure that project quality and schedule goals are met.

In each of the areas evaluated, INPO has established Performance Objectives and supporting criteria. Findings are listed under the Performance Objectives to which they pertain. Particularly noteworthy conditions that contribute to meeting Performance Objectives are identified as Good Practices. Other findings describe conditions that detract from meeting the Performance Objectives. It would not be productive to list as Good Practices those things that are commonly done properly in the industry since this would be of no benefit to Illinois Power Company or to INPO's other member utilities. As a result, most of the findings highlight conditions that need improvement.

The findings are intended to assist the utility in ongoing efforts to improve all aspects of its nuclear programs. In addressing these findings, the utility should, in addition to correcting or improving specific conditions, pursue underlying causes and issues. As part of each construction project evaluation, the evaluation team follows up on responses to previous findings, in this case those from the Self-Initiated Evaluation Report. All actions taken in response to that report have been completed. In areas where additional improvements were needed or where response actions have not been timely, a new finding that stands on its own merit has been written. Thus, this report stands alone, and reference to the previous self-initiated evaluation report should not be necessary. For this evaluation, there are four new findings relating to previous findings.

The findings listed herein were presented to Illinois Power Company management at an exit meeting on January 6, 1984. Subsequently, findings and responses were discussed with Illinois Power representatives on several occasions. Responses are considered satisfactory.

To follow the timely completion of the improvements included in the responses, INPO requests a written status by October 31, 1984. Additionally, a final update will be requested six weeks prior to the next evaluation of the Clinton construction project.

The evaluation staff appreciates the cooperation received from all levels of Illinois Power Company and Sargent & Lundy.



## ILLINOIS POWER COMPANY

### Response Summary

Illinois Power Company (IP) appreciates the professional and objective construction project evaluation of the Clinton Power Station (CPS). In keeping with INPO's goals, IP is dedicated to achieving the highest standards of excellence in nuclear plant construction.

With these findings, INPO has confirmed areas needing improvement, many of which had been identified by IP and for which improvement programs were being developed and implemented. As indicated in the responses to the findings, IP will coordinate the actions of IP, Sargent and Lundy, and Baldwin Associates to address the findings provided by the construction project evaluation team.

Positive actions have been initiated for each finding and a projected timetable for completion identified.

Subsequent to the evaluation, an analysis of the findings has been conducted and concluded that more attention will be focused on the following areas:

- o improving craft training
- o enhancing planning and scheduling
- o review of the traveler system and initiating necessary improvements
- o continuing to upgrade quality programs
- o increasing emphasis to ensure project quality and schedule goals are met

IP is encouraged by INPO's recognition of beneficial practices and accomplishments at CPS. This positive feedback should provide added motivation for all personnel.

## ORGANIZATION AND ADMINISTRATION

### MANAGEMENT INVOLVEMENT AND COMMITMENT TO QUALITY

**PERFORMANCE OBJECTIVE:** Senior and middle managers in the owner's corporate office, designer's office, and at the construction site who are assigned functional responsibility for matters relating to the nuclear project should exhibit, through personal interest, awareness, and knowledge, a direct involvement in controlling the quality of the project.

**Finding (OA.2-1)** Managers at the project have not always taken effective actions to ensure that project quality and schedule goals are met. Particular attention is needed to strengthen the following:

- a. training of workers
- b. increasing the effectiveness of the traveler system both to control and document work
- c. improving the coordination and effectiveness of detailed planning for recovery from identified problems
- d. requiring the quality programs to provide early identification of problems in work performance

**Response**

A plan will be implemented by July 1984 emphasizing IP nuclear program management actions to ensure that quality and schedule goals are met. Management involvement to impart a sense of urgency will be a central element of this plan. The following efforts are being strengthened:

- a. The training program has been revised to provide scheduled training for specific work tasks in support of the project schedules. A management evaluation will be conducted in April 1984.
- b. An independent review of the entire traveler program is being conducted. Short-term improvements in specific areas are being made (see CC.4-1). A follow-up program will be established by June 1984 based on review recommendations.
- c. Several initiatives are being taken to ensure that plans and schedules support the critical path (see PS.2-1, 2-2, and 2-3). Included in these initiatives is the establishment of a new position reporting to the Vice President (nuclear). A specific responsibility of this position is the coordination of detailed planning for recovery from identified problems. A management review of planning and scheduling will be conducted in April 1984.

- d. Quality programs are being improved to provide early identification of problems in work performance. A program for increased surveillance of work is being developed. Utility quality assurance oversight of construction quality programs has been increased. Plans, schedules, and procedures to support the improvement programs will be developed by June 1984, and initial evaluation of improvements will be made by August 1984.
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## DESIGN CONTROL

### DESIGN INPUTS

**PERFORMANCE OBJECTIVE:** Inputs to the design process should be defined and controlled to provide a consistent basis for making design decisions in order to achieve a complete, high quality design.

**Finding (DC.1-1)**

Some design inputs in the mechanical and electrical areas need to be reviewed to ensure that all design requirements are met. Problems were identified in the following areas:

- a. Review of one of a number of systems requiring transient analysis showed that the reactor core isolation cooling turbine discharge rupture disc blowdown transient was not considered.
- b. Review of one of a number of systems having a cold water injection mode showed that cold water injection was not contained in the input data sheets.
- c. Maximum control circuit cable length criteria have not been established.
- d. HVAC support design criteria conflict with the FSAR.

**Response**

Actions are being taken to ensure that all design requirements are met. These actions include the following:

- a. An analysis has been performed for the reactor core isolation cooling turbine discharge rupture disc blowdown transient. Pipe stresses and nozzle reactions meet code and vendor's allowables, respectively. A review has been conducted, and it has been determined that all other required transient analyses have been performed.
- b. The analytical drawing has been revised and approved to include the appropriate terminal movements for the cold mode of one subsystem of the RCIC System. A review has identified that two systems may have this concern. These systems have been reviewed, and amended stress reports have been prepared.
- c. The adequacy of current procedures will be evaluated as a part of the review of the applicability of Significant Event Report 80-83, scheduled for completion by April 1984. Analyses on some control circuits between remote buildings and the power block have indicated excessive voltage drop may exist. Based on these results, all cable lengths of control circuits between remote buildings and the power block will be reviewed for excessive voltage drop. This review and necessary corrective actions will be completed by April 1984.

- d. HVAC duct supports were designed in accordance with Part 1 of the AISC Code, and the stress allowables of the code are included in the CPS design criteria. These criteria have been added to the FSAR.
  - e. Reviews are being conducted on related areas to establish in the broader sense that all design criteria are met. This will be an ongoing effort.
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## DESIGN PROCESS

**PERFORMANCE OBJECTIVE:** The design process should be planned, scheduled, and controlled to ensure incorporation of design requirements.

✓ **Finding (DC.3-1)**

Piping corrosion allowances are inconsistently treated in the two systems reviewed. Some RHR and shutdown service water piping does not include allowances for the complete range of pipe used. The shutdown service water system design specification does not include allowances for the complete range of pipe used.

**Response**

Piping design specifications for the two systems reviewed have been amended to treat piping corrosion allowances consistently for the complete range of piping used. Review of the calculations for the systems was made to ensure sufficient allowances were made. No recalculations or design changes have been required.

The remainder of the piping design specifications have been reviewed and amended as necessary.

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✓ **Finding (DC.3-2)**

The component qualification group at the site was not implementing a design guide developed to qualify non-standard HVAC supports. As a result, non-standard HVAC supports are being qualified with improper interpretation of the AISC Code. This creates a potential for over-stressing members.

**Response**

A calculation has been made to establish the maximum allowable unsupported length of hanger members in accordance with the AISC Code. Based on the results of this calculation, a review of all non-standard HVAC duct hangers is in progress to ensure conformance with the calculation results. This review will be completed in May 1984.

All non-standard HVAC hanger calculations now include this criterion, where appropriate.



A follow-up monitoring program will be placed in effect to evaluate the effectiveness of actions taken. This will start in April 1984.

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Finding (DC.3-3)

A sample review showed that fatigue analysis for piping is based partly on incorrect or uncontrolled input data. For the feedwater system piping, some of the time-history temperature data for the fatigue analysis are in error. These and other changes to the input data for this analysis are not reviewed and approved.

Response

The one incorrect, uncontrolled input used in one fatigue analysis has been re-evaluated using correct and controlled input data with results consistent with earlier calculations. The remaining 33 fatigue analyses for ASME Class 1 piping are being reviewed to confirm that no other uncontrolled or incorrect input data were used. This review will be completed by April 1984.

The architect-engineer considers the method of modeling time-history temperature for feedwater system piping to be valid. In this regard, modeling of time-history temperature data was accomplished by making conservative simplifications to vendor input data. IP will have an independent technical evaluation completed to confirm the adequacy of the architect-engineer's methodology. This evaluation will be completed by April 1984.

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Finding (DC.3-4)

Electrical and mechanical design inputs, such as design criteria, design basis, regulatory commitments, and standards are not always incorporated correctly into design documents. The following are examples of some deficiencies found:

- a. Some circuit breakers are improperly sized for overload conditions.
- b. Shutdown service water system minimum flow requirements are not ensured.
- c. Functional requirements of a regulatory guide are not met.

## Response

Design reviews are being conducted by the architect-engineer and the utility to ensure the required design inputs are correctly reflected in design documents. These reviews are in progress and will be a continuing effort. In response to the examples above, the following actions are being taken:

- a. A review is being conducted of the criteria and sizes of circuit breakers feeding transformers and heaters. This review will be completed by April 1984. A plan identifying actions required as a result of this review will be completed in May 1984.
  - b. Calculations have been performed to ensure that (1) no equipment served by the shutdown service water system will be starved for flow and (2) pump run out will not occur. Corrective actions resulting from these calculations will be completed by June 1984. A review has been made of other water systems for the same problem, and it has been determined that this is the only such instance.
  - c. To meet the functional requirements of the regulatory guide, a formal calculation will be completed by May 1984 to verify the adequacy of the design of motor-operated valves. A preliminary review of typical vendor data to scope this issue did not identify any problems. A plan to implement any necessary corrective actions resulting from this calculation will be developed by June 1984.
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CONSTRUCTION CONTROL**MATERIAL CONTROL**

**PERFORMANCE OBJECTIVE:** Material and equipment should be inspected, controlled, and maintained to ensure the final as-built condition meets design and operational requirements.

**Finding (CC.3-1)**

The following Good Practice was noted: The constructor makes a weld pad from each lot/heat of incoming weld rod and performs a material analysis. Additionally, a check of electrodes with a magnet is made at the weld rod issue station. These steps are taken to ensure that accepted weld rod conforms to code requirements and that vendor weld material test reports are representative of material received by the constructor.

Also, whenever possible, very large amounts of a single heat/lot of weld rod are purchased. This is done to reduce material control problems in the field.

**Finding (CC.3-2)**

Preventive maintenance (PM) needs to be improved for equipment in the warehouses and in the plant. Some Storage and Maintenance Instructions and Records (SMIRs) do not include maintenance activities recommended by the vendors. Some equipment shows evidence of corrosion, contamination, and damage. The PM program does not include all equipment for which maintenance is recommended by the vendors.

**Response**

A utility supervisory position has been established and filled to oversee PM and warehouse operations and to provide overall supervision and guidance over contractor PM efforts. Other specific actions are being taken:

- a. Actions are in progress to ensure that required plant equipment is included in the storage and maintenance program. Completion is scheduled for April 1984.
- b. Vendor manuals have been reviewed to ensure completeness and accuracy to the SMIR cards for the equipment.
- c. An initial site survey will be conducted to correct material condition deficiencies of equipment and ensure adequate protection. This survey will be complete in April 1984 with necessary corrective actions completed in May 1984.

- d. A person specifically responsible for ongoing monitoring and review of protection of equipment has been assigned.
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### CONTROL OF CONSTRUCTION PROCESSES

**PERFORMANCE OBJECTIVE:** The construction organization should monitor and control all construction processes to ensure that the project is completed to design requirements and that a high level of quality is achieved.

**Finding (CC.4-1)** Improvement is needed in the traveler system to both simplify it and to establish feedback mechanisms to ensure that the system is providing the intended results. Problems were noted in the following areas:

- a. Traveler preparation is complicated by the use of multiple forms, attachments, and references.
- b. Travelers are broad in scope and thus remain in work for long periods of time.
- c. Work instructions are sometimes incorrect or incomplete.
- d. Field work cannot proceed without a traveler.
- e. Numerous and often redundant inspection points are required.
- f. Closeout and review is affected adversely by nonessential content.

**Response**

An independent review of the entire traveler program by an experienced nuclear construction group is being conducted to identify required changes. This review will be completed by May 1984.

A Procedure Review Committee has been formed to review and identify procedure problems and implement necessary improvements. Short-term improvements have been identified and simplifications are being implemented in construction work requests (CWR) and non-conformance reports (NCR). Implementation of newly revised CWR and NCR procedures is in progress.

A follow-up program to develop and implement required corrective actions will be established by June 1984 based on the independent review recommendations.

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Finding (CC.4-2)

Improvement is needed in providing work direction to craftsmen. On numerous occasions, work was observed being performed in a manner that conflicted with procedures. Installation mistakes were observed in several areas of work centered around the following components: concrete expansion anchors, pipe supports, mechanical snubbers, and cable tray. Specific corrective action is needed to improve the following aspects:

- a. craftsmen's knowledge of installation procedures
- b. convenient access by craftsmen to installation procedures, checklists, and information charts
- c. supervisor knowledge, guidance, and instruction to the craftsmen and follow-up of ongoing work activities

Response

The functional areas requiring training have been identified and reviewed for completeness and the determination of applicability by craft. The training schedule has been established with a full cycle of training scheduled for completion by July 1984. Practical field work exercises have been identified and factored into the training.

Each craft discipline department has reviewed documentation needs and initiated actions to ensure the most current information including procedures, checklists, charts, and tables are readily accessible to appropriate crafts. A survey will be conducted by May 1984 to assess adequacy of this action.

In addition to the supervisory training programs in effect, the departmental mandatory reading lists for craft supervisors have been revised to ensure that current information has been read by the appropriate personnel. A training program on effective leadership and communications will be developed by June 1984 to be attended by all craft supervisory personnel.

A monitoring program will be established by July 1984 to monitor effectiveness on a continuing basis.

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### CONSTRUCTION CORRECTIVE ACTIONS

**PERFORMANCE OBJECTIVE:** The construction organization should evaluate rework, audits, inspections, and surveillances; process replies and follow-up; and take corrective action to prevent recurrence of similar problems.

**Finding (CC.6-1)**

Weld reject rate, based on radiography results, is not being utilized to improve welder performance. A system is not in effect to identify predominant welding defects or to measure and correct poor welder performance.

**Response**

Only about 10 welds requiring radiography are made per week. The radiography results are evaluated by the quality program to monitor welding performance. To ensure this information is available to craft personnel, the results of the monitoring efforts are being provided to construction supervisors.

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PROJECT SUPPORT

## INDUSTRIAL SAFETY

**PERFORMANCE OBJECTIVE:** The construction site industrial safety program should achieve a high degree of personnel safety.

## Finding (PS.1-1)

**The control and storage of hazardous and flammable materials need improvement.** Instances of improper and uncontrolled storage of hazardous materials were noted. Improperly stored material includes gasoline, acetone, and oakite. Some materials are neither under centralized control nor stored in designated storage areas. The site procedures and guides are not sufficiently specific.

## Response

Actions have been initiated to provide a coordinated program between the utility and contractor to ensure better control and storage of hazardous and flammable materials. Construction actions that are being taken include the following:

- a. Site surveys to identify material and corrective actions resulting from the survey have been completed.
- b. Review and revision of site procedures to provide more specific guidance is in progress. Promulgation of the revised procedures is scheduled for April 1984.
- c. Reinstruction of supervisory personnel on procedures is scheduled for completion in April 1984.
- d. Increased employee education addressing hazardous and flammable material storage and use through safety newsletters, memos, posters, and signs has been implemented as an ongoing effort.

The utility's General Employee Training Program, which commences in August 1984, will include this area. Additional measures being taken by the plant manager include the following:

- a. A site survey has been completed. Corrective actions resulting from the survey will be completed by April 1984.
  - b. Utility procedures will be reviewed and revised to ensure coordination between construction and plant staff. Completion is scheduled for April 1984.
  - d. Oversight of the control and storage of hazardous and flammable materials will commence in June 1984.
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## PROJECT PLANNING

**PERFORMANCE OBJECTIVE:** Project plans should ensure completion of the project to the highest industry standards by identifying, interrelating, sequencing, and implementing the tasks of the project organizations.

**Finding (PS.2-1)**      The utility over-inspection program and the construction contractor field verification programs need to be integrated into the project schedule. The responsibility for management support aspects of the programs is not clearly defined. Aspects of the two programs that are not being scheduled properly are as follows:

- a.    manpower to provide services for the inspections
- b.    manpower to assist in the inspections
- c.    rework resulting from the inspections

**Response**              Over-inspection and verification programs have been factored into construction Level-II and Level-III schedules for remaining work. Total integration for all reinspection will be incorporated into project schedules by April 1984. This scope will include man-loading and tracking. Status of actions is as follows:

- a.    Schedules have been issued for remaining work that incorporate over-inspection and field verification requirements with provisions for rework.
- b.    A schedule to support reinspections of previously completed work will be completed by April 1984.
- c.    A policy statement will be promulgated by April 1984 to provide rework planning factors to be applied to schedules.
- d.    The utility Quality Assurance Department will conduct a review of over-inspection and field verification efforts in the schedules to ensure consistency with the critical path. This review will be completed by April 1984.

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**Finding (PS.2-2)**      The preparation of action plans for recovery from identified problems needs improvement. Problem resolution is not integrated into a coordinated plan of action. Resolution is neither approached nor pursued aggressively. Examples of areas needing attention included:

- a.    electrical raceway hangers
- b.    concrete anchor bolt installation
- c.    structural iron rework

**Response**

Actions are being taken to ensure that problems are scoped, planned, and scheduled immediately upon identification of the problem and are factored into integrated schedules to support the critical path. Actions include the following:

- a. A position has been established and filled reporting to the Vice President (nuclear) to oversee planning and scheduling efforts. Duties include tracking of new problems to ensure the technical adequacy of the resolution and that the resolution is integrated into a coordinated plan of action supporting the critical path to integrated flush in December 1984.
- b. The reinspection of electrical raceway hangers has been scoped, planned, scheduled, and was implemented on February 1, 1984.
- c. Corrective actions on concrete anchor bolt installations were commenced on November 29, 1983. A hold was placed on the installation, pending a determination and resolution of the underlying cause of these problems. Work was resumed on January 6, 1984, after procedure changes were made to clarify technical requirements and add interim quality control (QC) inspections, and training was completed for installation personnel. An assessment of the adequacy of these actions has been completed.
- d. Additional monitoring by QC personnel in addition to the procedural inspection requirements has been imposed to assess the adequacy of the actions. A reassessment of the need for the continued additional monitoring will be made in July 1984.
- e. As structural iron rework is identified, it is immediately factored in Level-III schedules. A monitoring program has been established to assess progress made and impact on the critical path.

**Finding (PS.2-3)**

**Improvement is needed in construction planning and scheduling.** In some instances, construction planning and scheduling do not adequately control and support work. The following schedule deficiencies were noted:

- a. The Level-I schedule is being reworked, but is being impacted by the ongoing work on the Level-III schedule.

- b. The present Level-III schedule does not provide the basis for effective work planning by craft superintendents.
- c. A plan or schedule has not been provided to establish a detailed sequence of actions needed to resume bulk cable pulling activities.
- d. Although restart from an HVAC stopwork is imminent, detailed recovery plans and schedules have not been established.
- e. The planning and scheduling for the structural steel rework does not account for the large scope of work, the probable rework, or forecast manpower requirements for the various work groups involved.

**Response**

Actions to ensure that planning and scheduling control and support work have been in progress over the past several months and are being enhanced to ensure that schedules support the critical path leading to flush in December 1984. The following actions are being taken:

- a. A new utility department has been established and the director position filled to coordinate and oversee the integration of plans and schedules to support the critical path.
- b. Integrated Level-I and Level-II schedules were issued, and milestones frozen on February 6, 1984. The schedules will be progressed and analyzed monthly to provide management tools to identify and take timely corrective actions.
- c. Construction superintendents will continue the present practice of two-week look-ahead schedules based on the Level-III schedules. Area coordinators are responsible for monitoring the work performance versus the work planned by the Level-III schedules.
- d. A new senior superintendent position has been established and filled to direct the area coordinators and to increase the visibility and use of schedules by craft superintendents. Craft superintendents will continue to be accountable for progress.
- e. The cable tray reinspection plan was implemented on February 1, 1984, and bulk cable pulling activities have been resumed.
- f. HVAC Level-II work schedules were issued on January 16, 1984, and the initial Level-III schedules have been issued. The remaining Level-III schedules will be issued by April 1984.



- g. A policy statement will be promulgated by April 1984 that will address structural steel and other rework and their integration into schedules. Structural steel rework is identified in the Level-III schedules, addressing known scope and related sequence of work. Future impacts to Level-III schedules will be assessed as new scope is identified.
  - h. Traceability between Level-III and Level-II schedules is identifiable to ensure work progress in support of the critical path.
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### DOCUMENTATION MANAGEMENT

**PERFORMANCE OBJECTIVE:** The management of project documentation should support the effective control and coordination of project activities and provide a strong foundation for the documentation/information requirements of the plant's operational phase.

**Finding (PS.6-1)**

**The control of project documents needs improvement.** Craftsmen and engineers are not always working to the latest available revision of the applicable drawing or procedure. The current status of some drawings and procedures in use could not be established in the document control center.

**Response**

A document control center management action plan has been implemented. This plan addresses the following:

- a. Establishing control of project documents by reconciling the computer data base with the document control center record cards. Completion is scheduled by May 1984.
- b. Ensuring that the latest revisions of documents are provided by correcting all document control center, office, and field files and maintaining status of current documents in the document control center. Completion is scheduled for May 1984.
- c. Correcting historical files. Completion is scheduled for September 1984.

Upon completion of the above actions, review and updates of documents will continue formally through a permanent document control center group.

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TRAINING

TRAINING MANAGEMENT SUPPORT

**PERFORMANCE OBJECTIVE:** Management should ensure that an effective program exists for indoctrination, training, and qualification of personnel involved in the project.

**Finding (TN.1-1)**

Support for construction training needs to be increased. The training unit does not always receive accurate manpower hiring forecasts. As a result, unscheduled training needs have contributed to problems in several areas.

- a. classroom scheduling
- b. instructor availability
- c. insufficient lead time for instructor preparation

Periodic management evaluation of components of the training program has not been performed as required by the site training plan.

**Response**

Manpower hiring forecasts have been provided to the Training Department, and quarterly updates will be provided.

Requests for unscheduled training will be approved by discipline department heads with copies of the requests provided to the utility and contractor project managers. This policy has been instituted.

A management evaluation of the training program will be conducted in April 1984.

Corrective action will be established by May 1984.

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## GENERAL TRAINING AND QUALIFICATION

**PERFORMANCE OBJECTIVE:** The training program should ensure that all employees receive indoctrination and training required to perform effectively and that employees are qualified as appropriate to their assigned responsibilities.

**Finding (TN.3-1)**      The following Good Practice was noted: The extensive use of audiovisual aids has enhanced training. Most courses offered by the project training unit incorporate either audio synchronized slide/tape units, overhead transparencies, or films. In addition, a site graphic art group produces custom transparencies that help portray lesson content.

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**Finding (TN.3-2)**      Improvement is needed in the job-specific training of craftsmen and supervisors. Many errors in work activities are causing rework and schedule slippage. A demonstration of learned skills needs to be included in the training process.

**Response**              A revised plan and schedule for training based on functional areas and craft involvement have been developed (CC.4-2). A demonstration of learned skills is included. A full cycle of training is scheduled for completion by July 1984.

A training coordinator for each construction discipline has been designated. This assignment will assist in ensuring that the training being provided supports construction schedules. A specific responsibility of the coordinator is to publish a training forecast on a monthly basis to support construction. The forecast will be provided at least one month prior to required training. Additional responsibilities of the training coordinator include review of lesson plans to ensure craft needs are reflected, obtaining feedback from craft supervisors on the effectiveness of training, and providing feedback to the training manager. This program will be implemented by July 1984.

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## QUALITY

### PROGRAM IMPLEMENTATION

**PERFORMANCE OBJECTIVE:** Quality assurance and quality control functions should be performed in a manner to support and control the quality of the project activities.

#### Finding (QP.2-1)

Some construction and quality records do not confirm that welding and quality controls have been performed in accordance with procedural requirements. A review of travelers and other documents related to a short section of the RHR system identified numerous deficiencies. The following are some examples:

- a. Post-weld heat treatment required by procedures was not shown to have been performed.
- b. Some control signatures on travelers are not consistent with the sequence of operations.
- c. Nonconforming material was accepted on the basis of invalid test results.

#### Response

Subsequent to the evaluation, detailed review has identified documentation to demonstrate the weld was performed and inspected in accordance with procedures.

It has been verified that the material in question conforms to requirements; documentation in the files was incomplete. Actions are being taken to address the problems that resulted in the finding. These actions include the following:

- a. An independent review of the entire traveler program by an external experienced nuclear construction group will be completed in May 1984.
- b. A follow-up program to revise and train to the traveler system changes will be established by June 1984, based on results of the review.
- c. A plan has been developed and has been implemented to ensure the accuracy of documents in both the document control center and the field, with completion for documents relating to work still in progress in May 1984, and for historical records in October 1984. Any hardware deficiencies identified will be prioritized for correction and tracked until resolved.
- d. An additional welding engineer has been hired. The duties of this engineer include review of welding performance and documentation on a continuing basis.

## Finding (QP.2-2)

Constructor audits and surveillances are not identifying some important problems affecting the quality of the project. Examples of audit and surveillance deficiencies are as follows:

- a. Undersized electrical support welds have been found on site. Welding at the cable tray and electrical support vendor has not been witnessed during surveillance activities, as required by procedure.
- b. Observations during the evaluation showed numerous instances of work performance not in accordance with procedures. Internal audit records show a concentration on records review and do not identify a similar level of worker performance problems.

## Response

A review of this issue has been completed and actions to correct the underlying causes are being initiated. These actions include the following:

- a. Surveillance schedules will be issued to provide a change in emphasis to surveillance of hardware from that of documentation, including increased surveillance of inspection activities. Personnel qualified to perform inspection of hardware will be added to surveillance teams. Personnel changes have been made to add welding expertise on external surveillances. The schedules will be developed and implemented and personnel changes will be made by May 1984.
- b. A training program for audit personnel will be developed, to be conducted by an external team. The training will be completed by June 1984.
- c. Additional qualified personnel will be recruited by June 1984.
- d. A monitoring program to assess, on a continuing basis, the effectiveness of actions taken will be established by the utility QA program. This program will be implemented by May 1984.

## Finding (QP.2-3)

The utility's quality assurance program needs to be more effective. Quality assurance surveillances and audits have not always identified substantive problems affecting the quality of the project. Inspector performance needs to be improved, and the program requirements need to be upgraded.



**Response**

A number of improvements in the utility's QA program have been realized in the past 12 months resulting from organizational changes, increased manpower, and educational programs. To ensure continued improvement, the following actions are being taken:

- a. The current short-term improvement plan has been modified to address items cited by INPO and other known areas requiring improvement. Evaluation of improvements in organizational and manpower effectiveness such as increased experience level, increased manpower, schedule compliance, and staff reassignment are scheduled for completion by April 1984. Improvements in verification planning, such as increased utility emphasis on hardware versus record review, are scheduled for completion by August 1984. Completion of all actions of the short-term plan is scheduled for December 1984.
- b. A longer term improvement plan has been developed to ensure continued improvements in the effectiveness of the quality program. The long-term supervision, operation, and maintenance activities associated with an operating nuclear power plant will be included in this plan.

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### QUALITY INSPECTIONS

**PERFORMANCE OBJECTIVE:** Quality inspections should be performed in a manner that ensures optimum monitoring of project activities.

**Finding (QP.3-1)**

Improvement is needed in the performance of some quality inspections. The required tools and gauges are not always used or used correctly when inspecting materials, welds, and assemblies. Some inspectors are not enforcing hold points and material control procedures.

**Response**

The quality training program now includes instruction concerning the necessity for use of required tools and gauges, including their correct use.

Enforcement of hold points and material control procedures are being emphasized with all inspection personnel in weekly staff meetings.

Actions taken to shift focus of surveillance activities to surveillance of hardware and work-related activities have, as an important goal, the improvement in the performance of quality inspections through surveillance of these activities. An evaluation of improvements will be made in August 1984.

Monitoring of performance, on a frequent basis, of quality inspections will be a continuing effort by the surveillance program and quality supervisory personnel.

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Finding (QP.3-2)	<b>Inspection procedures require improvement to meet project commitments.</b> Some procedures lack in-process inspection requirements and do not incorporate all design changes. Other procedures do not address all work activities or provide direction on inspection methods and acceptance criteria.
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Response	A program was initiated in December 1983 to assemble all construction engineering and quality requirements into a common procedure to govern specific categories of activity. The program includes design change reviews for incorporation into the procedures as necessary. The new procedures are scheduled for implementation by June 1984.
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Finding (QP.3-3)	<b>The methods for ensuring proper grouting need improvement.</b> Travelers for the safety-related pipe supports do not contain quality control requirements for grouting.
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Response	<p>The procedure has been revised to ensure that all safety-related grouting is performed in a controlled manner and is inspected by QC personnel. Actions in progress include the following:</p> <ul style="list-style-type: none"><li>a. A review of procedures for non-safety-related grouting to ensure adequacy of the procedures has been conducted.</li><li>b. Personnel involved with grouting operations will be trained regarding procedure requirements, with completion in April 1984. Implementation of any revised procedures will follow completion of training.</li></ul>
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- c. A program for review of prior grouting efforts will be developed by April 1984. This review will include both hardware and documentation. This review will be completed by July 1984.
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**Finding (QP.3-4)**

Some piping supports that are analyzed as part of the ASME pipe stress boundary have not been inspected as required. These supports are located outside of, but adjacent to, the ASME III pipe boundaries.

**Response**

Review of this finding indicated that inspection on some piping supports that are analyzed as part of the ASME pipe stress boundary was being conducted by personnel other than QC personnel. This occurrence has been identified on the supports located adjacent to the boundary. The following action has been initiated:

- a. A list of piping supports requiring inspection is being prepared by the architect-engineer in connection with the stress analyzed boundary. The list, along with inspection requirements for the supports, will be generated by April 1984.
  - b. A program to complete the required inspections by Quality Control personnel will be developed by June 1984.
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**CORRECTIVE ACTIONS**

**PERFORMANCE OBJECTIVE:** Conditions requiring corrections or improvements should be resolved in an effective and timely manner.

**Finding (QP.5-1)**

The following Good Practice was noted: The A/E's Quality Assurance (QA) Trend Review Committee reviews all nonconformances initiated by internal QA, Nuclear Regulatory Commission, and external audits. Since its implementation in 1980, the program has been successful in several areas:

- a. Eight generic problem areas were identified in the latest trend analysis. The description of each problem is comprehensive.

- b. Corrective recommendations are included. They are complete and thoroughly address the root causes of the problems.
  - c. The result of the trend analysis is supplied each quarter to all project directors, project managers, and other upper management personnel for use on each applicable project.
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## TEST CONTROL

### TEST PROGRAM

**PERFORMANCE OBJECTIVE:** The test program should include construction and pre-operational testing necessary to confirm the plant's design and capability to operate as intended.

**Finding (TC.1-1)** Improvement is needed in the management of testing activities. Three key areas were identified for improvement:

- a. Individuals are not always held accountable for missed commitments.
- b. Alternate solutions are not always developed to reduce delays.
- c. Shift test engineers are not sufficiently aware or involved in test activities.

**Response**

The current Test Event Plan meetings have been changed to address commitments and workarounds more definitively. Attendance at these meetings has been ~~reduced~~ and revised to ensure accountable department representatives are present and can be heard.

A plan-of-the-day meeting now is being conducted by Start-up management to improve information exchange and to actively pursue workarounds. This meeting includes active participation of shift test coordinators.

Senior site management is conducting a more detailed weekly review of testing activities to encourage more involvement of all site activities in support of the test schedule. This will encourage the shift test coordinator to become more deeply involved.

In April 1984 an independent observer will assess the effectiveness of these actions.

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**Finding (TC.1-2)** Some equipment turned over to Start-up is not being maintained effectively. Preventive maintenance is not performed on some equipment. Correction of some significant maintenance deficiencies on operating equipment is not pursued aggressively.

**Response**

A review of the CPS preventive maintenance (PM) program has been initiated to address completeness and adequacy of maintenance. PM procedures and the implementation of these procedures are being reviewed to ensure that preventive maintenance actions are



performed and that equipment is maintained effectively on all items that could adversely affect plant operations. Plant staff maintenance has the responsibility for execution of the PM program and this review. The review will be completed by May 1984.

Procedures detailing Start-up's interface with the CPS PM program will be prepared to ensure that special PM requirements unique to the construction and start-up environment (protection of equipment and housekeeping) are considered during execution of the PM program. The procedures will be implemented by April 1984.

Equipment requiring PM will be randomly surveyed during system walk-downs by plant personnel to determine effectiveness of the PM program. This survey will be completed by May 1984.

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### TEST PLANNING

**PERFORMANCE OBJECTIVE:** Testing activities should be controlled effectively through the use of detailed plans and schedules.

**Finding (TC.3-1)**

The preparation and planning for testing need improvement. Insufficient attention to detail prior to test evolutions contributes to late problem identification and results in unnecessary delays. Action needs to be taken to improve the following:

- a. recognition of required inspections
- b. availability of information and test equipment at the test site
- ✓ c. thoroughness with which test requirements are accomplished
- d. attention to safety considerations

**Response**

Preparation and planning for testing will be improved. Specific actions include the following:

- a. Additional dedicated support manpower has been provided to assist the start-up engineer in such efforts as gathering information, system walk-down, and providing system hardware and software configuration prior to test release.
- b. A requirement will be implemented by April 1984 for the system engineer to conduct briefings prior to testing and/or system turnover and to review overall test plans and schedules with the cognizant disciplines.

- c. An independent review of selected testing activities will be conducted by June 1984 to evaluate the effectiveness of actions taken.
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## TESTING PERFORMANCE AND DOCUMENTATION

**PERFORMANCE OBJECTIVE:** Performance and documentation of the test program should ensure that test objectives are achieved and that test results are reviewed and documented properly.

**Finding (TC.4-1)** Some testing procedures provide insufficient guidance to ensure test completeness and consistency. Guidelines and standards need to be established for the use of generic procedures.

**Response** A revision to the instruction on the use of generic test procedures will be issued by May 1984 to provide better standards for the use of these test procedures.

A review of the scope and adequacy of generic test procedures necessary to implement the test program will be conducted. Revisions or issuance of new procedures that result from this review will be completed by May 1984. This review will also identify any retest requirements. Retesting, if required, will be completed by December 1984.

A follow-up program will be established by July 1984 to verify the effectiveness of actions taken.

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**Finding (TC.4-2)** The performance of testing needs improvement to ensure that the test objectives are achieved. The following areas for improvement were identified:

- a. Deficiencies in training and guidance on the practical methods of testing sometimes result in incomplete and incorrect testing activities.
- b. Communications sometimes are not utilized effectively to coordinate test performance.
- c. Supervisors are not involved sufficiently in testing activities to ensure that the desired results are achieved.

**Response**

A review has been completed indicating that insufficient involvement of supervision in field testing activities has been due in large measure to the administrative requirements placed on the supervisors that detract from their primary responsibilities. To supplement the programs in place to improve the performance of testing, the following additional actions are being taken:

- a. Additional staff support has been approved and will be provided to allow supervisors to turn more attention to primary duties. This action will be completed by April 1984.
  - b. A category for involvement in field testing activities will be added to the supervisor's yearly progress evaluation. This action will be completed by April 1984.
  - c. An independent review will be conducted in June 1984 to evaluate progress.
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## CONSTRUCTION EXPERIENCE

### OPERATING AND CONSTRUCTION EXPERIENCE

**PERFORMANCE OBJECTIVES:** Industrywide and in-house design and construction experience, as well as operating experience, should be evaluated for applicability, and appropriate actions implemented in a timely manner. Information on in-house design and construction experience should be shared with the industry.

**Finding (CE.1-1)**      The program for timely notification to other utilities of significant project events with generic implications needs improvement. NETWORK entries are not made to inform others of significant events and problems.

**Response**              To promote the full use of NUCLEAR NETWORK, a Technical Department engineer has been assigned with the collateral duty of reviewing site operating and construction experiences for inclusion in NUCLEAR NETWORK. The technical supervisor will review and approve the engineer's proposed items prior to inclusion in NUCLEAR NETWORK.

The technical supervisor will assess the effectiveness of this action and initiate further actions if necessary. This assessment will be conducted in April 1984.

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**Finding (CE.1-2)**      The evaluation of applicable nuclear steam supply system vendor Service Information Letters (SILs) needs to be improved. SILs are not being reviewed promptly or consistently. The group assigned responsibility for SIL review has not always received them.

**Response**              In concert with the nuclear steam supply vendor, a verification of the SIL inventory has been conducted.

CPS is to receive future SILs.

Past SILs that are applicable to CPS will be prioritized based on anticipated corrective actions required. The prioritization will be completed by June 1984.

A schedule will be developed by June 1984 to address more complete investigation and corrective actions to ensure completion of all actions prior to fuel load without impact on the project schedule.

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SOER STATUS

The status of Significant Operating Experience Report (SOER) recommendations is as follows:

<u>Number of Recommendations</u>	<u>Action Taken</u>
84	Satisfactory
41	Not applicable
36 (3 red tab)	Pending - awaiting decision
36 (3 red tab)	Pending - awaiting implementation
104	Previously evaluated as satisfactory or not applicable

The following recommendations are pending - awaiting decision:

<u>SOER Number</u>	<u>Recommendation Number</u>
81-8	1
81-9	1
81-1	3, 4, 6, 10, 11, 12, 13, 15
82-13	1
82-15	5, 6
83-3	7
83-4	1, 5, 9, 13
83-5	6
83-8	7, 8, 9, 10, 11, 12
83-9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

The following recommendations are pending - awaiting implementation:

<u>SOER Number</u>	<u>Recommendation Number</u>
80-6	4, 8
81-13	2
82-1	4
82-6	3
82-8	3
82-9	2
82-10	1, 6
82-13	1, 2, 3, 4, 8, 10, 12, 13
82-14	3
83-1	2, 4, 6, 14
83-3	1, 10
83-4	4, 6, 12
83-5	3, 7, 8
83-6	1
83-7	1, 2, 5, 6, 7



An update on the status of each recommendation listed in the "pending - awaiting decision" or "pending - awaiting implementation" categories shown above is requested in the six-month follow-on response to this report. In addition, the status of each red-tab SOER recommendation received subsequent to this evaluation should be included in the six-month follow-on response. A tabular summary, similar to that shown in this report, is requested.



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