PERRY NUCLEAR POWER PLANT
COURSE OF ACTION
PROGRESS REPORT

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PROGRESS REPORT
PERRY NUCLEAR POWER PLANT COURSE OF ACTION

Executive Summary

The Perry Course of Action (PCA) documents plant and management performance deficiencies identified during internal and external audits and the corrective actions taken or planned to bring about necessary improvements. The purpose of this Progress Report is to detail the actions that have been completed pursuant to our PCA objectives. Periodic updates will be made to this report to reflect progress toward completion of PCA action items.

The Perry Course of Action was issued in the fourth quarter of 1993. The completion of RFO4 marks a major milestone in the achievement of objectives outlined in the PCA. Notable improvements have been realized in management and management philosophy, plant material condition, and resolution of specific programmatic issues.

Management and Management Philosophy

Several management assignment changes have been implemented to effect a positive shift in the organizational environment and direction of plant activities. To complement these management changes, several experienced nuclear management professionals have been retained as "shadows" for selected management staff to provide guidance and assistance in the day-to-day management of the site. The actions of the new team have reinforced organizational objectives and management expectations to identify and resolve issues affecting safe and reliable operation of the plant. One measure of effectiveness of this shift in management and philosophy is the aggressiveness of plant staff in the identification and resolution of plant material and process deficiencies identified through corrective action documentation.

Additional management changes and reassignments are planned and currently being implemented.

Plant Material Condition

Since embarking on the Course of Action, two outages have been completed to improve plant material condition. The first outage was a previously unscheduled Maintenance Outage conducted in the fall of 1993. The second was an extensive refueling and modification outage (RFO4) which began in February, 1994. Work performed in these outages resulted in significant improvements to the material condition of the plant. Major work included:

- Repacking of 460 valves and the repair of several steam and water leaks resulting in improved valve performance and reliability, and a reduction of plant contamination.

- Completion of 3316 work orders, 1388 preventive maintenance tasks, and 743 surveillance activities.

- Reduction of plant temporary modifications from 56 identified at the beginning of RFO4 to 28 at outage conclusion.

- Reactor Pressure Vessel water level modification improving the signal reliability.

- Modification and testing of 94 motor-operated valves in accordance with the program developed in response to NRC Generic Letter 89-10.

- Replacement of 21 Control Rod Drive mechanisms based on trending of performance data.

- Replacement of both Reactor Recirculation Pump Shafts to incorporate a new shaft design and improved seals.

- Main Turbine rotor modifications on all three Low Pressure Rotors as a result of torsional testing.

- Reduction of snubber population by 75, considerably reducing the extent of periodic snubber testing and maintenance activities.

- Inspection and repair (where necessary) of 4300 feet of fiberglass piping in the Service Water and Circulating Water systems due to fiberglass pipe cracking and failures in these systems. Approximately 300 linear feet of fiberglass pipe was replaced with steel piping.

- Design modifications completed for inboard and outboard MSIV lines A, B, C, and D. The modification details requirements to improve the seating characteristics of the valve. Additionally, a back-up air system to the MSIV accumulators was installed on the outboard MSIVs to assure proper valve leakage characteristics in the event of a loss of normal accumulator pressure.

- Rebuild/repair of all three main feedwater pumps.

Programmatic Improvements

Significant improvements in performance have been realized in specific programmatic and technical areas. The Motor-Operated Valve Program was developed and implemented under the requirements of NRC Generic Letter 89-10 to establish methodology and guidelines used to perform, review, and document the motor-operated valve program at Perry. 94 valves were tested during RFO4 to support the requirements of the program. Of the 94 valves tested, the preliminary flow test results for four butterfly MOVs in the Fuel Pool Cooling and Clean-up System (G41) indicated the required torque to close these four MOVs during a design basis event may be greater than the capacity of each MOV. Immediate corrective actions were implemented from these test results. All other valves tested under the requirements of the program were determined to be within their design function requirements. A post-RFO4 NRC Evaluation of the MOV Program and its implementation confirmed the program effectiveness.

A System Operation and Test Review (SOTR) Program has been developed and implemented to provide a direct, deliberate confirmation of system and equipment readiness and functionality. The program assures that plant processes and controls do not affect system and equipment design performance requirements. Three systems have been selected for testing and evaluation: High Pressure Core Spray System (HPCS), Off-Gas System, and the Turbine Control and Steam Bypass System. Functional testing on the HPCS system has been performed and evaluated. Some problems were identified during the testing of the system and appropriate correction action documentation and actions were initiated; however, test results verified that the HPCS system met all achievement criteria required for Technical Specifications. Testing of the Off-Gas system and the Turbine Control and Steam Bypass systems is complete. Evaluation of test results is ongoing.

The Corrective Action Program has been enhanced to address concerns with problem identification, determination of root cause and extent-of-condition, and implementation of corrective actions. Major improvements include the formation of a multi-discipline Condition Report Review Board and an event significance categorization process. The improvements made in the Corrective Action Program, coupled with management emphasis on critical self-assessment have encouraged active participation of the workforce in the identification and resolution of plant problems and deficiencies.

Actions completed on specific technical issues and processes have also had a direct impact on the overall improvement of plant operations. The Integrated Leak Rate Test/Local Leak Rate Test (ILRT/LLRT) Program was upgraded to incorporate improvements in the ILRT/LLRT process and procedures and the use of enhanced instrumentation. The ILRT was successfully performed during RFO4 using the enhanced procedures and instrumentation. Additional actions that have been completed on technical issues and processes include Off-Gas system modifications, Control Room configuration upgrade, Flow-Accelerated Corrosion Program revision, improvements in material handling, and Hydrogen Analyzer system modification.

SECTION 1

INTRODUCTION

The Perry Course of Action (PCA) documents plant and management performance deficiencies identified during internal and external audits and the corrective actions taken or planned to bring about necessary improvements. The purpose of this Progress Report is to detail the actions that have been completed to date pursuant to our PCA objectives. This initial report reflects progress through the completion of RFO4. This report is formatted to correlate directly with each section of the PCA. Periodic updates will be made to this report to reflect progress toward completion of PCA action items.

SECTION 2

MANAGEMENT ISSUES AND ACTIONS

The success of the Perry Course of Action is heavily dependent upon management performance. Detailed in this section are management actions completed to effect prompt, lasting improvement in the performance and reliability of the Perry Plant.

Leadership by Example

A fundamental approach to achieving substantive improvement in management performance is the concept of "leadership by example." This approach has been implemented through the following actions:

1. Management Changes

To begin addressing those deficiencies rooted in management performance, Centerior Energy has made several management assignment changes. These changes were made to ensure that select, experienced management and supervisory personnel transferred from Centerior Energy's Davis-Besse Power Station, as well as those from the Perry Plant are responsible for directing plant activities, identifying areas in which deficiencies exist, and implementing a corrective action program.

Robert A. Stratman continued as Perry Plant Vice-President, with the following direct-reports: David P. Igyarto, continued as General Manager, Operations; Neal L. Bonner, formerly Design Engineering Manager at Davis-Besse, promoted to Director, Nuclear Engineering; Robert W. Schrauder, formerly Licensing Manager at Davis-Besse, promoted to Director, Nuclear Services; and Kenneth R. Pech, former Perry Outage Planning Manager, promoted to Director, Nuclear Assurance. In addition, Mark Bezilla, former Davis-Besse Operations Superintendent, continued as Perry Operations Manager; Vincent J. Sodd, former Davis-Besse Maintenance Services Superintendent, promoted to Perry Maintenance Manager; and Lonnie W. Worley, formerly Davis-Besse Nuclear Materials Manager, assigned to the position of Perry Materials Manager. James Kloosterman was hired to fill the position of Manager, Regulatory Affairs Section. Efforts are also in progress to staff the recently vacated position of Manager, Mechanical Design Section. Other management changes to date include the selective reassignment of Perry management and supervisory personnel to best utilize the strengths of the Perry organization.

These changes provide the leadership needed to set and meet the high standards required by Centerior, including enhanced personnel performance and improved operations. Additional management changes are currently being implemented.

2. Tutorial Management Style

Extended Staff Meetings

Extended staff meetings are used to review in detail those activities that are important to the effective operation of the Perry Plant and to provide a forum for senior management to demonstrate, by example, the attitude and approach expected of new management staff.

Regularly scheduled extended staff meetings are conducted and chaired by the Senior Vice-President Nuclear. The meeting is attended by the Vice-President Nuclear, Perry Directors and their managers, and selected supervisors.

Plan of the Day

Plan of the Day meetings are conducted to discuss and evaluate the status of daily plant activities and to assign actions as necessary. This meeting is attended by directors, managers involved in day-to-day plant operations, and other managers and supervisors in the areas of operations, maintenance, and engineering support activities.

The Plan of the Day meeting provides another forum for senior management to establish the standard expected for management performance.

3. Seed and Shadow

Seeding

One of the aspects of leadership development that has been employed at Perry is the use of new expertise to augment the technical and management capabilities of the site staff. This has been accomplished by "seeding" selected technical talent into the organization to help resolve ongoing problems and to provide "mentoring" to develop the staff's technical capabilities.

Basically, two levels of seeding have occurred: (1) seeding of new management personnel into the organization, and (2) the seeding of subject-matter-experts to complete short-term projects in support of the plant management organization.

Shadowing

To complement the "seeding" process, selected site management have been provided with temporary "shadow" management consultation for guidance and hands-on assistance in the day-to-day management of the site.

Currently, we have four "shadows" onsite. The "shadows" and their functional assignments are as follows:

- Daniel C. Poole: Perry Plant Dept. (David P. Igyarto, General Manager)
- Richard D. Brandt: Operations Section (Mark B. Bezilla, Manager)
- Gregory E. Kane: Maintenance Section (Vincent J. Sodd, Manager)
- Jerry Falibota: Engineering Department (Neal L. Bonner, Director)

The tenure of each shadow will be determined on a case-by-case basis. Additional support will be implemented if needs are identified.

4. Expert Advisors

A complementary aspect of leadership by example is the use of expert advisors who have extensive experience in the recovery, restart, and performance improvement of commercial and government nuclear facilities. These advisors are used as both members of review committees and as direct consultants to assist in addressing selected technical and management issues.

To these ends, the Nuclear Safety Review Committee has been reconstituted, and an Independent Assessment Team has been established.

Nuclear Safety Review Committee

The Nuclear Safety Review Committee (NSRC) is responsible for the review and recommendation of actions on safety-related issues. Perry has long had a Nuclear Safety Review Committee. However, during assessments of site performance it was determined that the NSRC was not performing as an effective oversight organization. Accordingly, the Senior Vice-President Nuclear relieved all external members and reconstituted the NSRC with new members. The reconstituted NSRC is comprised of senior experienced personnel from all aspects of the nuclear industry.

Independent Assessment Team

The Independent Assessment Team (IAT) was established by the Senior Vice-President Nuclear to provide an independent, overall review of the development and implementation of action plans for the Perry Course of Action

(PCA). This overview will assist in ensuring that (1) the scope and depth of the action plans for the PCA are adequate, (2) action plans address the known deficiencies, (3) action plans are adequately designed to identify any additional deficiencies and formulate resolutions, and (4) action plans are being satisfactorily implemented. IAT membership was selected to provide a broad background of nuclear industry experience in design, engineering support, operation, testing, and maintenance of operating nuclear facilities.

Expectations and Accountability

Expectations and accountability were discussed and emphasized by the Site Vice-President, the Directors, and the General Manager to employees in face-to-face meetings. This message has also been communicated through site mission, vision, and value statements and reinforced in functional group level meetings and activities.

The "STAR" (S-top, T-hink, A-ct, R-eview) individual self-checking philosophy has also been implemented at the Perry Plant as a tool for plant personnel to utilize in our efforts to reduce personnel error and establish individual accountability for performance. "STAR" self-checking reminders have been posted in all areas of the plant and all plant personnel have received both classroom and interactive-video training on the "STAR" techniques.

In addition to these actions, a Human Performance Enhancement System (HPES) Coordinator has been designated for the plant. The HPES Coordinator is responsible for investigating plant problems and events involving human performance to determine cause(s). Once the causes are determined, corrective actions and necessary additional investigations are recommended to plant management. The HPES Coordinator has established and maintains rapport with plant personnel, encouraging the reporting of problems and events that can adversely affect plant performance. To date, the HPES Coordinator has conducted HPES investigations of several selected Condition Reports.

Improved Management/Labor Relationship

Perry Plant senior management has taken several substantive steps toward improving the management/labor relationship, including the following:

- The Vice-President-Nuclear, Perry, has been assigned management responsibility for long-term improvements in management/labor relationships, as well as the daily resolution of labor problems.

- The techniques used in nagement Response Action Checklists (MARCs), as described in the Managers Guide to Labor Relations, are emphasized for use by all management and supervisory personnel. MARC Refresher Training was

provided in the first quarter of 1994 to all managers and supervisors responsible for represented personnel. This training served to reinforce the MARC principles necessary for effective management/labor relations.

- The Perry Protocol Committee was reinstated the first quarter of 1994. The Perry Protocol Committee reports directly to the Vice-President-Nuclear, Perry, and interacts routinely with the CEI Protocol Group. The committee is chaired by the Plant Manager and includes as members the Department Directors, Operations Section Manager, Maintenance Section Manager, and Materials Section Manager. The Perry Protocol Committee assists in creating a harmonious labor relations environment through cooperative management implementation of contractual agreements with the represented bargaining units.

Communications

A Perry Plant management meeting policy was implemented in May 1994, requiring management staff to ensure that information exchanges occur openly and honestly at all levels of our organization. The minimum frequency set forth in the policy is as follows:

V.P. Nuclear	-	Two meetings annually with members of each Department.
Department Heads	-	Quarterly meetings with their Department.
Section Heads	-	Monthly meetings with their Section.
Unit Heads	-	Weekly contact with all unit members, whether in groups or individually, to review current events and encourage dialogue.

Time is allowed within each meeting's agenda for group dialogue, in the form of questions and answers or some other open discussion format. Meetings conducted by Managers and Directors are documented by agenda.

To further facilitate open communications, an Ombudsman position has been created and staffed. When the established communications paths do not function properly, concerns in the areas of quality, nuclear safety, industrial safety, security, and radiological controls may be reported, investigated and resolved through the Ombudsman in a confidential manner. To date, the Ombudsman has resolved over fifty employee and contractor concerns.

The Ombudsman has governing procedures and a designated office area that contributes to employee confidentiality. The Ombudsman also conducts site training, develops and distributes advertising materials and pamphlets, and publishes Perry Lines articles. Contracts have also been modified to include Ombudsman exit interviews with contractor employees.

Management Involvement

In order to reinforce expectations and improve accountability, a management involvement plan has been implemented. The plan includes the development of Policies and Practices Procedures for PNPP "Management By Walking Around Program" (MBWA) and PNPP Manager's "Off-Normal Hour Tour Program."

The MBWA Program ensures that management has set aside an appropriate amount of time for interaction with the workforce. Each Manager is expected to perform MBWA approximately 8 hours per week, minimum.

Off-Normal Hour Tours enable PNPP management staff to interact casually with the workforce. These tours enable management to observe activities and interact with the workforce during off-hours plant operations. A schedule for Off-Normal Hour Tours is approved and issued by the Plant Manager.

Supervisor Assessment and Training Program

1. Supervisor Assessment

   Supervisor Assessment instruments and methodologies have been selected for use at the Perry Plant. Incumbent supervisors and their identified successors will be given a test battery that consists of the following:

   - Leatherman Leadership Questionnaire (LLQ): The LLQ measures individual knowledge in 27 different leadership skill areas.

   - 16 PF: The 16 PF measures primary personality traits.

   - Career Ability Placement Survey (CAPS): The CAPS measures reasoning, knowledge, and/or ability in eight cognitive skill areas.

   The assessment instruments will be independently administered and validated by an external consulting firm. Results of the assessment process will be used as a basis for training and development to improve the performance of incumbent supervisors.

2. Supervisor Training Program

   A Supervisor Training development team, consisting of both Perry Plant and Corporate management and training staff have completed the analysis, design, and development of the Supervisor Training Program. This activity included:

- Review and revision of existing supervisor training materials.

- Development of new core supervisor training courses.

- Development of specialized courses to support supervisor assessment items and activities.

Succession Planning

A Succession Plan is being implemented to ensure that there are candidates being trained and developed to assume the job duties of the Site's management positions whenever vacancies occur. Pursuant to this objective, Succession Plan guidelines have been developed that describe the process and criteria by which personnel are nominated/identified for the Succession Plan. The Succession Plan includes, as a minimum, all positions in the following categories:

-	Directors	4
-	Managers	17
-	Direct Reports	48
-	Supervisors	73
-	TOTAL	142

SECTION 3

ORGANIZATIONAL ISSUES AND ACTIONS

This section details organizational actions completed to address the issues which contribute to the Perry Plant's operational performance and reliability.

3.1 Operations

Several problems and deficiencies have been identified which relate to the professional stature of Operations Section personnel. To address issues relating to Operations personnel performance, the following actions have been completed.

Promote Professionalism

Several activities and programs have been completed to address specific problem areas and promote a professional attitude among the operations staff.

1. Desk Guides have been developed for Operations positions. These Desk Guides provide guidelines for performance of activities, restating of management's expectation, and how expectations apply specifically to the position.

2. An increased professional atmosphere in the Control Room has been facilitated through identified standards for leadership, work ethics, and control of access to the Control Room. Physical modifications have also been made in the Control Room which have contributed to an enhanced professional atmosphere. Section 4.4.6 details these modifications.

3. Heightened awareness and sensitivity to safety has resulted in the disclosure of safety concerns and a safety message at the beginning of every Shift Turnover briefing.

4. Non-Licensed Operators (NLOs) and the Shift Foreman have been relocated to the Unit 2 Control Room area. Improved teamwork has occurred since the relocation of the NLOs has taken place and increased management attention has resulted from the presence of the Shift Foreman. An overall increase in the professionalism in the NLOs' performance and appearance has also been experienced.

Communicate Expectations and Feedback

The "Operations Section Operating Directives and Policies Handbook" has been developed to support this objective. The handbook details Operations Management expectations in the form of Policies and Directives. General areas addressed within the handbook include:

- Operating Directives/Interpretations
- Shift Routines
- Operations Foreman Activities
- Bargaining Unit Policies
- Safety and Health
- Plant Systems
- Test Control
- Program and Procedural Issues
- Desk Guides

Enhance Communications

1. Communications relating to plant activities have been improved through the development and use of Operations Evolution Orders (OEO). The OEO is used to communicate from shift to shift on activities that require standardized plans and directions. The OEO is also utilized to communicate guidance to workers completing activities in the field both with and without pre-evolution briefing.

2. The use of Daily and Standing Instructions has been increased to provide Operations Management and Supervision an avenue and mechanism to convey information that is needed and used by On-shift personnel for both short term and longer term activities, operational guidelines, and general information exchange.

3. A policy was created that requires verbalization of the receipt and clearing of a Control Room Alarm Annunciator. This policy is consistent with the practices and standards in the commercial nuclear industry.

4. Unified shift turnovers with both the Licensed and Non-Licensed operators is now required. This action improves overall awareness of shift activities and impact on each other as well as establishing a practice that enhances teamwork.

5. An Operations Work Control Unit has been created. This dedicated work control unit provides improved planning and better work coordination resulting in enhanced execution of the work activities.

Enhance Teamwork Among Shifts, Sections, and Departments

1. An In-house Peer Observation Program has been drafted that establishes a systematic and comprehensive approach for peer observation in the performance of on-shift activities. These observations emphasize the positive attributes of performance and constructively feed back comments on the areas that are in need of improvement. Peer observations are provided to Operations Management as
record of completion of the assessment and also a tracking mechanism to follow responses to the areas of concern.

2. Perry has also utilized peer evaluations from both INPO and other plants to identify areas for improvement.

   - An INPO Operations Assist Visit was conducted the fourth quarter of 1993. Specific feedback and suggestions from this visit have been synthesized into Operations improvement plans including the PCA.

   - A Work Assist Visit was conducted by INPO the second quarter of 1994. Areas for improvement and specific suggestions for improvement were provided. The suggestions presented from this visit were evaluated for incorporation into applicable improvement programs already under way.

   - An Industry Peer Visit was conducted the second quarter of 1994 to evaluate and review the safety tagging process. Following the peer evaluation, a Safety Tagging Program Improvement Task Force was formed to incorporate improvements into the safety tagging process.

Promote Responsibility and Ownership

1. A Job Performance Rating (JPR) process has been implemented for bargaining unit personnel. The JPR provides a controlled process for bargaining unit personnel to receive feedback on performance and compliance with management expectations.

2. INPO Teamwork Training has been conducted for all Operations crews. Bargaining unit personnel also participated in this training.

3. Performance indicators have been revised to highlight specific items and objectives important to management. The revised performance indicators establish goals based on industry standards for excellence. Progress is tracked against these goals and changes are communicated. The distribution of these

indicators has also been increased through the Monthly Operations Management Information System.

Improve Emergency Operating Procedures and Programs

A Plant Emergency Instruction (PEI) Improvement Team, comprised of seven full-time personnel, has been formed to review the emergency operating procedures and resolve technical and administrative problems. The PEI Team has completed the following items:

- All PEI flow charts have been revised, verified, validated and reviewed by the Plant Operations Review Committee (PORC).

- PEI Special Plant Instructions (SPI) have been revised, verified, validated, and PORC reviewed.

- PAP-0524, "Development of Plant Emergency Instructions," has been revised to ensure and maintain quality in the PEI program.

- Insights from NRC, Perry Plant Quality Assurance, outside auditors, and self assessment audits/evaluations have been evaluated and incorporated into the program to help maintain/ensure quality.

Correct System Problems Affecting Chemistry Controls

System problems affecting Chemistry Controls can be divided into two areas of concern.

First, systems and related equipment used to implement the Chemistry controls are not adequate to achieve required standards. Audits and self assessments have shown that plant sampling and on-line analysis equipment are obsolete and do not support the rapid response to plant transients required for Chemistry Control. Second, assessments have also revealed that improvements are needed in the identification and follow-up of data anomalies, out-of-specification conditions, and general corrective actions.

To address these issues, the following actions have been completed:

1. Chemistry Monitoring capabilities were improved by purchasing a new chemistry data base management system. This system will be linked later to the turbine plant sampling panel to make it commensurate with industry standards for rapid response to changes in plant chemistry.

2. The existing turbine building sample panel was re-designed and will be installed by the end of RFO5 to improve representative samples of the turbine and condensate systems to ensure appropriate analysis results.

3. Reactor panel conductivity monitors, reactor panel dissolved oxygen monitors and turbine plant dissolved oxygen monitors were replaced with more reliable instruments.

4. The availability and reliability of on-line monitors was enhanced by performing maintenance repairs for on-line monitors on a priority basis.

5. Supervisory oversight and personnel training was provided. This training outlined how to identify and take prompt corrective actions in response to out of specification system parameters and sample data anomalies.

6. RPI-0124, "Conduct of Operations," was developed for all personnel in the Chemistry Unit. This procedure details the expectations to improve data anomalies and cause identification and provide for prompt corrective action.

Improve Auxiliary System Chemistry Controls

The assessment of the Auxiliary Systems Chemistry Control program by INPO in November 1992 revealed opportunities for improvement. Certain bases for corrosion control parameters were unknown. Additionally, some of the corrosion control practices were not the same as some standard industry methods. Oxygen control, important to minimizing corrosion on mild steel, is compromised by system leaks requiring frequent chemical additions. In addition, questions were raised concerning the adequacy of an uncatalyzed oxygen scavenging chemical which may not be as effective as a catalyzed product.

Actions which have been completed to address these issues are as follows:

1. Current industry methods were investigated for corrosion control improvement opportunities. Concurrently, a complete evaluation of the materials of construction was performed along with a compilation of the original bases for the current treatment program. The purpose of this evaluation was to correct known system problems and to investigate possible improvements to the treatment and monitoring program.

2. A training lesson plan (CHC-4200) was developed to address current industry methods for corrosion control based on materials used for chemistry systems. The training detailed the chemicals used in plant systems and what effect water chemistry has on different materials of construction. This training was provided during the Continuing Training cycle for all Chemistry Unit personnel.

3. Plant oxygen control practices were evaluated to minimize leakage from auxiliary systems which would require the addition of chemicals to scavenge oxygen. The work has been identified; some work has been completed and the remainder has been scoped for completion in the future. Chemistry is currently being maintained within established limits.

4. The lowering of pH controls for the auxiliary cooling system to protect copper-bearing heat exchanger tubes was evaluated. The upper pH limit has been lowered from 10.0 to 9.2 for auxiliary cooling systems, which is closer to normal operating range and helps ensure that appropriate action is taken before copper-bearing heat exchanger tube corrosion becomes a problem.

3.2 Maintenance

There are six objectives associated within the Maintenance Organization Course of Action; 1) address management issues, 2) improve work practices, 3) reduce large maintenance backlog, 4) improve plant material condition, 5) implement deficiency tagging process, and 6) improve industrial safety and health practices.

The following activities have occurred to support these objectives:

Address Management Issues

1. Reorganize the Maintenance Organization

   Management reorganization plans have been developed to improve the lines of communications, establish ownership of maintenance assignments, and promote consistency in work practices. This plan includes the consolidation of Maintenance and Instrument and Controls into one section. When completed, the following new positions will be created:

   - Electrical and Mechanical Maintenance Superintendent
   - Instrumentation and Control Systems Superintendent
   - Contracts and Services Maintenance Superintendent

   Maintenance Section reorganization is scheduled to be completed in September, 1994.

2. Communicate Performance Expectations

   Maintenance management staff have held and continue to hold meetings with all personnel in the Maintenance Section. Backshift tours are also conducted to facilitate informal communications with maintenance personnel and establish a management presence in the working spaces. During these formal and informal

contacts, maintenance management communicates information on plant status and expectations for improved performance and solicits personnel inquiries and recommendations.

3. Develop Performance Indicators

Maintenance has developed improved performance indicators to measure Maintenance Section performance. These performance measures include items such as:

- Overdue Maintenance Activities
- Tracking of Condition Reports Generated
- LERs due to Personnel Error
- Re-test Failures
- Non-outage Corrective Work Orders
- Preventive vs. Corrective Maintenance Work Orders
- Temporary System Alterations
- On-the-job Injuries
- Lost-time Accidents

These performance measures are based on industry standards. They are measured on a monthly basis and are reported to management.

Improve Work Practices

1. Improved Computer-based Work Order Preparation System

A Maintenance Section assessment of the improvements needed to implement a computer based work order preparation system has been completed. The results of the assessment indicate that the system presently provides the capability for ready changes. However, improvements in optical and character imaging, accessibility of data files for vendor information, computer software to construct sketches, electronic preparation, review and approval of special permits, on-line review of radiological work permits and electronic ties for procurement activities, ALARA planning and system constraints are needed.

2. Improved Maintenance Procedures

Maintenance procedures have been revised as necessary to support outage activities and to correct technical errors. Objectives and target dates have been established to complete revisions to all Maintenance procedures to meet present industry standards.

3. Improved Maintenance Training

A new Maintenance Training Facility has been designed and built to support all Maintenance Section Training. The Training Facility includes separate Mechanical and Electrical labs to support task-specific performance based training, new classrooms with enhanced audio-visual capabilities, and in-facility instructor offices to improve accessibility of instructors for maintenance personnel.

4. Standardized Testing Requirements

Maintenance has completed a review of current pre- and post- maintenance practices at Perry, other nuclear facilities, and INPO good practices. Based upon this review, recommendations have been developed and forwarded to System Engineering for inclusion in the Maintenance Test Manual.

5. Tracking of Staged and Stored Material

PAP-0204, "Housekeeping/Cleanliness Control Program," has been revised to implement the Blue Tag Material Accountability Program. The program requires the timely removal of equipment and scaffolding.

Reduce Large Maintenance Backlog

1. A review of the existing backlog of work orders has been completed and all duplicate work orders have been canceled. These are currently 3886 work orders, 1965 of which are non-outage Corrective Maintenance Work Orders.

2. The process for review of the current backlog has been revised. All preventive maintenance tasks are evaluated by management whenever a request for deferral is made to ensure that the most important task is performed first.

3. PAP-0904, "Work Prioritization System," was issued on 3/1/94. This new procedure details a work prioritization process. The process was developed based on available industry information and information provided by Perry personnel. The new process has been implemented with new work being prioritized as it is identified on a Work Request and old work orders being reviewed and re-prioritized.

Improved Plant Material Condition

1. The October, 1993 Maintenance Outage was conducted to improve the material condition of the plant. Items completed include:

- 260 valves were repacked to reduce leakage.
- Thirty eight temporary modifications were removed.
- Heater Bay and the Residual Heat Removal rooms were cleaned and painted.
- A significant volume of radioactive material was removed from the plant for processing.
- Extensive housekeeping was performed in the containment and drywell areas.

See Section 4.3 for details regarding the 1993 Fall Maintenance Outage.

2. PAP-0204, "Housekeeping/Cleanliness Control Program," has been revised to include a "clean as you go" philosophy in the plant. Maintenance management has also emphasized this philosophy in their communication with Maintenance personnel. To support efforts to improve plant cleanliness, Perry has developed a plant cleanliness action plan which includes painting, patching, and sweeping. Increased management tours in the plant are also performed to assess material conditions. Significant improvements in area cleanliness have been recognized in the Heater Bay and the lower level turbine power complex.

Implement Deficiency Tagging Process

PAP-0902, "Work Request System," was revised to include a Material Deficiency Tagging Program. The Material Deficiency Tagging Program assists in positively and visibly identifying all known plant deficiencies. It also eliminates duplicate work orders, identifies backlog, and provides a tracking mechanism for work requests.

3.3 Radiation Protection

The purpose of the Radiation Protection improvement program is to address deficiencies in the following areas:

- Unplanned personnel contaminations
- Volume of radioactive waste generated
- Access to the Radiological Restricted Areas (RRA)
- Control of radioactive material stored in the RRA
- Control of Locked High Radiation Areas (LHRA)
- Sensitivity and accuracy of RP instrumentation/dosimetry
- Enforcement of Radiation Protection Controls
- Emphasize on ALARA in RP planning

The following actions have been taken to address these deficiencies.

Unplanned Personnel Contamination Events

Over the past two years the Perry Nuclear Power Plant has experienced a high number of Personnel Contamination Events (PCEs) resulting from poor radiological work practices. To address this concern, increased accountability has been placed on first line work supervisors. Training has also been provided for workers and supervisors to increase their awareness of potential causes for personnel contaminations and improve radiological work practices.

1. Supervisor Participation

   Emphasis has been placed on increased first-line supervisor accountability. This was accomplished by increasing their involvement in reportable contamination events. HPI-E0007, "Personnel Decontamination," was revised to require supervisors of affected personnel to participate in PCE investigations and to sign-off on the PCE form.

2. Training

   Advanced Radworker Training (ARWT) was provided to Perry personnel required to supervise or perform work in contaminated areas during RFO4. This training increased personnel awareness of the potential causes of personnel contaminations. ARWT was also provided to selected contractor personnel involved in high-risk radiological activities.

   Additionally, Radiological Awareness Bulletins are issued for reportable contaminations which could have been prevented. The bulletins provide details on the event along with actions which should be taken to prevent its recurrence. Radiological Awareness Bulletins are posted for review by all plant personnel. Radiological Awareness Bulletins are also discussed at Section/Unit safety meetings or continuing training sessions to ensure lessons learned from Personnel Contamination Events, Condition Reports, and Radiological Awareness Reports are shared with all personnel.

   Root causes and lessons learned from Personnel Contamination Events, Radiological Awareness Reports, and Condition Reports have been incorporated into Advanced Radworker and Radiological Controls Training programs.

   As the table below indicates, there has been a significant reduction of PCEs in 1994. This reduction is attributed to the efforts of the employee, their supervisors, ARWT, and a general overall plant effort.

Unplanned Reportable Personnel Contamination Events

Year	Events	Rate	Total RWP-h
1992	116	0.55 per 1000 RWP-h	212,019
1993	180	0.76 per 1000 RWP-h	210,157
1994	141	0.26 per 1000 RWP-h	532,422

3. Contaminated Area Reduction

Reducing the number of contaminated areas helps reduce the number of unplanned personnel contaminations resulting from the spread of the contamination to clean areas of the plant.

The following actions were taken to accomplish this goal:

- A Plant Decontamination Committee was established and meets weekly during non-outage periods to evaluate and establish decontamination priorities, to support plant decontamination activities, and provide input into the formal program development. During outages, these activities are coordinated through the Health Physics Decontamination Supervisor and Plan of the Day meetings.

- A schedule was developed and is in place to ensure critical decontamination activities are performed on a periodic, routine basis. Representatives from nuclear engineering, maintenance, operations, and radiation protection work together to define and correlate the activities on the schedule.

- RPI-1204, " Equipment and Area Decontamination," was effective in April 1994. This new procedure provides additional guidance on decontamination activities and includes more stringent post decontamination release criteria for large area decontaminations.

- PAP-1903, "Perry Plant Decontamination Program," was effective in May 1994. This new procedure provides guidance on a formal decontamination administrative program.

- Additional staffing was dedicated to support outage decontamination activities.

- Major leaks in Containment which could contribute to area contamination build-up were identified and repaired during the October Maintenance Outage and RFO4.

These actions have resulted in a reduction of Total Plant Contaminated Area to approximately 2%. The contaminated areas of Emergency Core Cooling System (ECCS) rooms have also been reduced to the 1994 goal of 40%, with a 1995 goal reduction to 20%.

Reduce Volume of Radioactive Waste Generated

To reduce the total volume of solid and liquid radioactive waste the following actions have been completed:

- The establishment of a Radioactive Waste Reduction Task Force to coordinate the development of methods to minimize the generation of radwaste.

- To minimize wet radwaste the condensate deep bed resin is being used twice, once in the Condensate systems and then in the Radwaste systems. The septa tubes used in the Condensate system have also been changed to reduce the amount of backwashing from every 4-5 days to 28 days. A new septa is currently being evaluated which does not require precoating.

- A Waste Segregation Program has been implemented which requires personnel to segregate waste as part of their job completion process.

- An instructional video to improve worker awareness on waste segregation and use of waste segregation stations has been developed. This video has been incorporated for use in Advanced Radworker and RCT Training Programs to stress waste minimization techniques and issues.

- The development and implementation of a method to track the collection of Dry Active Waste (DAW) placed in interim storage. This action is accomplished via a computerized inventory program which allows Perry to track Radwaste via container number, type and storage location. Radwaste inventories will also be tracked by dose rate, curie content and running volume accumulation. These actions are taken to ensure compliance with NRC Generic Letter 81-38.

The table below illustrates radwaste volume reduction, especially in the area of wet waste.

Year	Buried Wet Waste	Buried Dry Waste
1992	165.50 m^3	89.28 m^3
1993	65.70 m^3	23.70 m^3
1994	52.49 m^3	153.95 m^3

Note: 1994 volumes are higher due to RFO4.

Radiological Restricted Area (RRA) Access Improvements

Standard Industry practice is to have a single point access and egress from the RRA. Traffic flow patterns are separated for access and egress to help prevent cross contamination of workers in clean areas of the RRA. Presently at Perry, there are two primary access and egress points to the RRA, neither of which precludes the potential for cross contaminations of personnel in clean areas. The emphasis of this corrective action is to modify Radiologically Restricted Area (RRA) primary and secondary access and egress points to improve traffic flow, enhance communications, reduce background noise interference during pre-job briefings, and minimize the potential for clean area contamination.

Pursuant to these objectives, the following actions have been completed:

- Interim modifications to the Control Complex (CC) 599' RRA access control point to control the access and egress to the RRA.

- The installation of interim enclosures to support RFO4 HP control point activities to improve communications, reduce noise and improve worker access and egress during outages. The enclosures will remain in place when the plant moves into power operations. Replacement of these interim enclosures with permanent structures prior to RFO5 is being evaluated.

- Permanent modifications to CC 599' are currently being evaluated for design and construction prior to RFO5.

Disposition and Control of Radioactive Material Stored in RRA(s)

Standard industry practice is to disposition tools, equipment, and plant components that are known to be contaminated to help reduce the large amount of radioactive material (RAM) stored in the Radiological Restricted Area (RRA). Reducing the large amount of RAM stored inside the RRA can improve worker efficiency and productivity and also helps improve housekeeping and material condition of the plant. To reduce the volume of Radioactive Material and equipment currently stored in the plant's RRA, the following actions have been completed:

- A Radioactive Material Disposition Task Force was established to coordinate and disposition the volume of radioactive material, equipment, and tools stored in the plant or in the Radioactive Waste Interim Storage Building (RISB). Approximately 20% of the radioactive waste shipped to Barnwell Burial Site this year was dispositioned materials identified through the efforts of the task force.

- All RAM areas and responsible sections/units were identified and the owners of RAM areas provided a plan for inventory and disposition of material. Responsible units/sections are following the plan as required.

- A segregation plan has been developed and is being utilized for materials based on usage frequency.

- The purchase and testing of the "RADSTORE" software program to maintain a database of stored RAM and radwaste, which allows Perry to track and control its inventory of storage areas. All radioactive material stored in the RISB and the On Site Storage Container Area (OSSC) has been inventoried.

- An Outage Demobilization Committee was formed and developed a plan to provide programmatic controls for demobilization and inventory of material and equipment removed from storage in the plant, RISB, and/or Sealand containers. As outage demobilization commenced, material was inventoried and placed into the Sealands for storage. Material that is not reusable was dispositioned as waste and disposed of. This plan also controls, segregates, and decontaminates contaminated tools and equipment stored within the RRA.

- PAP-0515, "Control of Radioactive Materials," has been revised to improve labeling and control of contaminated tools and equipment inside the RRA.

Control of Locked High Radiation Areas (LHRAs)

Perry Nuclear Power Plant has experienced a high number of unlocked or unsecured high radiation areas. In response to these events, prompt corrective action was taken to help minimize and/or eliminate high radiation areas from being left unlocked or unsecured. These corrective actions including the following.

- An audible/visible locking control system has been installed to signal personnel exiting an LHRAs that the doors have been properly secured.

- Enhanced training was provided to all Radiation Workers on the significance on controlling LHRA doors and the new audible/visible locking control system.

- All keys for LHRAs were re-assigned to the Radiation Protection Section for access control authorization to help prevent leaving LHRA doors open or unsecured.

- Expectations of plant management on the control of LHRAs and the consequences of leaving a LHRA door unsecured were communicated to all plant personnel.

- Improved locking devices and door frames were installed to prevent unauthorized access to LHRAs. 76 of 133 have been installed.

- An independent verification by Health Physics has been established for LHRA doors which are not alarmed to provide an additional measure of assurance of positive access control.

Improve Radiation Protection Instrumentation/Dosimetry Sensitivity and Accuracy

An interim computerized digital alarming dosimeter (DADs) access control system was implemented between RRA access control points and interior plant HP control points. These DADs have similar monitoring capabilities as TLDs, therefore increasing the accuracy between DADs and TLDs.

A computerized access control system, HIS-20, has also been purchased to provide automated access control by interfacing with the DADs. This system provides computerized Radiation Work Permit generation and dosimetry records management. The system has been implemented at Davis-Besse and the software has been loaded into the system at Perry. The methodology for the migration of historical data has also been tested. An HIS-20 Committee was established and meets weekly to address implementation/operational problems encountered.

Additionally, the clean trash monitoring program was re-evaluated and changes to the calibration and operation of the equipment was implemented to achieve industry standards.

Improve Administration and Enforcement of Radiation Protection Controls

Actions to address this objective include the establishment a formal observation program of the RRA by Radiation Protection Section (RPS) personnel to assess RPS program performance. The emphasis of this objective is to:

- Ensure consistency between supervisors and technicians in implementing and enforcing Radiation Protection Control Standards.

- Improve communications with plant personnel to improve credibility and communicate expected standards.

- Evaluate and improve program controls to minimize the release of RAM from the plant Protected Area.

- Evaluate the use of Job Coverage Standards (JCSs) on specific tasks to help minimize inconsistencies between Health Physics technicians covering these

tasks, ensure that the HP technicians are cognizant of the expected requirements, and maintain radiation dose to workers ALARA.

The following actions have been completed to address these issues:

- RPI-0201 was revised to include a Code of Conduct and Standards of Performance for Radiation Protection personnel.

- Increased Radiation Protection management observation tours (MBWA) of the plant were established to assist in communicating expectations and enforcing standards.

- Communication Training (Effective Listening Skills) was given to Radiation Protection personnel and contractors to improve their skills in communicating with Section and Plant personnel.

- Radiation Protection Administrative Instructions and Plant Administrative Procedures have been revised to provide guidance on minimizing the release of RAM from the Protected Area.

- Increased Management oversight was provided during routine and outage conditions to ensure management expectations were met.

- RPI-0124 was effective in February 1994. This new instruction details the requirements for Shift Turnover Meetings to ensure that all pertinent information is communicated consistently between shifts.

<u>Emphasize ALARA standards in Radiation Protection Planning</u>

- All Radiation Protection Section procedures were amended to meet the intent of the revised 10CFR20 which became effective January, 1994. The revisions were implemented in October, 1993, during the Fall Maintenance Outage to familiarize personnel with the revised health physics requirements and to minimize changes/impacts for RFO4.

- Worker understanding and involvement in the ALARA program has also been improved through:

    * Implementation of an ALARA suggestion program modeled after Centerior's Bright Idea Program. The ALARA suggestion program provides positive feedback and rewards through active participation.

* Improved communication and active participation in the ALARA review process.

* Management review/oversight of work performed in the RRA.

- RRA work now requires first line work supervisors to review ALARA Reviews prior to approval. PAP-0118 was revised to include the use of checklists for pre-job briefings and the performance of post-job evaluations. These actions help to ensure personnel understand all necessary information to maintain personnel doses ALARA.

- The HP planning element publishes a monthly ALARA report and distributes it to the various departments. The report highlights items such as accumulated dose, contaminated areas in the RRA, personnel contaminations, etc. This report provides information to update the various departments with current plant radiological status and provides status on radiological/ALARA goals and objectives.

- Management policies on equalizing dose to workers and supervisory tours of the RRA were established and distributed to site supervisors to help maintain radiation doses ALARA.

A total estimate dose savings of 294 person-rem was realized during RFO4 due to these efforts and other engineering controls, including:

Temporary Shielding	220 person-rem
Radioactive decay	33 person-rem
Robotics	21 person-rem
Total Rad. Risk Assmt. Eval.	18 person-rem
Chemical Decontamination	2 person-rem

3.4 Quality Assurance

Several issues had been identified which relate to the effectiveness of the Quality Assurance organization. To address these issues, the following actions have been completed to support improvements in Quality Assurance activities at Perry.

Assure Management Support

1. A new Director has been assigned to the Nuclear Assurance Department (NAD) to implement the necessary improvements for the NAD.

2. An Independent Assessment Policy Statement was issued by the Senior Vice-President-Nuclear. This policy describes the role of independent

assessments in achieving performance improvements, as well as senior management's expectation that all personnel will welcome, encourage, and cooperate with those performing such assessments. To clarify this management expectation, the policy specifically states, "We will not be defensive or argumentative when discussing the observations, inquiries, or results of an assessment."

3. A new Nuclear Quality Assurance Program Policy has been approved for implementation at Perry by Centerior's Chairman and Chief Executive Officer. In addition to establishing guidelines for the development, maintenance, and implementation of the Perry QA Program, the policy describes the Chief Executive's expectations of the Vice-President-Nuclear, and the Director, Nuclear Assurance.

4. The Nuclear Assurance Department's mission has been redefined and issued to all department personnel to clearly communicate that the prime objective is to identify, effectively communicate, and confirm the resolution of quality problems.

Perform More Effective Quality Assurance Quarterly Assessments

1. Assessment Guidelines

   The Quality Assurance Quarterly Assessment process has been revised to ensure that proper focus is placed on key issues requiring senior management attention. The report has been reformatted with emphasis on the significant problems and opportunities facing the Perry Nuclear Power Plant. Additionally, the report has been developed in conjunction with, and incorporates the major results of the condition report quarterly trend report. This has helped ensure that the issues raised in the Quality Assurance Quarterly Assessment are those requiring senior management attention.

2. Assessment Review

   The Quality Assurance Quarterly Assessment review board has been reconstituted to help ensure that senior management is adequately informed of the assessment results. The review board is now comprised of the Perry Plant General Manager and the Directors of the Perry Nuclear Assurance, Perry Nuclear Engineering and Perry Nuclear Services Departments.

Improve Audit, Assessment, and Inspector Performance

1. External Plant Visits

Perry Nuclear Assurance Department personnel have visited other nuclear plants to observe their practices and performance. These trips have included participation in audits and INPO assessments and visits which focused on specific technical and program issues. Future trips are planned to facilities that have consistently received NRC SALP 1 ratings in one or more functional areas. A process is currently being developed to ensure that future plant visits are effectively conducted and lessons learned are captured.

2. Technical Specialists

The Perry Nuclear Assurance Department has increased the use of technical experts on audits. These technical experts have been obtained from other plants, consulting organizations, and other Perry Nuclear Power Plant Departments. Having fifty percent of quality assurance audit teams include technical specialists has been established as a goal and is being tracked as a departmental performance indicator. Thirteen of fifteen, or 87%, of the audits completed between January 1 and June 30 of 1994 utilized technical specialists as part of the audit team.

3. Inspection Effectiveness

The Quality Control Section is responsible for implementing an inspection program that addresses safety-related, augmented quality, ASME Code, and seismic systems, components and structures. Detailed procedures and instructions are utilized to control the inspection process. Quality Evaluators review and approve Work Orders within the scope of the program. During this review, hold and witness points are assigned that trigger an inspection to verify compliance with the work order and related requirements.

The scope of the current inspection program does not include non-safety related systems, components or structures other than Code welding activities. During an assessment in 1993, it was recommended that the Quality Control Section inspection scope be revised to ".... include those systems important to core degradation, those systems most responsible for losses in plant capacity, and those components with high failure rates."

An action plan has been developed to implement the above recommendation. Currently, information has been collected which identifies those systems that are significant contributors to reduced plant electrical output; those components

that have experienced a higher than expected failure rate; and those systems that are potential significant contributors to core damage frequency.

To complete this activity, an evaluation will be performed to identify those systems not included in the current inspection scope and determination made on which should be included. The inspection instructions will be modified to include the revised scope. The target is to use up to 10% of the available inspection man-hours on the revised scope. Training in the requirements of the new program will be provided to inspection personnel before it is implemented. In addition, inspector familiarity with the additional systems in the revised

scope will be enhanced by participation with system engineers during their periodic system walk-downs.

Achieve Quality Organization Excellence

An assessment of the PNPP Nuclear Assurance Department, using external quality assurance management personnel, was conducted during the first quarter of 1994. The conclusion reached by the team was that the Department was staffed with qualified and experienced personnel. No immediate changes were identified as being needed. Recommendations and suggestions for further improvement were made and have been factored into Perry Nuclear Assurance Department's long range planning.

3.5 Engineering

The Perry Course of Action (PCA) identified a number of issues regarding Engineering Department performance. These range from the technical competency of Department personnel to adequacy of plant support efforts. Several specific topics related to engineering activities are detailed in Section 4.0. The necessary actions to address the various issues are being carried out as follows.

Prepare an Engineering Development Plan

A plan has been drafted to address both immediate and long-term improvement activities. The plan details:

- Organization improvements and shifts in responsibility.
- Departmental weakness and remedial actions to be completed during Cycle 5.
- Technical and management development for engineering personnel.
- Director level policies and expectations.

Improve Processing of Design Changes

1. A plan has been developed for the improvement of the design change process. In support of this plan, selected personnel have been surveyed to provide recommendations for improvement to the DCP process. Various elements of the DCP process have also been flow-charted from their applicable procedures. The next step is to review and revise the process to improve the technical quality and effectiveness of programmatic controls.

2. To support design work associated with RFO4, selected Engineering Department personnel were trained as Safety Evaluation preparers/reviewers.

3. A Director's Policy has been issued regarding Safety Evaluations and the use of engineering judgment in the design process.

Reduce Backlog of Modification Requests

PAP-0904, "Work Prioritization System," was effective in March 1994. This procedure details the method for prioritizing modifications. The method is in use in the Engineering Department for screening new modifications. Issued modifications have been initially screened using the new methodology and some candidates for cancellation have been identified.

Increase Engineering Involvement in Refueling Outage Planning

Key engineering personnel participated in the planning of the 1993 Fall Maintenance Outage and RFO4. The Engineering Department provided a dedicated engineering support team to immediately and responsively assist in the implementation of work packages during Fall Maintenance Outage and RFO4. In addition, the Department's senior managers were placed within the plant on a shift basis to directly support station needs with expedited resolution and assistance efforts where necessary.

Implement Improved Incident Response Team

In support of RFO4, the Plant Engineering Response Team (PERT) was assembled to provide direct support to both the Perry Plant and Nuclear Engineering Departments for the resolution of immediate corrective actions, questions from the plant, and emergent work requiring engineering support activities. These activities were coordinated through the PERT in lieu of being performed by the normal responsible engineering functions. Following RFO4, the Incident Response Team (IRT) will assume the functions of an on-call team of technical support for the control room. PAP-0606, "Condition Reports," effective in June 1994, details the functions and responsibilities of the IRT.

SECTION 4

SELECTED TOPICS ISSUES AND ACTIONS

This section details the actions that have been completed on issues and topical areas which are important to both short- and mid-term improvements in operations of the Perry Plant.

4.1 System Operation and Test Review Program

The System Operation and Test Review Program provides a direct, deliberate confirmation of system and equipment readiness and functionality. The program also assures that shortcomings observed in the execution and implementation of process controls have not adversely affected the functional adequacy of plant systems and equipment.

To these ends, several action items have been completed. They include:

1. System Selection

   Screening criteria were developed for selecting systems to be considered for review. These screening criteria defined the attributes for those systems to be considered for review. Systems were then selected that met the defined selection criteria. These systems are representative of those that form an integral part of the unit's operation and capabilities. They represent the emergency systems, the reactor control and power generation systems, and the process systems for radioactive waste. The systems selected were:

   High Pressure Core Spray System
   Off-Gas System
   Turbine Control and Steam Bypass System

2. Review of Maintenance, Modification History, and Acceptance Testing Records

   The documents associated with this activity were reviewed for the impact on the functional requirements of the system. The documents reviewed included:

   Work Orders
   Commitments
   Condition Reports
   Non-Conformance Reports
   Repetitive Tasks

Design Modifications
Acceptance Tests
Industry Events
Temporary Alterations
Setpoint Change Requests
Component Equivalency Review Forms

3. Identification of Detailed Functional Requirements

The identification process included a review of the engineering and licensing documents and identification and compilation of all the functional requirements for the systems. This listing supported the other SOTR review activities such as the procedure review, the commitment review, and the condition report review.

The verification process included a detailed evaluation of the methodology and achievement criteria contained in the documents (Repetitive Tasks, SOI's, IOI's, Surveillances, etc.) that are used in the verification of system functional requirements. As a result of this effort, a System Function Evaluation Form was developed that contains an identification of the following:

* System Function
* System Subfunction
* Subfunction Achieved By
* Achievement Criteria
* Subfunction Achieved By

4. Review of Surveillance and Periodic Testing Requirements

An assessment was conducted of all System Operating Instructions (SOI), Surveillance Instructions (SVI), and Performance Test Instructions (PTI) including all revisions and changes against the functional requirements for the system. The assessment verifies the completeness of testing used to confirm functional adequacy.

5. Detailed Acceptance Criteria Applicable to Periodic or One-Time Testing to Confirm Functionality Will Be Confirmed or Determined

Detailed Acceptance Criteria were developed as a function of the Functional Requirement Development Process. These acceptance criteria are identified as "Achievement Criteria" on each system's System Function Evaluation Form and is used for the basis to confirm or determine the systems capability to perform its required functions.

6. Perform functional testing on selected systems

Functional testing on the High Pressure Core Spray System (HPCS) has been performed and evaluated. Some problems were identified during system testing with HPCS suction pressure, HPCS Suppression Pool Level Instrumentation,and the installation of insulation for the HPCS minimum flow valve. Corrective action documentation was generated and corrective actions were completed for these issues; however, overall test results verified that the HPCS meets all the achievement criteria required by Technical Specifications.

The next step in the completion of the action items for the System Operation and Test Review Program includes:

- Testing of both the Off-Gas System and Turbine Control and Steam Bypass System.

- Evaluating test results to verify achievement criteria for functional requirements.

- Identification and implementation of corrective actions for deficient areas identified through the verification process.

4.2 Corrective Action Program

Several improvements have been made to Perry's Corrective Action program to address concerns with problem identification, determination of root cause and extent-of-condition, and implementation of corrective actions. The Perry Course of Action (PCA) divides these improvements into two phases.

Phase I

The Phase I activities, which have all been completed, established an increased emphasis on problem identification and the timely completion of Condition Report (CR) investigations and corrective actions. Phase I also included the formation of the Condition Report Review Board (CRRB), comprised of senior supervisory personnel, to review CR investigations and new corrective action items for adequacy and consistency of quality, and to assign organizational responsibility for determining resolution of issues identified by CRs.

This multi-discipline review board has established high standards for the program, resulting in steady improvement in the overall quality of CR investigations. This is evidenced by the decline in the CR investigation rejection rate for first time reviews from 55% in January to 20% in May 1994.

Another improvement in the CR program is the implementation of the categorization process developed for the new Corrective Action program (Phase II). The categorization process sets the evaluation level of CR investigations based on the significance of the event as well as the risk of recurrence. It also implements improvements in the root cause evaluation process by implementing a two-tier cause evaluation. This affords the site the capability to more effectively assign resources to resolve the most pressing issues. All unapproved CRs have been categorized to support implementation of this program improvement, and new CRs are categorized on a daily basis. As a result of this activity, the schedule for addressing the CR backlog has been significantly modified to focus on the most significant outstanding CR investigations.

Phase II

Phase II of this activity involves the development of a new Corrective Action Program which will include a single process for all conditions considered potentially adverse to quality, a multi-discipline review board, an improved root cause investigation process, detailed action tracking process, and a trending process to assess the program's effectiveness. Phase II will be implemented through a new procedure, PAP-1608, "Corrective Action Program" scheduled to be effective no later than October 15, 1994. In the interim, PAP-0606 has been revised (as described above) to partially satisfy this commitment.

Several root cause investigation program improvements have been implemented. A list of personnel who have had formal training in root cause analysis techniques has been distributed to allow managers to select appropriately trained personnel when root cause investigations must be performed. These efforts have resulted in fewer first review rejections by the CRRB.

The recent addition of a categorization process, and additional guidance in cause analysis methods, is expected to focus effort on solving the most significant issues in the short-term, while utilizing existing work processes to solve issues of lesser significance. The development of a formal qualification program for root cause evaluators is underway to support the requirements of PAP-1608, with a target population of 75 trained evaluators. An HPES qualification card has been issued to ten evaluator candidates, and an equipment performance evaluator qualification card is under development.

Action tracking has already been improved by moving all of the information associated with open CR investigations from the Operations Action Tracking System (OATS) to the more user friendly and capable Perry Master Action Tracking System (PMATS).

Trending software has been obtained from Davis-Besse which will allow the use of statistical process control techniques to improve the trending capabilities at Perry. This software will also enhance the capability for performing searches for prior similar

events. The software is currently being revised to support Perry-specific nomenclature and organizational structure.

4.3 Material Condition Improvement

To achieve immediate improvement in the plant's material condition, a previously unscheduled outage was performed in the Fall of 1993 and the length of RFO4 was extended. The Fall 1993 Outage began on October 1, 1993, and ended on November 17, 1993. The Fourth Refueling Outage began on February 4, 1994 and ended with generator synchronization to the grid on August 14, 1994.

The Fall 1993 Maintenance Outage

The Fall 1993 maintenance outage was focused on selected improvements in the material condition of the plant and implementation of selected modifications to increase the margin of safety. Major activities completed to that end include:

- 789 work orders, 180 preventive maintenance tasks, and 32 surveillance activities were completed.

- A modification was made to the Reactor Pressure Vessel water level indicating system to improve the reliability of the signals.

- 8 valves were modified and/or tested in accordance with the requirements of Generic Letter 89-10 (Safety Related Motor-Operated Valve Testing and Surveillance.) This work provided a schedule baseline and methodology feedback for the 89-10 related valve work to be performed in RFO4.

- 260 valves were repacked and several steam and water leaks were repaired. This will contribute to the reduction of in-plant low-level contamination, personnel radiation exposure, off-site releases, and waste water processing and make-up requirements.

- The number of temporary modifications was reduced, including the removal of several leak repair clamps. Efforts continued in RFO4 to further reduce the number of temporary modifications installed in the plant.

- Paint blister removal and touch-up painting in the Drywell was completed as part of the overall Containment and Drywell clean-up effort.

- Extensive repairs were completed on components in the Feedwater and Condensate systems.

Refueling Outage 4

Important activities completed in RFO4 may be categorized as either improvements in overall margin of safety or as upgrades to reliability and material condition.

Improvements in the Overall Margin of Safety are as follows:

- A total of 94 motor-operated valves (MOVs) were modified and/or tested in accordance with the requirements of Generic Letter 89-10 (Safety Related Motor-Operated Valve Testing and Surveillance).

- Modifications were made to the inboard and outboard 'C' line MSIVs to improve their seating characteristics. (Similar modifications had been previously performed on the A, B, and D MSIVs.) Additionally, a safety related air system to the outboard MSIV accumulators was installed to ensure proper valve performance in the event of a loss of normal accumulator air pressure.

- Provisions for an electrical cross-tie was established between Division 2 and Division 3 electrical systems to provide a backup electrical power source for safety related equipment in the event of a station blackout.

- Valve internal modifications were performed on two valves in both the 'A' and 'B' Residual Heat Removal systems to improve the flow control characteristics of these systems.

- 21 of 177 Control Rod Drive Mechanisms were replaced based on trending of performance data.

- All 19 Safety Relief Valves were replaced due to seat leakage and poor performance histories during surveillance testing.

Reliability and Material Condition Upgrades are as follows:

- 2527 work orders, 1208 preventive maintenance tasks, and 711surveillance tests were completed.

- Temporary modifications were reduced from 56 at the beginning of RFO4 to 28 at its conclusion.

- The population of snubbers was reduced by 75, considerably reducing the extent of periodic snubber testing and maintenance activities.

- Both Reactor Recirculation Pump shafts were replaced to incorporate a new shaft design and improved seals. Additionally, modifications were performed on each loops' discharge check valve.

- Modifications were made to the two reactor feed pumps and the motor-driven feed pump to increase performance and useful pump life through reduced vibration.

- Modifications were made to the hydrogen analyzer system which will improve system reliability.

- Main Turbine rotor modifications were performed on all three Low Pressure Rotors as a result of torsional testing. These modifications were performed to achieve sufficient resonant frequency separation to prevent turbine damage.

- Inspection and maintenance were performed on all three Diesel Generator engines and auxiliary systems.

- Repacking of over 200 valves significantly reducing in-plant contamination.

- The Off-Gas refrigeration system was modified to allow the use of a non-CFC cooling medium.

4.4 Related Issues

This section includes status on a range of items related to overall improvement of Perry Plant operations. These programmatic and technical areas warrant focused attention as an integral part of the Perry Course of Action to achieve substantive improvements in performance.

4.4.1 Motor Operated Valve Program

The motor-operated valve program, implemented under the requirements of NRC Generic Letter 89-10, was determined to be deficient in engineering, testing, and planning. To address these concerns, the following actions have been completed.

1. Several important motor operated valve issues were identified by a Quality Assurance audit performed in August 1993. Since that audit, the PNPP motor operated valve program has received additional management attention and dedicated resources to improve the program and accelerate valve testing.

2. A motor operated valve program manual has been developed to establish the methodology and guidelines used to perform, review, and document the motor operated valve program for the Perry Plant. The Nuclear Engineering Department developed the Motor Operated Valve Program Plan for Generic

Letter 89-10 (MPP) to provide appropriate management review and approval and to document control of the motor operated valve program. The MPP is included as part of the PNPP Operations Manual. It includes guidance and position papers related to all items of Generic Letter 89-10 and the Supplements to Generic Letter 89-10.

3. On April 8, 1994, PNPP notified the NRC by letter that Perry Plant was changing its commitment to complete initial Generic Letter 89-10 testing. PNPP had previously committed to both statically test each MOV within the program and dynamically test each MOV that is practical to dynamically test by June 28, 1994. The revised commitment exempts some MOVs from testing (in accordance with NRC guidance), excludes some MOVs from dynamic testing (also in accordance with NRC guidance), and combines the remaining MOV test population into appropriate groups for the purpose of testing a representative sample of MOVs within the groups. An August, 1994, NRC evaluation confirmed the Perry Plant MOV Program effectiveness.

4. The fourth refueling outage schedule originally included 78 static valve tests and 24 dynamic valve tests. 94 valves were statically tested and 34 valves were dynamically tested in the fourth refueling outage. Of the 94 valves that were tested in the program, four butterfly valves in the Fuel Pool Cooling and Clean-up system indicated the required torque to close these four MOVs during a design basis event may be greater than the capacity of each MOV. Corrective action documentation was generated and appropriate actions initiated. These four valves have been tagged shut in their safety function (closed) position until corrective actions are completed. The fifth plant operating cycle will see continued valve testing, both before and during the outage, and continued strengthening of the motor operated valve program.

4.4.2 Circulating and Service Water System Improvements

The Perry Course of Action (PCA) improvement plan for the resolution of Circulating and Service Water System fiberglass pipe degradation issues is proceeding in a phased approach. The commitment for inspection of both systems in RFO4 was fully implemented as follows:

1. All fiberglass piping within the scope of CEI's RFO4 Inspection Program Plan for the Circulating and Service Water Systems was inspected and the baseline updated.

2. All defect categorizations were finalized and repairs completed in both the Circulating Water and Service Water Systems.

3. Design basis calculations were prepared, verified and reviewed by CEI for continued Unit operation.

Repair actions taken as a result of implementing PCA commitments are as follows:

1. All defects relevant to maintaining confirmed margins of material safety over the fifth operating cycle were repaired. 4300 square feet of fiberglass piping inspection and repairs were made to the Circulating and Service Water Systems. A total of 300 linear feet of fiberglass piping was replaced with steel piping.

2. As a preventative measure, repairs were specified and issued when inspection results indicated a combined area of distress or degradation (whether or not relevant). This applied particularly in areas associated with rigid connections.

3. Defects, which in the aggregate indicated an extreme distress condition, a degradation trend, or extreme repair measures, were candidates for complete replacement or total pipe reline.

In addition to activities performed in RFO4 for continued maintenance of the fiberglass piping, progress towards the final resolution of fiberglass degradation is as follows:

1. Consultants have been selected and are in process of establishing prudent options for the final resolution of fiberglass pipe degradation issues.

2. Centerior has established the objectives and the approach for evaluating, determining and selecting the final options from a plant benefit, cost and implementation viewpoint.

Remaining activities to complete PCA commitments are related to implementation of CEI's option selection process, establishing RFO5 work activities and implementation of detailed design and installation plans.

4.4.3 Reactor Recirculation Pump Shaft Replacement

Thermal cracking and mechanical fatigue failure may occur due to design deficiencies. To correct these deficiencies, the following actions have been completed.

1. Both Reactor Recirculating Pump Shaft rotating assemblies have been replaced. Replacement worked included the impeller, the pump/motor transition piece, an improved seal heater-cooler and a rebuilt pump seal. Both motors have been operated in both fast and slow speed uncoupled from the pump to obtain baseline motor vibration spectra. The pumps were then coupled to the motor

and operated in slow speed to collect coupled vibration data. During shutdown, the B pump was operated as the lead pump and showed improved vibration readings since RFO3. The A pump was operated intermittently to collect data but was otherwise shutdown. The B pump seal responded as designed during the vessel In-Service Leak Test. However the A seal cavity readings indicated a failed seal. The seal was subsequently replaced, with root cause analysis identifying a failed O-ring that was cut during installation. The removed rotating assemblies has been shipped for disposal thus preventing the long term storage of this radioactive material. The transition piece and supporting hardware has been retained for an emergency replacement along with the new rotating assemblies that are stored in the warehouse.

2. A design change has been implemented to re-establish the seal purge at a lower flow rate. An improved flow regulator has been installed along with additional flow instrumentation. The use of seal purge flow reduces dirt infiltration into the seals, thus increasing service lifetime. This is made possible by a new shaft design that increased the diameter below the seal and moved the shaft to impeller weld to an isothermal area. A pump heater/cooler was also installed that heats the purge water prior to being applied to the shaft. All modifications have been completed, procedure changes prepared and temporary instrumentation installed to provide alarms to the operator for out-of-spec seal flow rate.

3. Vibration monitoring has been performed and will continue during the upcoming operating cycle with the same equipment that has been used in the past. A new mounting bracket has been installed onto the motor itself to monitor the motor bearing . A design change has been generated that will provide permanent vibration monitoring equipment. The need for continued/long term vibration monitoring will be evaluated during the upcoming operating cycle.

4.4.4 Off-Gas Effluents

Off-Gas System equipment deficiencies have created the potential for increased offsite dose levels. To address this concern, the following actions have been completed:

1. All identified Off-Gas System leaks were repaired during RFO4.

2. Air in-leakage into the Off-Gas System was reduced to within design limits (from 55 scfm to 26 scfm).

3. All air handling units, vapor barriers, and heaters have been inspected and repaired as necessary, and identified air in-leakage has been corrected.

4. The Blower Control System was recalibrated and set points adjusted during the Fall Maintenance Outage.

5. All system insulation was restored to design configuration during RFO4.

6. Operating temperature of the Off-Gas System has been adjusted from 0°F to 35°F.

The system must now run for an extended period of time at 35°F to evaluate reliability.

4.4.5 Maintenance Rule Implementation

On July 10, 1991, the NRC published in the Federal Register (56 Fed.Reg. 31324) its final Maintenance Rule entitled, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." Regulatory Guide 1.160 and NUMARC 93-10 were issued in May 1993, to provide guidance on implementation of this rule. Compliance with 10CFR50.65 is required by July 10, 1996.

The following actions have been completed to establish a program to satisfy the requirements of the new NRC Maintenance Rule:

1. A Steering Committee consisting of the managers of Engineering Support, Mechanical Design, System Engineering, Operations, Maintenance, Regulatory Affairs, Quality Control, and the supervisor of Perry Client Services has been established. These managers represent the plant sections which have a significant part in implementation activities.The Davis-Besse Maintenance Rule coordinator also participates in Steering Committee activities. A charter defining Steering Committee responsibilities was approved by the Director of the Perry Nuclear Engineering Department (PNED).

2. A Project Plan providing an overview of the steps required for Rule implementation, the strategies identified in the PCA, and the intention to utilize the industry guideline NUMARC 93-01 has been concurred to by the Steering Committee and approved by the Director PNED. The Project Plan includes a schedule for completing implementation activities to meet the July 1996 compliance date, and a resource estimate by action item and responsible organization(s).

3. As stated in the strategies, Perry personnel have been participating in industry activities to exchange ideas, plans and information. Personnel have participated in NEI/NUMARC workshops and meetings, and are providing requested information for NEI distribution. Perry is also supporting BWR Owners Group initiatives. Personnel from Perry have visited Grand Gulf Station to examine

their implementation program, bringing back insights which have been incorporated into the Project Plan. Information exchange has also taken place at EPRI meetings on related topics. Regular communication has occurred with Davis-Besse and Clinton Station personnel.

4. It is Perry's intent is to utilize existing programs, procedures and databases to the maximum extent possible thus avoiding the costly development of a new standalone Maintenance Rule program. To accomplish this, a process has been implemented for verification and validation (V&V) on three plant systems to identify the programs which interface with Rule requirements, how they can be utilized and how they may need to be modified to support Rule compliance. Interfacing programs include the Work/Scheduling processes and PPMIS, Condition Reports and corrective actions, Reliability Information Tracking (RITS), Operations LCO and Tagout Logs, and equipment testing activities (SVI/PTI). V&V activities are over 50% complete and some initial findings regarding work and testing documentation have been provided to the Steering Committee.

5. In addition to the specific strategy areas described above, several initial implementation steps have been completed. The systems which must be considered under the scope of the Rule have been established by a multi-discipline team of engineering, operations, and maintenance personnel. Systems which are considered to be risk significant or standby per NUMARC 93-01 have also been defined. And, a preliminary set of performance criteria has been developed, against which to judge system and plant performance.

The next steps in the completion of action items for Maintenance Rule Implementation include:

- Completion of the V&V process and initiation of necessary program enhancements.
- Assembling and training a Working Group.
- Review of Cycle 4 system performance history.
- Collection of Cycle 5 performance data.

4.4.6 Control Room Upgrade

Numerous problems have been identified by Control Room Operators with regard to the configuration of work spaces and access to critical information during "off-normal" conditions. To address these issues, the following significant Control Room upgrades have been completed.

- In the Supervising Operator (SO) area, two work stations have been added at the P680 panel and one work station has been added at the P877 panel.

- Two 6'X8' computer projection screens have been mounted over the horseshoe area. These screens display the Safety Parameter Display System and Process Computer System. They are clearly visible anywhere within the horseshoe area, and most other areas of the Control Room. The displays can be controlled independently from both the SO work station and the Unit Supervisor work station.

- The Unit Supervisor area has been ergonomically reconfigured to enhance access to the newly installed computer projection display and facilitate an enhanced working environment. The new configuration also assists in limiting and controlling access to the area.

- The entry area has been reconfigured to accommodate required tasks performed in that area and allow control of access/traffic.

Respective upgrades have also been made to the Simulator.

4.4.7 Flow-Accelerated Corrosion Program

Based on industry experience and a review of the Perry Flow-Accelerated Corrosion Program, it was determined a revision to the program was required to ensure consistency with current industry experience, as defined in Nuclear Safety Analysis Center (NSAC)-202L and the Electric Power Research Institute (EPRI) developed "CHECWORKS" family of computer software. The following actions have been completed in support of this activity.

1. Vectra Technologies, Inc. was hired as a consultant to assist in the development of the program revision.

2. The Responsible System Engineer received Chexal-Horowitz Users Group (CHUG) sponsored training in Flow-Accelerated Corrosion and the Checkworks code.

3. All of the 83 piping systems have been reviewed to the parameters outlined in NSAC-202L. This review identified 18 Perry piping systems possessing attributes of susceptibility to the effects of flow-accelerated corrosion.

4. Computer modeling of the 18 piping systems has been initiated for identification and ranking of the most susceptible fittings/piping. To date, eight systems have been completed with an overall 67% of activities for modeling being accomplished.

5. During the 1993 Fall Maintenance Outage and RFO4, inspections and the gathering of ultrasonic wall thickness data were performed at 232 piping areas. This data is used to establish actual wear rates and frequency requirements for future examinations.

4.4.8 Post Maintenance Test Manual

The Perry Course of Action Issue 4.4.8 identified that there is no single compilation of requirements for the retest following work on equipment and components. The action plans to address this issue included:

- Review of current testing practices.
- Review of industry practices on pretesting.
- Review of INPO Good Practices regarding testing.
- Preparation recommendations for a post maintenance test manual.

To these ends, the following activities have been completed:

1. A multi-discipline Post Maintenance Test Review Team was assembled to review and improve the current practices for pre-maintenance and post-maintenance testing.
2. A review was conducted by the multi-discipline team that evaluated past indicators, solicited recommendations and conducted interviews with planners, engineers, supervisors and managers.
3. A review of industry practices was also conducted as part of the industry survey on Post Maintenance Test Programs.
4. INPO Good Practice MA-305, Post Maintenance Testing (INPO-87-028), was reviewed to assess the inclusion and applications of the INPO recommendations into the Perry Post Maintenance Test Program. Key elements essential to a successful Post Maintenance Test Program were identified in this process.
5. Recommendations were generated by the Post Maintenance Test Program review team which detailed the development and control of a Perry-specific Post Maintenance Test Manual. These recommendations were submitted to System Engineering for action.

4.4.9 ILRT/LLRT Program

The Integrated Leak Rate Test/Local Leak Rate Test (ILRT/LLRT) needs to be upgraded to improve performance. The following actions have been completed to support this activity.

1. BCP Technical Services Inc. was contracted to provide third party review of the ILRT/LLRT program. This review consisted of three phases; 1) evaluation of testing program requirements as defined in surveillance test instructions and associated plant procedures; 2) evaluation of planning and scheduling

   documents, manpower allocation, scope of supporting activities and test instrumentation; 3) evaluation and technical consultation during the 1994 ILRT.

   All phases have been completed and BCP's recommendations were reviewed by site personnel and applicable items for ILRT performance were incorporated into SVI T23-T0394, "Integrated Leak Rate Test".

2. Instrumentation recommendations were evaluated and new style dew cells, pressure gauges, and a Fluke data logger have been leased from BCP for use during the 1994 ILRT. All instrumentation is on-site and calibrated.

3. RTD and dew cell placement were evaluated by BCP which resulted in a recommendation for relocation. This was approved by CEI design engineering. The relocation of these instruments provides consistent and reliable data.

4. PAP-1120, "Type A, B, and C Leak Rate Test and Accountability Program," was revised to incorporate additional guidance to determine the need to perform pre-maintenance LLRT's. In addition it allows the LLRT program to monitor containment leakage rates between Type A tests.

5. The Integrated Leak Rate Test (ILRT) was successfully performed in July 1994, using the leased instrumentation. A report of the test has been initiated.

The next step in this program is to revise PAP-1120 to incorporate reduced accident pressure as required by new Technical Specifications. Other BCP recommendations and experience from the upcoming ILRT will be incorporated in this revision process. This revision process is currently scheduled for completion by the end of 1994.

4.4.10 Suppression Pool Strainers

The suppression pool strainers have been found fouled and/or damaged in previous inspections since RFO1. Actions have been performed to address this problem including improving housekeeping/cleanliness standards and inspecting both the

containment and drywell portions of the suppression pool. Pump strainer monitoring and material accountability and control have been implemented, and personnel training regarding this problem and its importance to Perry's safe operation has been completed. Design alternatives have also been evaluated and the following activities have been completed.

- All ECCS Strainers were redesigned and replaced.
- Containment and drywell roughing filters were removed.
- Fibrous insulation and other items within the pool swell region which could potentially foul the strainers were removed.
- Strippable coatings in containment were removed and blistered paint was evaluated and reworked, as necessary.
- Strainer back-flush capability was implemented.
- Changes were made to the Chemistry control program to enhance the monitoring of the suppression pool water.

Long-term corrective actions to address suppression pool cleanliness and ECCS Strainer fouling include the following:

- Suppression pool covering material (non-fibrous based) was approved and utilized in RFO4.
- Plant instructions were revised to incorporate steps to backflush the RHR 'A' and 'B' strainers.
- Special equipment was purchased to facilitate more thorough inspections of the suppression pool.
- A design modification was implemented to add remote ECCS suction pressure instrument indication in the Control Room. Alarm capability is included for RHR 'A' and 'B'. ERIS indication was added for RHR 'A', 'B', and 'C' and Low Pressure Core Spray.

4.4.11 Safety Relief Valve Seat Leakage

The most detrimental effect of Safety Relief Valve (SRV) seat leakage is that is results in excessive use of the Residual Heat Removal (RHR) system in the suppression pool cooling (SPC) mode during normal plant operations. Reduction or elimination of SRV leaks will minimize RHR SPC operation.

To address this problem, a multi-discipline Safety Relief Valve Task Force has been formed to work on issues that are anticipated to improve SRV seat leakage performance. These issues include application of more stringent post-refurbishment leak test requirements, root cause analysis of SRV leakage, investigation into potentially eliminating post-installation lifting of the SRVs for surveillance testing, evaluation of the development and installation of an alternate suppression pool cooling design modification, and application of additional SRV body insulation to reduce potential valve body thermal gradients which could distort internal dimensional tolerances.

The SRV Task Force is also investigating the onsite bench testing of SRVs with nitrogen such as that currently performed at the Clinton Nuclear Power Station.

All 19 SRVs were replaced in RFO4 due to seat leakage and poor performance histories during surveillance testing.

4.4.12 Main Steam Isolation Valves

Leak rate failures for the 26" Atwood & Morrill Main Steam Isolation Valves (MSIV) has been above industry norms. To address this issue, a MSIV Task Force was established by System Engineering to review industry experience regarding effective methods for resolving this problem. The review of industry experience and vendor correspondence identified positive results with the Atwood & Morrill design modification package for MSIVs. The modification detailed requirements to improve seating characteristics of the valve. It was determined that Perry would implement these MSIV modifications. Based upon these recommendations, the following actions have been completed:

1. The Atwood & Morrill design modification package was completed for inboard and outboard valves on MSIV lines A, B, and D during RFO3. Design modifications on inboard and outboard MSIV line C were completed during RFO4.

2. A safety related air system to the outboard MSIV accumulators was installed to ensure post-accident leak tightness in the event of a loss of normal accumulator air pressure.

All MSIVs have now been properly modified and conditioned to produce successful LLRT results for the next several cycles.

4.4.13 Reactor Vessel Level Instrument Modification

During RPV depressurization, either rapid or slow, dissolved noncondensible gases can come out of solution and travel up the reference leg due to the density difference between the noncondensible gases and the water. This can result in the formation of gas pockets (large bubbles) in the reference leg, which in turn can cause water in the condensing chamber to overflow into the steam leg and thus be transported back to the RPV upon depressurization. This reduction of water inventory in the condensing chamber and reference leg can result in potentially non-conservative (biased high) RPV water level indication. Based upon this potential occurrence the NRC issued Bulletin 93-03.

The NRC Bulletin requested that BWR licensees commit to short term compensatory actions and subsequent installation of a reference leg backfill modification or other effective hardware change that would prevent the build-up of the noncondensible gases in the reference legs. The short term actions to address this issue included:

- Increased monitoring of the reactor vessel water level during depressurization.

- Increased restrictions on operations with the potential to drain the reactor vessel during Mode 3 operation.

- Training licensed operators to the lessons learned in the WNP-2 event.

These actions were completed at Perry within the NRC Bulletin requested time frame. Additionally, more detailed training of licensed operators was requested and completed in July 1994, within the NRC Bulletin time frame.

Each licensee was also requested to implement hardware modifications necessary to ensure the level instrumentation system design is of high functional reliability for long term operation. Pursuant to these requirements, Perry installed the permanent continuous backfill modification during the Fall Maintenance Outage. Upon completion of the installation, an extensive pre-operational test was performed per TXI-0173. Its purpose was to demonstrate that the modification would not adversely affect the RPV instrumentation. Upon successful completion of the test, the continuous backfill system was declared operable. The system has performed as designed since its installation.

Perry continues to provide monitoring of the backfill system via operator rounds. The operators assure that the proper flow rates are maintained. Also, during plant startup and shutdown activities, the system is monitored to detect evidence of noncondensible gases. No evidence of noncondensible gases coming out of solution, or notching, has been detected during the two start-ups and shutdowns since the modification has been installed.

4.4.14 Temporary Scaffolding

Scaffolding is installed and removed each outage or remains to support various repetitive tasks. Installation of temporary scaffolding requires a large labor expenditure; and in the RRA, potentially results in increased radiation exposure. To address the potential savings in the use of permanent scaffolding, the following actions have been completed.

1. 42 scaffolds were reviewed for replacement with permanent scaffolds.

2. Engineering has issued 19 Engineering Design Change Requests (EDCR) to address those scaffolds which were the best candidates for replacement with permanent platforms.

3. These EDCRs have been prioritized and are scheduled for installation over the next three cycles.

4.4.15 Engineering Spare Parts List (ESPL)

Information related to the Perry Approved Applications List (AAL) was determined to be inadequate. To address this issue, an Engineered Spare Parts List will be developed and maintained. Pursuant to this effort, the following action items were identified:

1. Review other plant experiences and benefits.
2. Perform pilot study of ESPL project.
3. Evaluate pilot study results for continuation justification.
4. Perform ESPL project if justified.

All action items up to and including evaluation of the pilot study results have been completed. In addition, a bid package for the remainder of the project has been prepared and is currently being evaluated for approval.

4.4.16 Auxiliary Boiler Contamination

In-plant leakage has resulted in contamination of the Auxiliary Boiler. To address the problem, all of the Auxiliary Boiler system primary isolation valves and a majority of the plant side valves identified as leaking were repaired during the 1993 Fall Maintenance Outage. During plant restart from the outage, temperature monitoring identified no in-leakage sources and the Auxiliary Boiler system remained free from contamination. The last isolation valve was repaired during RFO4. Ongoing monitoring is conducted to identify any new sources of boiler in-leakage. No new sources have been identified to date and the Auxiliary Boiler remains free from contamination.

4.4.17 Hangers (Spring Cans)

Multiple Condition Reports have been generated to document problems with spring can travel stops. The problems are categorized into two main areas; personnel safety hazards due to travel stops falling from stored positions and travel stops installed in the spring cans when the piping system is in service.

To address these problems, walkdowns have been conducted on all spring cans to identify personnel hazards and incorrectly installed travel stops. Additionally, a decision has been made to store all travel stops in the hot tool crib. All spring cans will also be labeled as work is performed on them on a work order by work order basis.

4.4.18 Material Handling

An excessive quantity of material and/or parts is currently pre-staged or issued for plant maintenance. Many of these parts are not used, resulting in large return rate to the warehouse. To alleviate this problem, the following actions have been initiated:

1. Material Management Section has developed a plan to reduce material cost through an improved issuance and return process and lower inventory levels. Implementation of the plan will follow RFO4.

2. Materials Management Section and Information Systems conducted an assessment of the computer changes required to allocate stock against individual work orders. The assessment yielded required computer revisions and their implications. It was also determined that changes to the computer system has both implications and use at Davis-Besse and our fossil plants.

3. Material Services Section has determined that contingency materials and parts will no longer be pre-staged, but remain allocated and "on the shelf" in the warehouse.

4.4.19 Inventory Review

Perry's Warehouse inventory value is excessive. Current procedures, practices and computer programs have failed to provide an environment by which a means of maintaining an optimum inventory level can evolve. The following actions were completed to determine Perry's optimum inventory value and assure inventory accuracy.

1. The Economic Order Quantity (EOQ) process has been implemented at Perry to maintain inventory at optimum levels. The EOQ process is based on the

Corporate EOQ formula. Inventory levels are also monitored using the Materials Management Section performance indicators. $7 million of inventory has been identified for removal from the warehouse, of which $3 million has been removed.

2. Materials Management Section personnel have received training on the Corporate EOQ process.

3. Cygna Energy Services has been contracted to perform an evaluation of all of Perry's stock codes using the EOQ process, in addition to various other methods. There are approximately 30,000 safety related stock codes in existence. Materials Management Section has established a goal to review/evaluate 15,000 stock codes for 1994 and the remainder by December 31, 1995.

4. Bar-coding technology will be utilized in the material management data processing system. As a first step in the preparation for its use, the Perry Warehouse has been bar-code labeling all material coming into the Warehouse for storage. All Warehouse locations have also been bar-coded. The complete bar-code system will be installed in three phases:

Phase 1	Receiving
Phase 2	Issuance
Phase 3	Cycle Count and Miscellaneous

5. Performance indicators have been established to monitor specific material related activities. Relevant information is tracked and graphed and forwarded to the appropriate functional groups for review.

4.4.20 Solenoid-Operated Valve Testing and Design

The NRC notified holders of BWR Operating Licenses of problems that existed with solenoid-operated valves (SOV). Several events and experiences were described in the NRC reports regarding SOV failures which have affected safety related components and systems. To address the concerns with SOVs, Perry has completed the following items.

1. A Performance Improvement Team (PIT) was formed to evaluate the Perry Plant and industry concerns relative to SOVs.

2. A plan was developed by the PIT to establish a significant population of SOVs that should be evaluated. Based on criteria established by the PIT, the population amounted to approximately 150 valves.

3. All designated valves were reviewed against four critical areas defined in NUREG-1275, Volume 6: Design Application, Equipment Qualification, Testing, and Maintenance. Each review resulted in a white paper being submitted for each critical area. These white papers were combined into a final report which outlined the conclusions and recommendations of the PIT.

These findings are summarized as follows.

- From an equipment qualification standpoint, Perry has a program that meets the industry standards and guidelines for all safety related SOVs.

- No need was identified for Perry to establish a formal testing program.

- No major deficiencies were identified related to safety related SOVs.

- A recommendation was generated for the maintenance area to include re-evaluating safety related SOVs for maintenance frequencies, and to establish a maintenance frequency for non-safety related SOVs.

- It was concluded that Perry has a low failure rate of SOVs. It was also concluded that Perry does not have major design deficiencies or concerns related to the design application aspect of SOVs installed in the plant.

Recommendations were generated from a design standpoint and a final review of these recommendations has been completed. The next step in the completion of this activity is to establish action items and due dates to ensure all recommendations are completed.

4.4.21 Air Operated Valve Program

A wide range of design and maintenance problems with Air-Operated Valves (AOV) has been experienced in the nuclear industry. Perry has identified an action plan to address this issue.

1. A review of the Davis-Besse AOV program.

2. A review of past experience with AOVs in the industry and at Perry to

   determine the need for an AOV program. This action is to be completed by 12/30/95.

To date, no significant actions have been completed for the AOV program.

4.4.22 Hydrogen Analyzers

Documented history of the performance of the hydrogen analyzers has been much less than desirable. Numerous Condition Reports have been initiated to address the inaccuracy and lack of system reliability. Utility correspondence revealed similar problems with similar systems that were corrected by the implementation of vendor recommended changes. As a result, a design change was developed to modify the system consistent with the vendors improved design. The modified design incorporates the latest technology. The design change includes:

1. Enhanced reliability and accuracy

   - Replacement of the reagent and calibration gas flow meters with units that provide a more accurate indication and valving for flow control.

   - Replacement of a bypass flow check valve with a flow meter.

   - Replacement of the system chassis from a 3 wire cell configuration to a 4 wire cell configuration. This design offers more stability and faster system response.

   - Decreasing the system span from 30% to 10%. This change increases the accuracy of readable hydrogen concentrations that are associated with the actions defined in the Plant Emergency Instructions. The change also reduces the response time of the analyzer due to quicker system stabilization.

   - Increasing the reagent and calibration gas bottle regulator pressures for improved calibration gas flows.

   - Reconfiguration of the analyzer cell flow path to eliminate the pump oscillations from the cell assembly for more calibration accuracy.

   - Increasing the hot box temperature from 130°f to 285°f. This change decreases system response time by rapid purging of contaminants from the cell (typically water accumulation from the catalytic reaction of the cell assembly) due to the higher temperature.

2. Personnel Safety

   - Installation of test fittings and associated valves to preclude the need for personnel to climb above the equipment to perform routine system calibrations. This change eliminates scaffold erection cost and operator support as I&C personnel can operate the new test valves.

3. System Enhancements

- Addition of a ground cable to help protect delicate electronic components from electrical spikes.

- Deletion of wide/narrow range switching. A single range is now utilized eliminating components while improving system accuracy.

- Revision of hydrogen alarm setpoints to correspond to Plant Emergency Instruction action levels to enhance operator awareness of conditions.

All modifications have been completed and retested, and the system is considered operable. Preliminary operation showed a great improvement in system operation, stability, repeatability and accuracy. During the performance of the operational surveillances, both analyzers operated almost identically to each other with all readings within the allowable bands.

A new procedure was developed based on the recommendations of utilities that successfully operate this type of analyzer. This test instruction performs an abridged monthly functional test which provides two benefits. The first is to ensure the operational readiness of the equipment by ensuring the obtained data is within permissible values. The second is to provide manipulation of internal components during operation to maintain diaphragm flexibility, essential for overall flow control and critical for proper system operation.

4.4.23 Integrated Scheduling

The purpose of the Integrated Scheduling Action Plan is to implement an Integrated Long Range Plan which encompasses three or more cycles to provide clear project work scope definitions for detailed design and implementation schedules. This requires a consistent prioritization system for modifications and their corresponding work documents; a schedule for modifications which is based on installation windows with milestones for completion of engineering work; a consistent authorization process for all projects (not just modifications); consistent tracking of level-of-effort work items.

In order to accomplish this plan, several action items have been assigned. They include:

- Develop a schedule which ensures the tracking of plant modifications from inception to completion.

- Prioritize all modifications using the same prioritization system for plant work items.

- Establish standard milestones for completion of design modifications to support the On-Line Schedule.

- Establish the process for identifying and authorizing all projects including modifications and programs.

- Establish a centralized activity tracking system to provide accountability and tracking for routine work items.

The following activities have occurred in support of these action items.

1. Modification Schedule

   Many changes to the Engineering Schedule were made over the last year. Plant modifications are scheduled for conceptual engineering, detailed design, procurement and installation. The installation is scheduled to support appropriate Functional Equipment Groupings in the on-line maintenance schedule or future refueling outage. Additionally, planning lead-times have been established for overall completion of engineering and procurement to support installation of modifications during either refueling outages or system maintenance windows. The closure activities for modifications are tracked through the central database for action items.

   Previously, the Engineering Schedule only included those modifications assigned to the current cycle. As the modifications are assigned to a particular Operating Cycle for installation, they are also tied to the overall Cycle milestones for completion of engineering and procurement. The Engineering Schedule was also expanded to include the plant's Non-Generating Modifications.

   The priority system for modifications was converted to the same priority system as other plant work documents including Work Orders. The majority of the modifications have been prioritized using this system. Based on the relative scores of the modifications, the initial scope for Cycle 5 was developed. The initial Cycle 5 scope is currently being evaluated by the Project Review Committee for operational impact, regulatory impact, equipment obsolescence and resource availability. The remaining modifications will be evaluated for assignment to the appropriate Cycle for installation or recommended for cancellation in conjunction with the Engineering Action Plan discussed in Section 3.5.

2. Project Identification and Authorization

The process for evaluating and authorizing projects has been revised. Previously, only modifications were evaluated and authorized as projects. Other projects such as engineering studies, major maintenance activities or major programs were not evaluated by a management-level committee. The DCP Review Committee has been restructured as the Project Review Committee with more membership from the plant organization. The Project Review Committee has the responsibility to evaluate all projects to determine the technical feasibility and to authorize the projects for implementation. A Director level committee (Perry Scope Committee) has also been established for additional oversight of projects greater than $100,000 in total cost.

The Policy Statement for the Project Authorization Process has been issued. The Project Review Committee and Perry Scope Committee have been established and their respective charters have been issued. Procedures have been developed to describe the process for project authorization including the identification, evaluation and implementation of non-modification projects. The Committees are currently establishing the Cycle 5 work scope for modifications and other projects. This will provide the basis for the 1995 budget.

3. Centralized Activity Tracking System

To provide a centralized activity tracking system, the existing Operations Action Tracking System (OATS) was revised. OATS served more as a document tracking system than an activity tracking system. OATS was upgraded to the Perry Master Activity Tracking System (PMATS) in January, 1994. The primary changes in the computer system were the additional capability to track the actions, responsibilities and due dates for document completion. The upgrade to PMATS provided the capability to track individual actions eliminating the need for separate action tracking systems in each Section.

The documents tracked in OATS were updated in PMATS to include additional information on responsibility, due date and action required to complete the documents. With the installation of PMATS, individual action tracking systems are being eliminated by loading the information into PMATS. By December 1, 1994, all stand-alone tracking systems are to be eliminated unless specifically exempted by the Vice-President. To date, the training-related activity tracking programs and commitment tracking programs have been exempted from PMATS.

The general upgrade to PMATS included the implementation of a standard report system to track the actions assigned to individual Sections. The standard report system is available to all personnel and provides a variety of reports to show the open actions from both PMATS and the commitment tracking system.