August 14, 1997

Duke Power Company
ATTN: Mr. W. R. McCollum
Vice President
Oconee Site
P. O. Box 1439
Seneca, SC 29679

SUBJECT: MEETING SUMMARY - OCONEE NUCLEAR STATION (ONS)

Dear Mr. McCollum:

This refers to the open Management meeting that was conducted at your request in the Region II office on August 7, 1997, for you to present a self-assessment of ONS performance. A list of attendees and a copy of your presentation handout are enclosed.

It is our opinion that this meeting was beneficial in that it provided the NRC staff with a good overview of your perceived strengths, as well as existing challenges and plans for improvement.

In accordance with Section 2.790(a) of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and its enclosures will be placed in the NRC Public Document Room.

Should you have any questions concerning this meeting, please contact us.

Sincerely,

Original signed by:
Scott M. Shaeffer, Acting Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos. 50-269, 50-270, 50-287
License Nos. DPR-38, DPR-47, DPR-55

Enclosures:
1. List of Attendees
2. Licensee Presentation Handouts

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Compliance
Duke Power Company
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cc w/encls cont'd: (See page 2)

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P PDR

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OFFICE	RII:DRP					
SIGNATURE						
NAME	RCarroll					
DATE	08/13/97					
COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\OCOMTG.SUM

LIST OF ATTENDEES

NUCLEAR REGULATORY COMMMISSION:

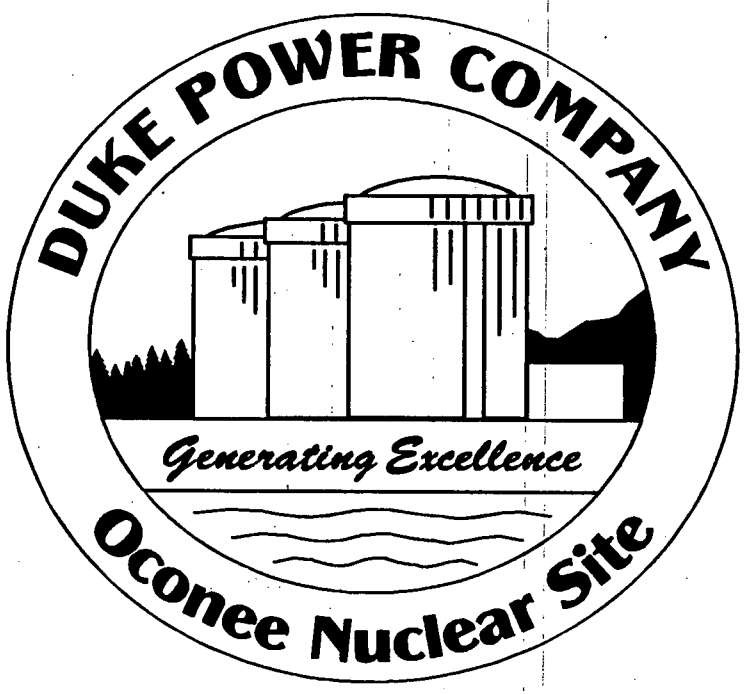
L. Reyes, Regional Administrator, Region II (RII)
H. Berkow, Director, Project Directorate II-2, Office of Nuclear Reactor Regulation (NRR)
B. Mallett, Acting Deputy Regional Administrator, RII
J. Jaudon, Director, Division of Reactor Safety (DRS), RII
L. Plisco, Deputy Director, Division of Reactor Projects (DRP), RII
S. Shaeffer, Acting Chief, Branch 1, DRP, RII
C. Ogle, Senior Resident Inspector - Vogtle, DRP, RII
H. Christensen, Chief, Engineering Branch, DRS, RII
D. LaBarge, Project Manager, Project Directorate II-2, NRR
S. Freeman, Resident Inspector - Oconee, DRP, RII
M. Dudley, Region II Coordinator, Office of the Executive Director for Operations
R. Carroll, Project Engineer, Branch 1, DRP, RII

DUKE POWER:

W. McCollum, Vice President, Oconee Nuclear Station (ONS)
B. Peele, Station Manager, ONS
W. Foster, Safety Assurance Manager, ONS
M. Nazar, Engineering Manager, ONS
J. Burchfield, Regulatory Compliance Manager, ONS

ENCLOSURE 1

OCONEE NUCLEAR STATION



SELF ASSESSMENT PRESENTATION

AUGUST 7, 1997

OCONEE NUCLEAR STATION
SELF ASSESSMENT MEETING
AGENDA

- Introduction
- Overview of Station Performance
- Engineering
- Operations
- Maintenance
- Plant Support
- Summary

OCONEE NUCLEAR STATION
SALP ASSESSMENT

- Purpose: Balanced Self Appraisal

TOO MANY EVENTS

SITE DIRECTION

- Put Defenses in Place
- Conduct Near Term Assessments
- Perform Required Immediate Actions
- Increase Self Assessment
- Continue Long Term Initiatives

OCONEE PERFORMANCE

- Perspective
  - Dedicated Staff
  - Aware of Issues and Root Causes
  - Initiatives Are Addressing Issues
  - Real Equipment and Design Issues
  - Process Improvements Can Help
  - Performance Improvements Needed
  - Accountabilities Need Strengthening

STRENGTHS & CHALLENGES

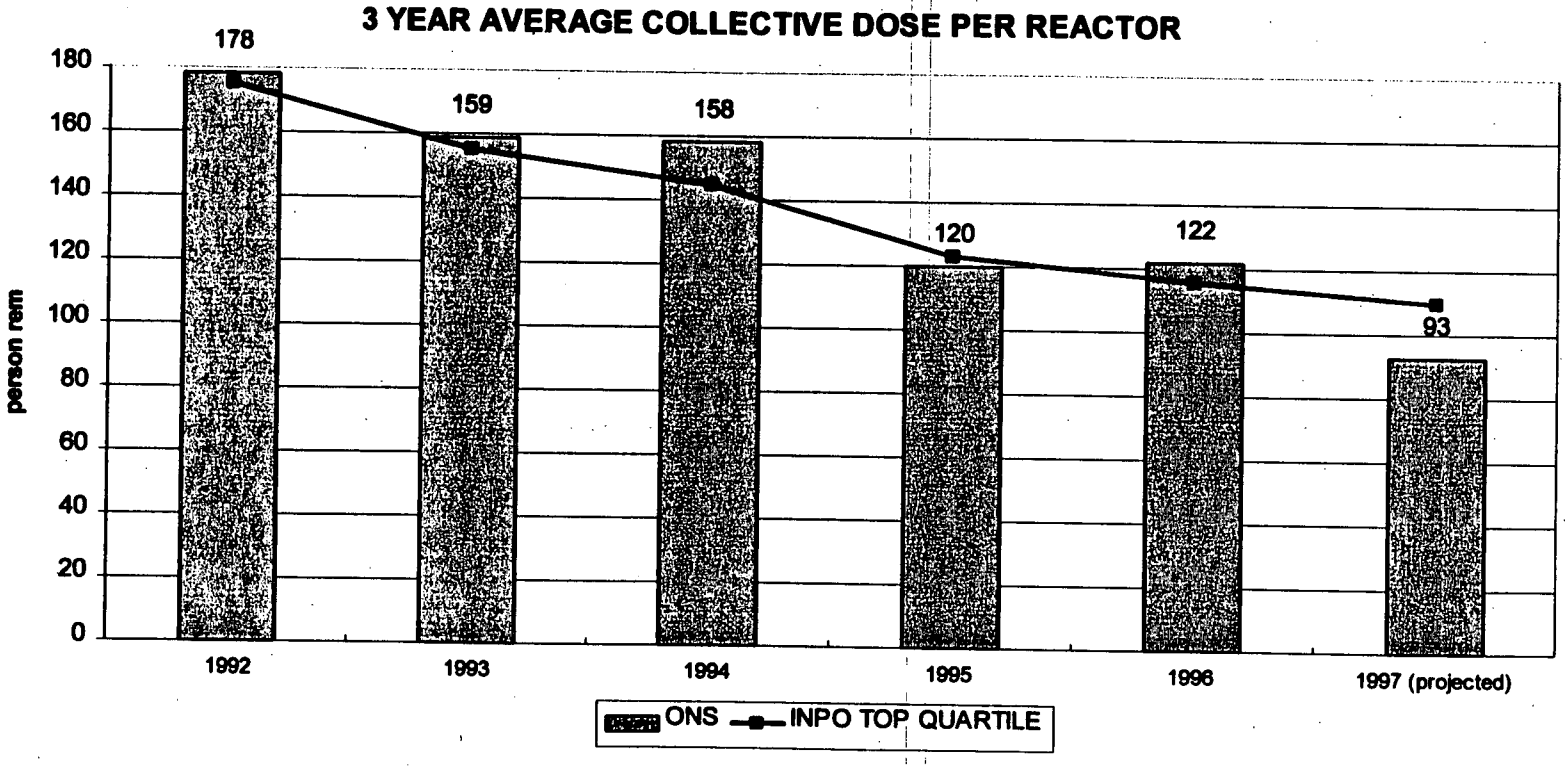
STRENGTHS

- RP/Chemical Control
- Conservative Decisions
- Technical Capabilities
- Design Basis Initiatives

CHALLENGES

- Human Performance
- Equipment Reliability
- Procedure Use & Adherence
- Self Assessment Culture
- Operational Focus
- Process Formality

PERSONNEL RADIATION EXPOSURE



FOCUS AREAS

DESIGN BASIS	SYSTEM/ EQUIPMENT RELIABILITY	HUMAN PERFORMANCE
NAZAR	*NAZAR*	*McCOLLUM*

SELF ASSESSMENT/ CORRECTIVE ACTION	OPERATIONAL FOCUS	FINANCIAL MANAGEMENT
FOSTER	*PEELE*	*MILLS*

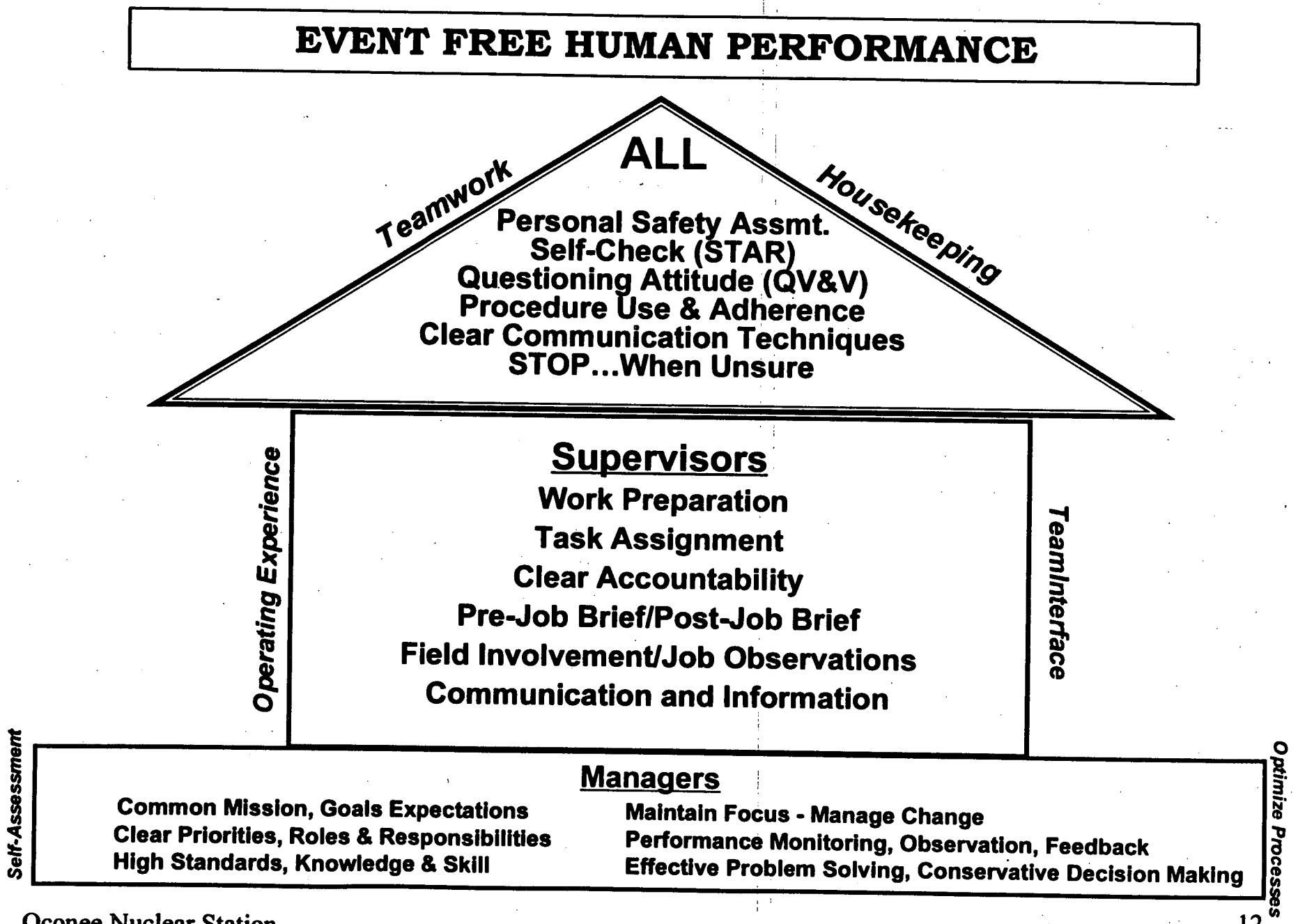
DESIGN BASIS INITIATIVES

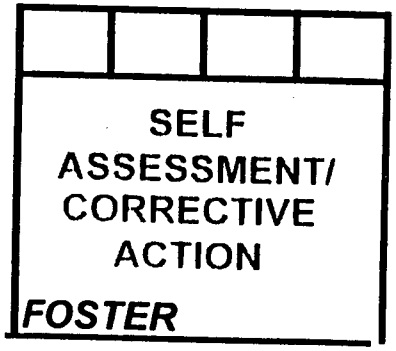
- OSRDC
- Chapter 15 Reanalysis
- UFSAR Review
- Service Water Upgrade Project
- Emergency Power Project

EQUIPMENT / SYSTEM RELIABILITY CONCERNS

- CRDM's
- Reactor Coolant Pumps
- Large Motors
- Facility Materiel Condition

OCONEE HUMAN ERROR REDUCTION MODEL





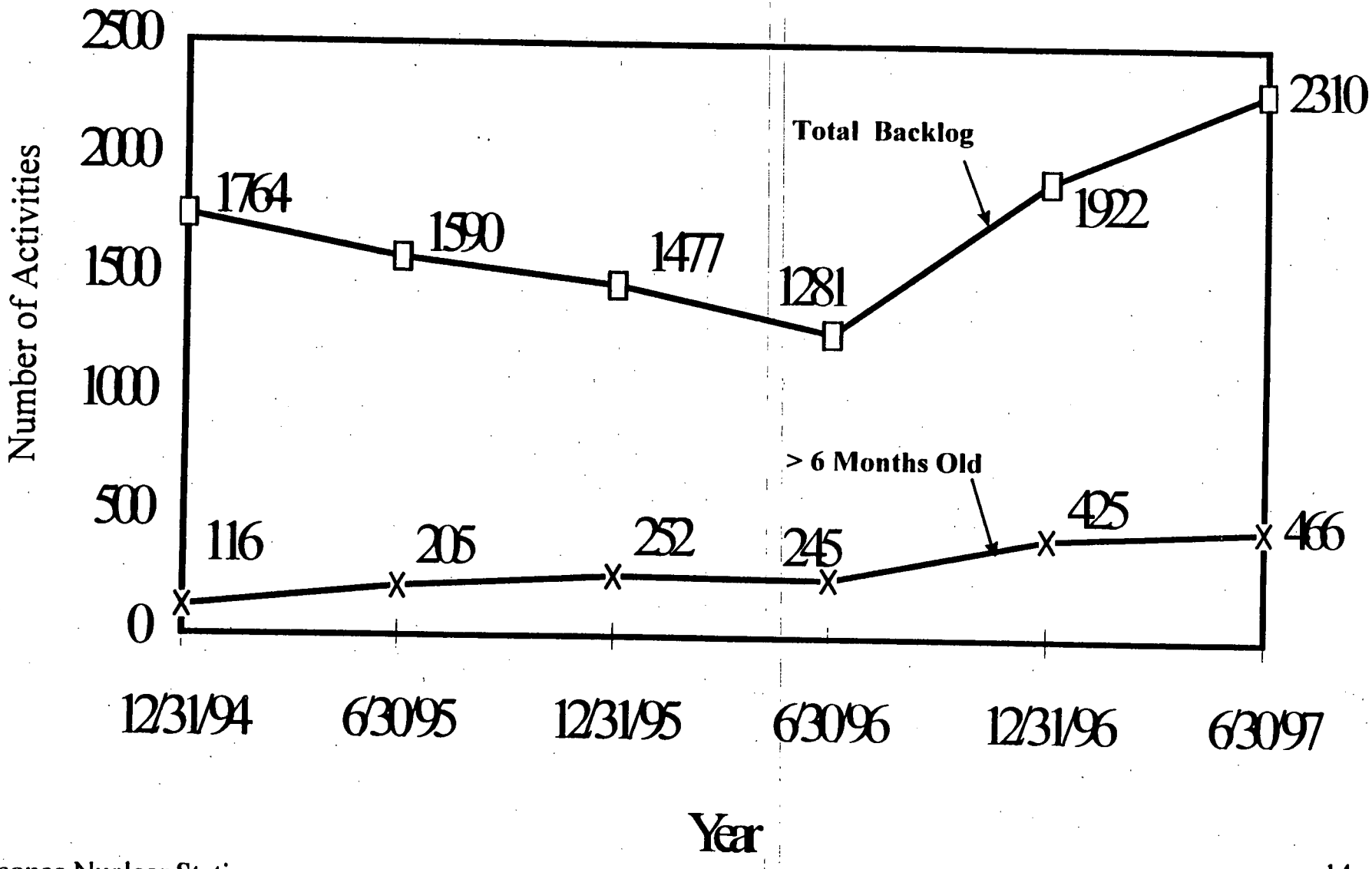
RECOVERY FOCUS AREA

SELF ASSESSMENT/ CORRECTIVE ACTION

Identify and address Site issues through effective self-assessments.

- ***Initiatives:***
  - **PIP Backlog Reduction**
  - **PIP Quality**
  - **Manager Observation/Group Assessment Effectiveness**
  - **Inplant Review and SRG Job Observation (Quick Hitters) Process**
  - **Increased Benchmarking**
- ***Measures:***
  - **Corrective Action PIP Backlog**
  - **Manager Observations Conducted**
  - **Group Self-Assessments Conducted**
  - **PIP Corrective Action Effectiveness**
  - **Number of inplant reviews and SRG Job Observations (Quick Hitters) Conducted**
  - **Number of outside benchmarking activities completed**

CORRECTIVE ACTION BACKLOG



Operational Focus

- Engineering / Operations / Maintenance Communications
  - Established daily Engineering management focus meetings
  - Assigned ownership for daily operational concerns
  - Implemented action register
  - Implemented biweekly Operations/Engineering management meetings
  - Implemented monthly Maintenance/Engineering management meetings

ENGINEERING

ENGINEERING STRENGTH

Integrated Engineered Safeguards Test

The Oconee Integrated Engineered Safeguards Test was performed January 2-5, 1997 to demonstrate the ability of the Oconee emergency power system and engineered safeguards equipment to perform during six LOCA and LOOP scenarios. Tests were bounding and involved all three Oconee units for simulated LOOP and LOCA/LOOP events; the tests included Keowee from "initially in standby" and from "grid generation", included both overhead and underground paths from Keowee and a Lee Combustion Turbine and associated power paths. The test was a complete success: Keowee, Lee, & Oconee performed very well; test acceptance criteria were met for all six tests. Extra loads (Unit 2 non-safety loads 2X1, 2X2, 2X3, and 2 CCW Pumps) were added at the conclusion of test to verify the capability of CT4 to supply full load requirements (total CT4 load approx. 15 MW).

NRC had positive comments on the execution of the test, pre/post-test briefings, communication, and the "back-shift" problem resolution team. A test report presenting the results of the test, including much of the technical data, was submitted to the NRC on April 30, 1997. An analysis comparing "Actual Test Results versus Calculated Results" is scheduled for completion by December 31, 1997.

ENGINEERING STRENGTH

Broad Functional Testing

Throughout the SALP period, broad functional tests were performed to verify design basis capability of various systems.

A special Low Pressure Service Water (LPSW) test was conducted in March of 1997 to gain a better understanding of actual plant responses to a LOOP in the LPSW cooling to Reactor Building Cooling Units (RBCU) and auxiliary coolers. Test results showed conservatisms in the calculations and were used to enhance the quality and accuracy of Oconee's response to GL 96-06.

Extensive ICS testing went very well overall and textbook transient responses were seen. Special transient tests conducted included loss of power at zero power, loss of power at power, turbine trip, load rejection, loss of a feedwater (FDW) pump, loss of a RCP, maximum runback, and a reactor trip (unrelated to ICS mod but data was recorded and analyzed).

A Keowee endurance test included load run, endurance and margin, and hot restart tests which demonstrated the ability of the Keowee units and support systems to operate for extended periods at low load. Units were operated at 69 MW for 16 hours followed immediately by 24 hours of 20 MW operation followed immediately by a shutdown and emergency start test. All results met acceptance criteria.

A Standby Shutdown Facility (SSF) 24 hour Diesel generator run was successfully performed in September 1996; this test demonstrated the ability of SSF D/G & support systems to operate for an extended period. Data was recorded to benchmark the SSF Service Water System flow model. SSF Room temperatures were recorded to validate SSF HVAC calculations.

Following one of the Integrated Engineered Safeguards Funtional tests, water was pumped from the BWST through the primary system to the refueling canal to verify NPSH, Letdown Storage Tank (LDST) curves, and calculations. Results were better than expected, showing conservatism in calculations.

ENGINEERING STRENGTH

Design Basis Initiatives

Several major voluntary initiatives are ongoing to clarify Oconee's design basis and upgrade systems where necessary:

A $3 million proactive voluntary project called Oconee Safety Related Designation Clarification (OSRDC) is ongoing to clarify the Oconee design basis via thorough review of the bases for event mitigation. Design basis issues are being clarified and resolved; QA1 classification has been clarified in the UFSAR. A new QA classification for important equipment not classified as QA1 and an associated program to enhance maintenance and testing are under development.

A dedicated project and leadership team is on a success path for the completion of the service water project. First of a kind engineering is nearing completion, and the overall project is approximately 40% complete based upon cost. A new detailed schedule is complete, based on implementation needs. Project cost is now estimated at $26.5M. Redundant, safety related siphon sources feeding LPSW from the Unit 2 condenser circulating water system is expected to be operational & tested by the end of the Unit 2 Outage (U2EOC16-spring 1998) . Pages 21 through 23 provide photographs of some of the construction activities associated with the service water project.

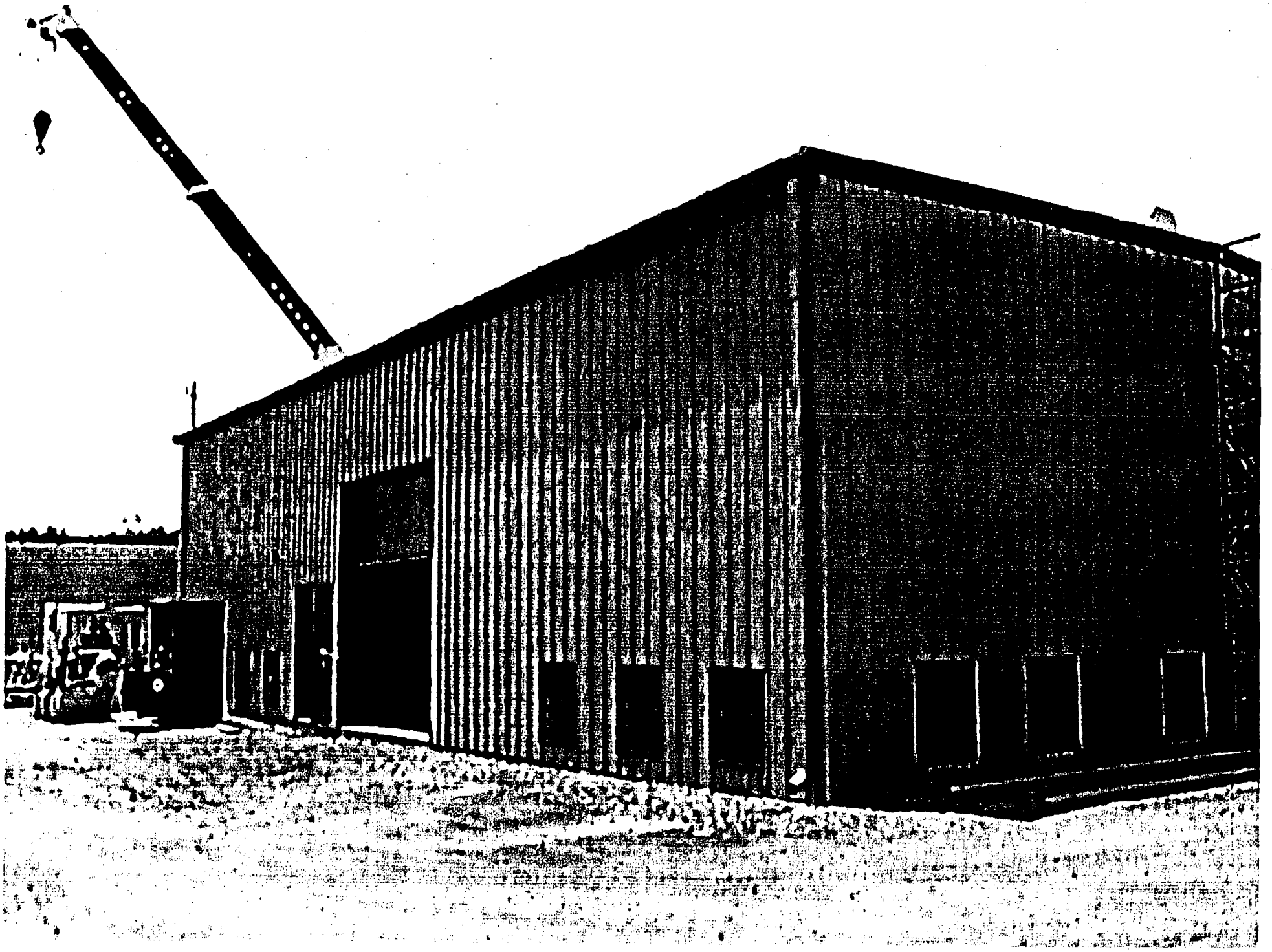
In response to IN 96-17, the UFSAR is being reviewed for accuracy and completeness and to resolve identified discrepancies. The first phase will review Chapter 5 of the UFSAR by October 1997. The second phase will include a review of the remaining UFSAR chapters.

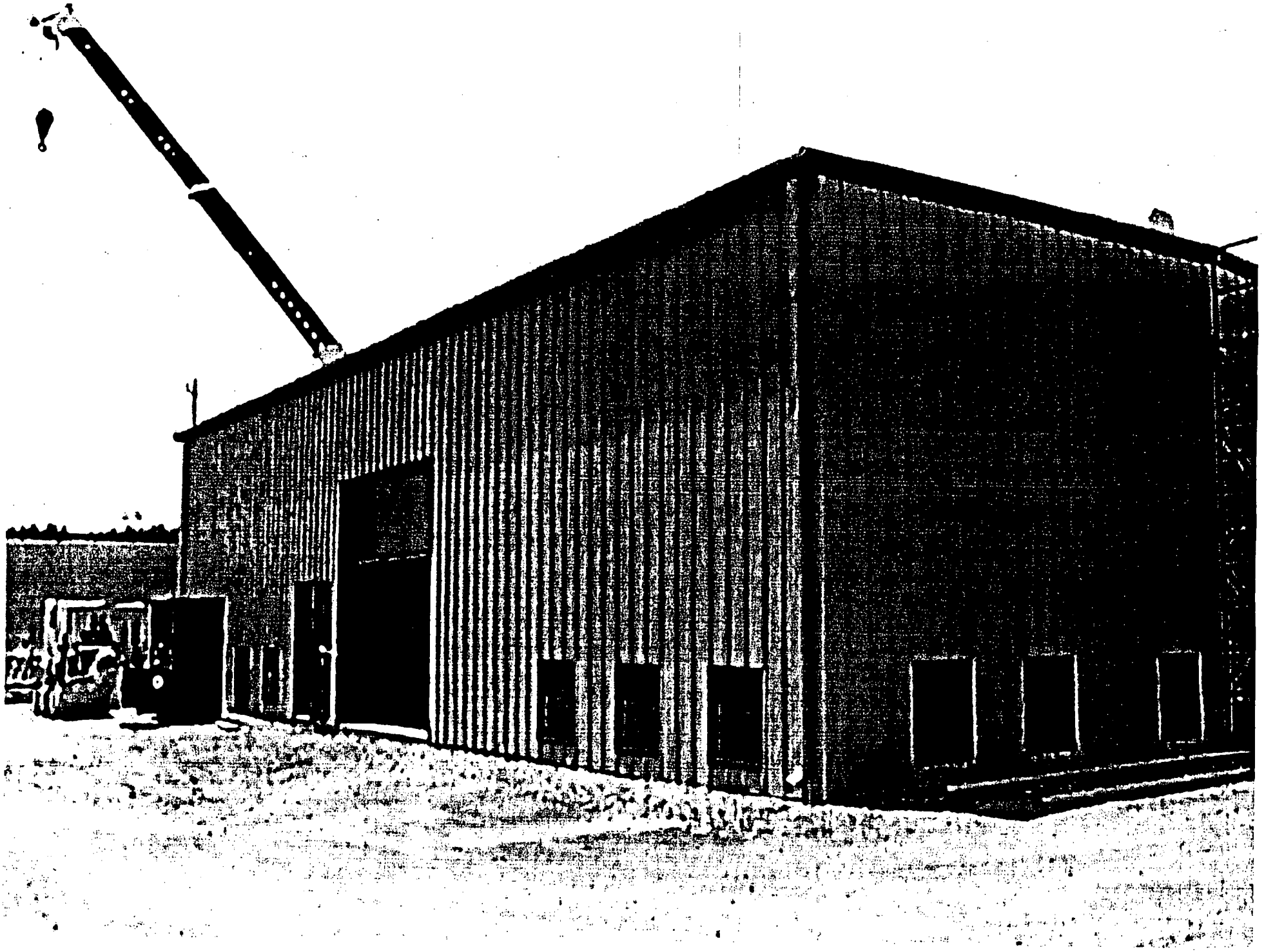
Conversion to Improved Technical Specifications (ITS) began in July 1996; all sections have been through Plant Operation Review Committee (PORC) review; Nuclear Safety Review Board (NSRB) review is following closely behind that of the site. The scheduled NRC submittal date is October 1997. An implementation team has been established to implement ITS by the end of 1998.

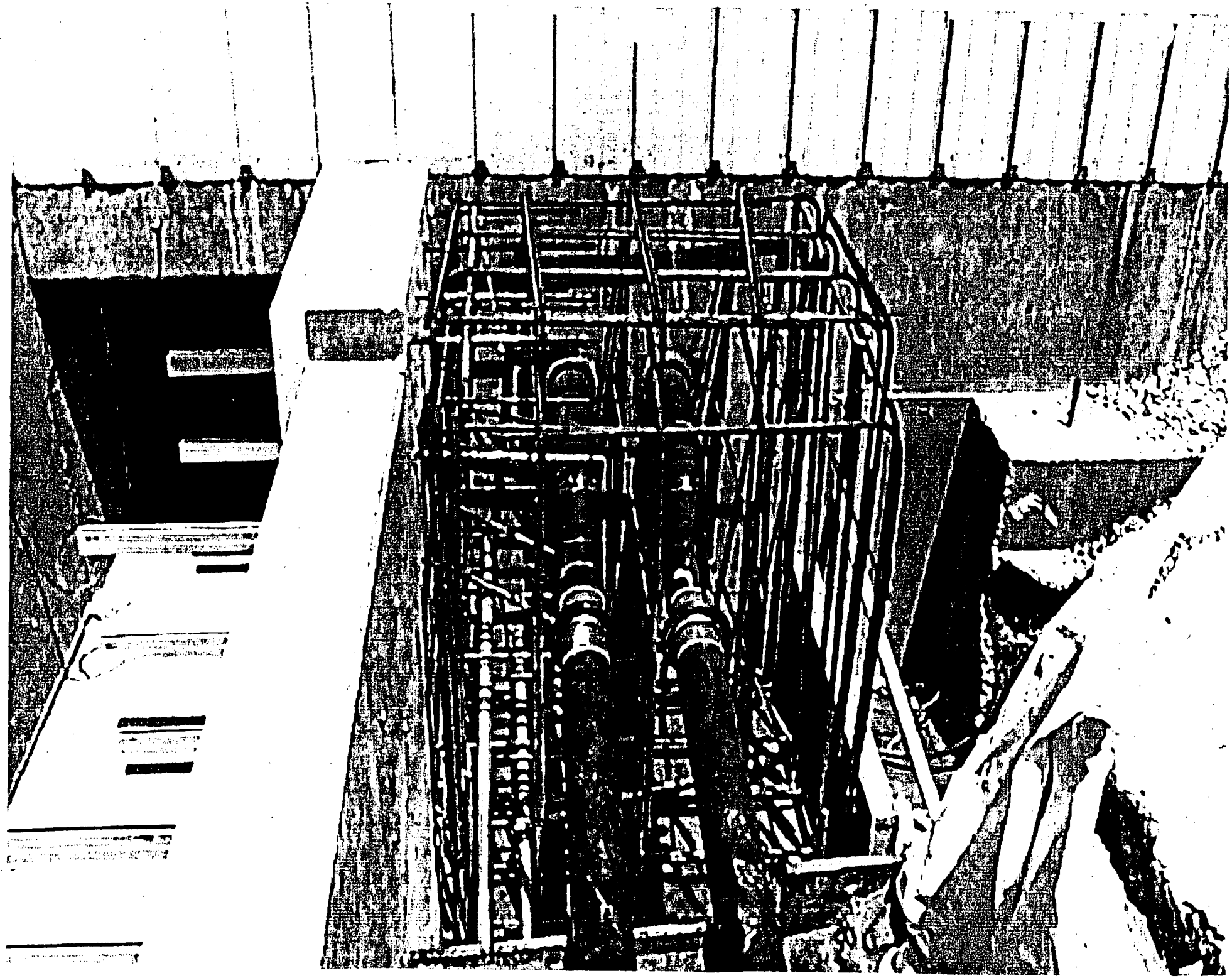
ENGINEERING STRENGTH

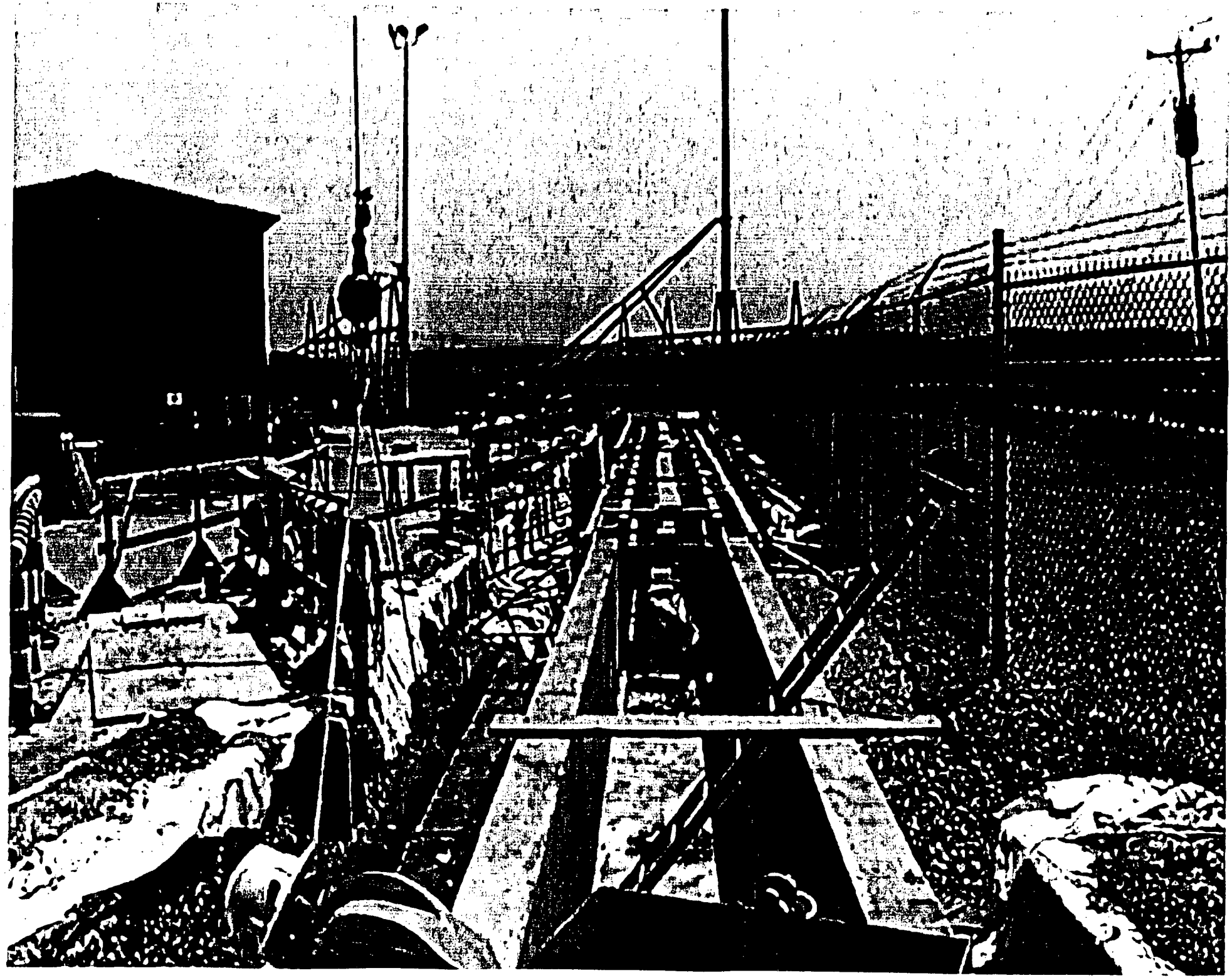
Design Basis Initiatives (cont'd)

The topical report "UFSAR Chapter 15 Transient Analysis Methodology" (DPC-NE-3005) was submitted to the NRC in July 1997. This report describes a new methodology for analyzing the transients and accidents in the Oconee UFSAR Chapter 15, excluding LOCA. The current UFSAR analyses date from the 1970s, and the level of detail concerning the assumptions used in the analyses and the results is often less than desired. In addition, modern computer codes enable more accurate simulation of plant transients and accidents. The methodology described in the report will be used for a complete reanalysis of UFSAR Chapter 15. With full knowledge of the assumptions used in the new analyses, and with up-to-date modeling of the plant systems and components, more thorough safety evaluations will be possible. New analyses will also be required due to the introduction of a new fuel assembly design incorporating mixing vane grids and a modern DNB correlation. NRC review of this topical report is necessary to modernize the Oconee UFSAR Chapter 15 analyses and to transition to an advanced fuel assembly design.









ENGINEERING STRENGTH

Failure Investigation Process

The Failure Investigation Process (FIP) was developed by Duke to thoroughly investigate equipment problems, to look both broadly and deeply into problems. It provides a detailed systematic approach to identify the fundamental cause for an equipment problem. Any significant equipment problem now requires the use of this methodology to identify the root cause.

Steps in the process include:

- Problem Identification
- Data Collection/Evidence Preservation (including quarantine steps)
- Failure Mode and Failure Scenario Determination (brainstorm all possible causes)
- Cause Determination (elimination of possible causes until one is clear)
- Benchmark
- Operability and Generic Applicability/Transportability
- Corrective Actions
- Documentation--extensive documentation prescribed by the process
- Follow-up/Trending

The process invokes the formation of multi-disciplinary "Expert" teams and has been successfully used in a number of different instances during 1996-97. By using this process, we have improved our ability to determine real root cause. The process has been used successfully on problems such as the inadvertent turbine driven emergency feedwater pump start, the September 1996 pipe rupture, the Unit 2 HPI nozzle leak, the Unit 3 HPI pump failure and the 3B HPI motor oil loss.

ENGINEERING STRENGTH

License Renewal Program

Oconee licenses currently expire in 2013/2014. A full time team has been established for Oconee license renewal and is leading industry efforts in the license renewal arena. To facilitate NRC review, Duke has agreed to make partial submittals; the Reactor Building Containment Evaluation Topical Report was submitted July 1996. The plan is to have the Duke Energy Board of Directors prepared to make a decision regarding renewal in July 1998. Several public meetings have been held with the NRC to discuss the level of detail required in the license renewal application. The NRC is striving to develop a standard to be used for renewal. Duke had been active in working with the NRC in developing this standard.

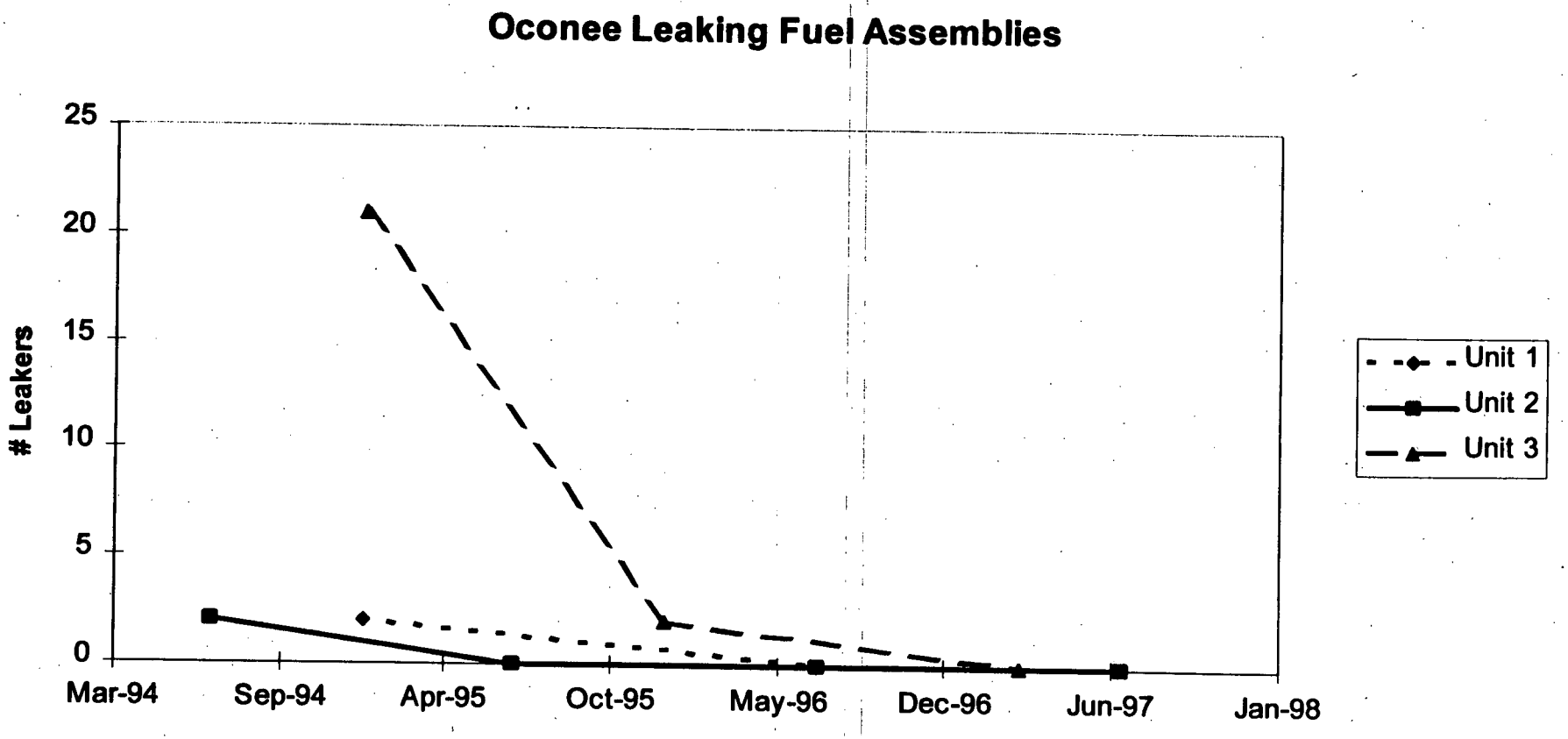
ENGINEERING STRENGTH

Fuel Integrity

After 21 failed fuel pins were found during U3EOC15 RFO, a joint Fuel Integrity Quality Improvement Team (FIQIT) was formed between Duke Power and fuel vendor Framatome Cogema Fuels (formerly Babcox and Wilcox). This team was tasked with evaluating the root cause of fuel failures and making recommendations for design and manufacturing enhancements to eliminate failures. Many enhancements to the manufacturing process were made as a result of the team's findings. The improvements include real time X-ray and Gamma scan of each fuel rod to detect pellet gaps and improper loading, a change from felt plug to air blast for cleaning the ID of new fuel rod stock , 100% UT and X-ray of fuel rod welds, end cap drill, fuel rod evacuation, etc. Helium purity monitoring equipment has been installed in the fuel rod pressurization station.

During U3EOC16 RFO, two failed fuel pins were found. The failures were in fuel that was manufactured prior to the FIQIT enhancements. Since FIQIT improvements, there have been zero fuel failures in the three Oconee cores. Oconee will continue to work with the fuel vendor for design/manufacturing enhancements and internally to maintain industry standard chemistry for reactor coolant parameters and to enhance fuel handling processes to minimize duty on the fuel assemblies during core offload and reload. No leakers go back into the core.

ENGINEERING STRENGTH
Fuel Integrity



ENGINEERING AREA OF PROGRESS

Major Equipment Replacement / Upgrades

Oconee has made progress in the replacement of several major systems that were becoming obsolete or were experiencing high failure rates. These include the Integrated Control System, the Operator Aid Computer System and several other major replacements and upgrades.

ENGINEERING AREA OF PROGRESS

ICS Replacement

The ICS modification resolves long standing power supply sensitivities of the Integrated Control System (ICS) by separating ICS hand and auto power sources and redistribution of power loads. This modification also implements the major concepts of the B&W Owners Group (BWOG) designed Plant Control System (PCS) algorithm using Framatome (BWNT) designed and manufactured Control STAR modules. The PCS algorithm offers numerous operating advantages over the ICS, and will result in increased reliability, improved control performance, improved fault tolerance, and reduced operator burden during all operating modes.

This modification includes signal buffering and/or isolation for all signals leaving the ICS cabinets except for signals to the Auxiliary Shutdown Panel indicators. Also the critical analog inputs will be expanded to 3 inputs with the new ICS designed to perform a median select to ensure that a good signal is selected for control. A serial data link interface to the Operator Aid Computer (OAC) is provided to enhance the amount and quality of the information sent to the OAC from the ICS.

The combined effect of this modification should be increased reliability due to the replacement of the many aging and obsolete analog Bailey modules with the newer Control STAR modules. This improved design will also eliminate unit transients due to single power supply failures, single analog input failures or shorting of output signals external to the ICS cabinets, which constituted the majority of transients experienced on the old ICS.

Unit 3 installation overall has been a big success; lessons learned are being incorporated into the Units 1 and 2 installations:

- Automatic reduction in power when coming off of level control was due to total feedwater flow input to the integrated master being set to 0. This problem was due to a line of code being inadvertently deleted while resolving other problems. Root cause was determined to be human error. Corrective actions include counseling of involved individuals and two minor programmatic changes.
- Use Core Thermal Power instead of flux for power tracking at low power levels
- When FDW loop masters in manual, manual control partially bypassed
- Software change required to resolve interaction between FDW and turbine
- Made appropriate allowances for the unexpected
- Gained knowledge about 50.59 requirements for digital system upgrade--will use in FDW 315/316 mod

ENGINEERING AREA OF PROGRESS

ICS Replacement (cont'd)

Extensive efforts were applied to ICS Software Verification and validation (V&V); all software is based upon the control algorithms developed and V&V'd during the BWOG Plant Control System project. Rev 0 of current programs was written based upon the PCS algorithms and requirements of the ICS modification Initial Scope document. A record of changes to the software has been maintained. Ryan Nuclear performed an independent V&V of the ICS software, an additional V&V was performed by an independent ONS engineer. Ryan Nuclear developed an Oconee Simulator which was then connected to Star Modules running the ICS software to further verify the algorithms; the ICS code was converted to FORTRAN and run on the Plant simulator further verifying the algorithms. Dr. Tom Wilson of ORNL performed an independent review of the design basis for the ICS mod; Dr. Luther Joyner developed testing procedures; all testing procedures were V&V'd on the plant simulator. Unit 3 ICS was extensively tested for proper operation and transient response .

A problem with automatic reduction in power when coming off of level control was due to total feedwater flow input to the integrated master being set to 0. This problem was due to a line of code being inadvertently deleted while resolving other problems. Root cause was determined to be human error. Corrective actions included counseling of involved individuals and two minor programmatic changes.

ENGINEERING AREA OF PROGRESS

OAC Replacement

The existing Operator Aid Computer (OAC) is the original plant computer and is difficult to maintain. Expertise in both the hardware and software area has become more difficult to maintain. Access to more and better data in shorter and shorter times is necessary to keep pace with both industry and regulatory requirements. The old centralized computer is being replaced with a state of the art distributed computer system with much greater flexibility, expandability and responsiveness. Included in the replacement are I/O equipment, power supplies, both existing OAC's, all video and printer interfaces, saturation monitors and the clock. The OAC has been successfully installed on Unit 3; lessons learned are being applied to subsequent unit installations. The $26 million project includes over ½ million database fields requiring configuration control, over 2500 alarm setpoints, over 700 pieces of hardware , over 50 microprocessors replaced or upgraded, over 200 graphical displays, over 10,000 copper terminations, over 300 fiber terminations, and over 300 work-years of Engineering and Design effort.

ENGINEERING AREA OF PROGRESS

Other Equipment Replacement/Upgrades

Power Battery replacement - The unit 1 power battery modification is complete and is the first in a series of modifications intended to replace all of the power and control batteries at ONS. The power batteries at ONS have experienced poor performance and reduced capacity. In an attempt to be proactive and ensure that these batteries perform properly in the future, the entire battery (and not just selected cells) will be replaced.

RCP vibration monitors replacement. The old RCP vibration system has been removed from all 3 units and replaced with a state of the art digital system with 10 sensors per pump. This greatly enhances the ability to monitor and diagnose problems on these critical pumps.

HD and MS-112/173 mods - To resolve issues identified following the 9/96 pipe rupture, a major system upgrade to the heater drain system/controls was undertaken, particularly in the controls area. The old pneumatic controls were replaced with modern digital controllers as well as the sensors, indicators, positioners etc. Also included in this mod were the check valves to prevent backflow, low point drain valves (and controls), as well as replacing large amounts of pipe and hangers. This modification is complete on all 3 units.

Turbine Bypass valve replacements - This mod replaced obsolete manual isolation valves, in order to increase pressure ratings as well as replacing the Bypass valves and valve operators and positioners. These valves are obsolete and have caused problems for operations and maintenance. Unit 2 installation remains.

HPI stop check valve replacement - 4 HPI stop check valves (HP-126,127,152 and 153) were replaced due to obsolescence and flow test concerns with 2 valves each (a check and a globe). Unit 1 installations remains to be completed.

ENGINEERING AREA OF PROGRESS

Work Management

Engineering has established dedicated project teams for Special Projects in the following areas:

- **Major Modifications** - Oconee Service Water Project, Integrated Controls System (ICS) Replacement , Operator Aid Computer (OAC) Replacement
- **Major Design Basis Issue Resolution** - Seismic Qualification Utility Group (SQUG) Assessment and Oconee Safety Related Designation Clarification (OSRDC) Analysis

- **Backlog Reduction** - MSE PIP Backlog Reduction, ESE Power Backlog Reduction, Piping Stress Backlog Reduction

A dedicated team generally consists of a project manager, engineering supervisor(s), and engineering individual contributors required to make the project a success.

Dedicated project teams have proven to be beneficial for both the project and the baseline organization. Establishing a special project team ensures a focused effort is applied to the project. This focus and accountability leads to a higher probability of project success. This arrangement also reduces the day to day impact of special projects on the baseline organization. The baseline organization can focus on routine plant support, proactive engineering support, short term problem resolution, etc.

This approach has clearly been more successful than would have been possible using a fragmented matrix approach.

ENGINEERING AREA OF PROGRESS

Work Management (cont'd)

Engineering managers and supervisors performed a detailed work assessment in February 1997. The goal was to capture the work to be performed in engineering over the next 12 months, evaluate it for completeness and accuracy, and assess it against the current resources available in engineering. The assessment revealed that existing resource levels were inadequate to deal with the priority issues facing engineering.

Based on the assessment and reviews of senior management, engineering was given approval to hire 24 additional engineering direct resources and approximately 60 additional engineering contract resources. The direct resources will be utilized in various areas in engineering to enhance the ability to perform core businesses (15 have been hired to date). The majority of the contract resources will be utilized to staff special projects or projects associated with reducing existing engineering backlogs.

Engineering established an Engineering Work Control Section (EWC) in January of 1997. This group focuses on developing and implementing processes and tools to aid work management in engineering. The EWC section adds structure, formality, and rigor to the way we manage work.

The EWC Section has three major areas of responsibility: Engineering liaison/coordinator to Station (Engineering Coordinator), Project Management for NSMs and Special Projects, Planning/Scheduling Resource for the Division. This clearly provides an accountability and focus for this particular area.

ENGINEERING AREA OF PROGRESS

Work Management (cont'd)

ONS Engineering had previously attempted to use an in-house database tool called PLAN for scheduling. After some period of use, it became obvious that this "punchlist approach" was not well suited to this situation. ONS Engineering is making a transition to a new scheduling tool that is an effective multi-project scheduling tool that will allow engineering to manage dates (project/activity scheduling) and resources (resource histograms, resource loading. etc.). The idea of actively managing both dates and resources in a scheduling tool presents formidable challenges. In most organizations, the focus is on activity driven scheduling (one dimensional) with resource decisions based on judgment. It is, however, imperative to incorporate the resource piece in order to be successful.

The tool selected is used by Work Control in the Nuclear Generation Department to schedule maintenance work activities at the station. The use of this tool creates the potential for having an integrated site schedule at some point in the future (long term goal).

The goal is to include engineering work (routine, NSMs, special projects, etc.) in the tool by year end.

Engineering utilized an "Engineering Top Issues List" during the pipe rupture recovery time period (Sept 1996 - Apr 1997) to provide a relative ranking of major issues in engineering. The list was intended to provide direction when there were multiple demands on limited resources. Engineering will attempt to include work prioritization in the scheduling tool. In an ideal situation, a priority is included for each activity and the tool can help balance resources, due dates, and priorities.

Cornelius and Associates, an external trainer/consultant in the area of project management, provided Project (Work) Management Training to engineering managers and supervisors. The course attempted to introduce/reinforce the basic fundamentals of project (work) management. The major topics were: project management overview, initiating (scoping) projects, project planning, and project resource management.

ENGINEERING AREA OF PROGRESS

Work Management (cont'd)

ONS adopted a two step process for NSM Selection and Activation in the Spring of 1997. The process change was intended to add more structure and rigor to methods for selecting NSMs.

Step 1 of the process (Selection) requires the sponsoring group to develop a one page summary that includes the problem description, recommended action to be taken, initial (ball park) cost, and Contribution to Site Success Rating. This information is provided to the Site Selection/Activation Committee to determine whether the item merits a more detailed evaluation.

Step 2 of the process (Activation) requires the sponsoring group to develop a more comprehensive project scope (Preliminary Scope Document) and a more accurate estimate of project cost. The Site Selection/Activation Committee then reviews the more detailed information and reaffirms commitment to the project (or rejects the project based on the additional information provided).

The Contribution to Site Success Rating can make the selection/activation process less subjective. The two step process allows management to focus resources on the problems deemed most important. (Limited resources are spent developing the summary information for items to be selected. Additional resources are focused on scoping the important projects that are selected by management).

A recently performed three site (ONS, CNS, & MNS) assessment of the Selection/Activation Process can lead to additional enhancements in the process.

ENGINEERING AREA OF PROGRESS

Training / Development of Managers / Supervisors

All Engineering Managers have completed either Senior Reactor Operator or Technical Nuclear Certification training. Nine of sixteen Engineering Supervisors will be at this same point by Oct 97. Three Supervisors are scheduled for the next class.

The ESP Training Accreditation renewal in November 1994 indicated no weaknesses, no concerns and one strength. The next renewal accreditation visit is in the fall of 1998. The only engineers who have not completed the program are new hires and five SQUG personnel. A Training Program Review Committee provides oversight for engineering training needs, including the recommendation of topics for continuing training, Position Specific Guide enhancements, etc.

The purpose of the above training is to have a more knowledgeable engineering management team and staff to better understand problems as they occur and better develop solutions, thus to better support operations.

ENGINEERING CHALLENGE

Operations Focus

Strengthening "operations focus" is a challenge area for Engineering. Engineering maintains "operations focus" through activities such as participation in daily station status meetings, regular interface between plant engineering management and the Operations Superintendent, including biweekly meetings to assure common focus.

Formality of communications among Engineering/Operations/Maintenance is being addressed through a "Plant Concerns and Action Register" communication process initiated 7/15/97. Use of the Top Equipment Problem Report process was initiated on July 31, 1997. The Operations "Workaround" process is supported by Engineering through weekly discussions of status of these items and new issues added to the list.

Qualified review and 50.59 support for Operations and Maintenance procedures is provided on a daily basis. Subject matter experts provide Operations training support.

ENGINEERING CHALLENGE

Operating Experience Review

Both the LDST event and HPI line crack involved issues that had previously been identified by operating experience from the 1980s (line crack is IN 92-09, GL 85-20, and IEB 88-08, LDST is IN 82-19, SER 76-83, IN 84-70, SER 54-85, and IN 92-15). An assessment has been initiated to review approximately 1500 OE documents from 1982 to 1992. This review includes SERs, SOERs, and INs. Each OE document is being rescreened for applicability by a team of experienced OE analysts. For those documents that are applicable to ONS, the acceptability of past corrective actions for each applicable OE issue will be assessed. Verification of documents to assure corrective actions were implemented is included in the scope of the effort. Some 1528 items(IN, SERs, SOERs) are being reviewed at the rate of approximately 40 per week, with a completion date of 4/15/98. Presently a total of 218 items have been reviewed with two of these identified for further evaluation by reassignment to an OEA Champion.

This is a significant effort, but it is prudent that Duke take a hard look at this operating experience. The current program is sound, and there is no indication that a re-review of more recent OE documents is warranted.

OPERATIONS

OPERATIONS DIRECTION FOR IMPROVEMENT DURING THE PERIOD

Use Industry Expertise and New Management to:

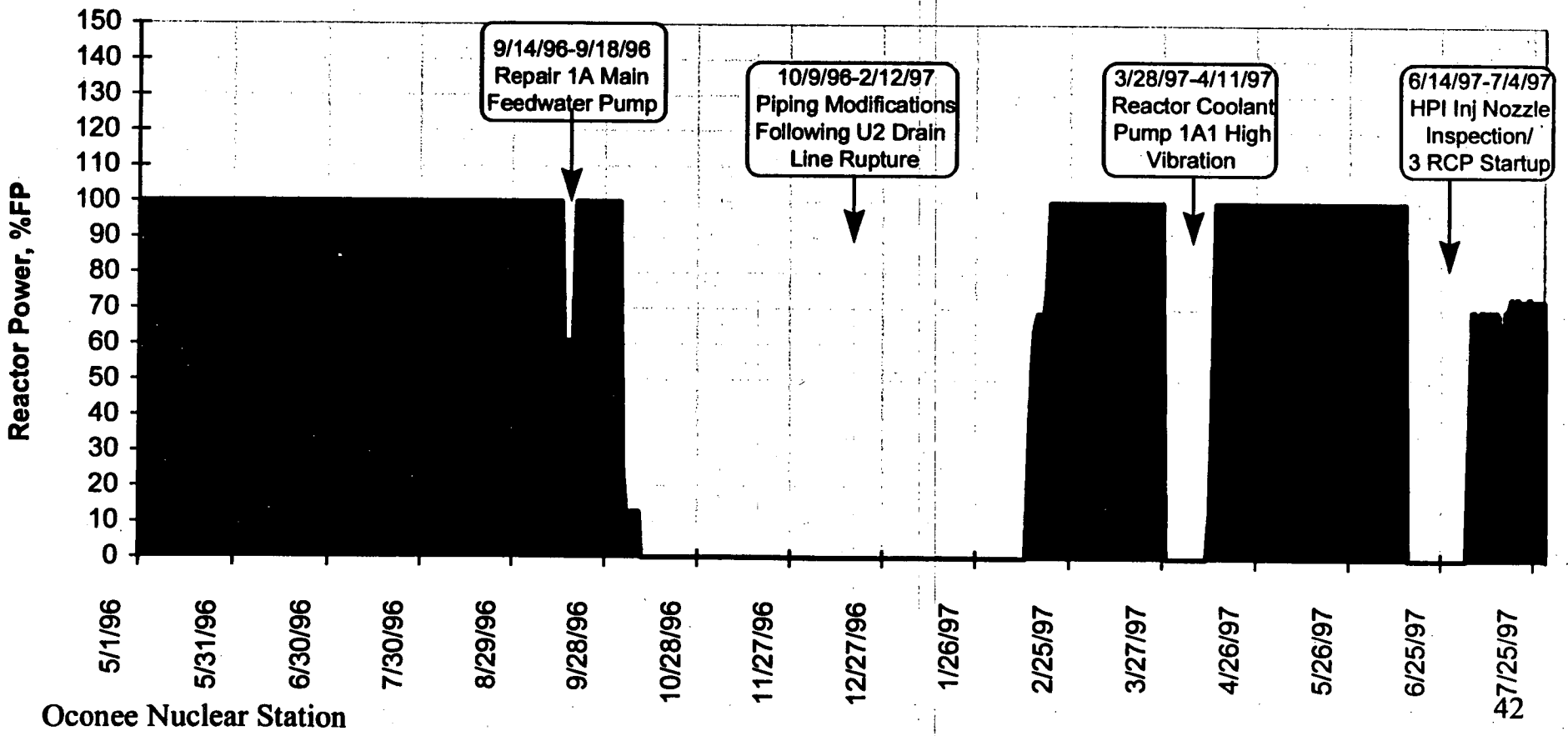
- Improve Operations Control of Keowee and Fuel Handling Operations
- Improve Operations Control of Equipment Priorities
- Provide Shift-Focused Support for Procedure Upgrades
- Sharpen Efforts to Decrease Mispositionings
- Continue Improvements in Log Keeping

During this SALP period, Operations assigned new management in several areas to implement industry practices aimed at improving performance in previously identified problem areas. Significant improvements were attained in some areas by early in the SALP period, such as Keowee operator performance. Some problems areas, such as component mispositionings and procedure quality, persisted into the period and contributed to events.

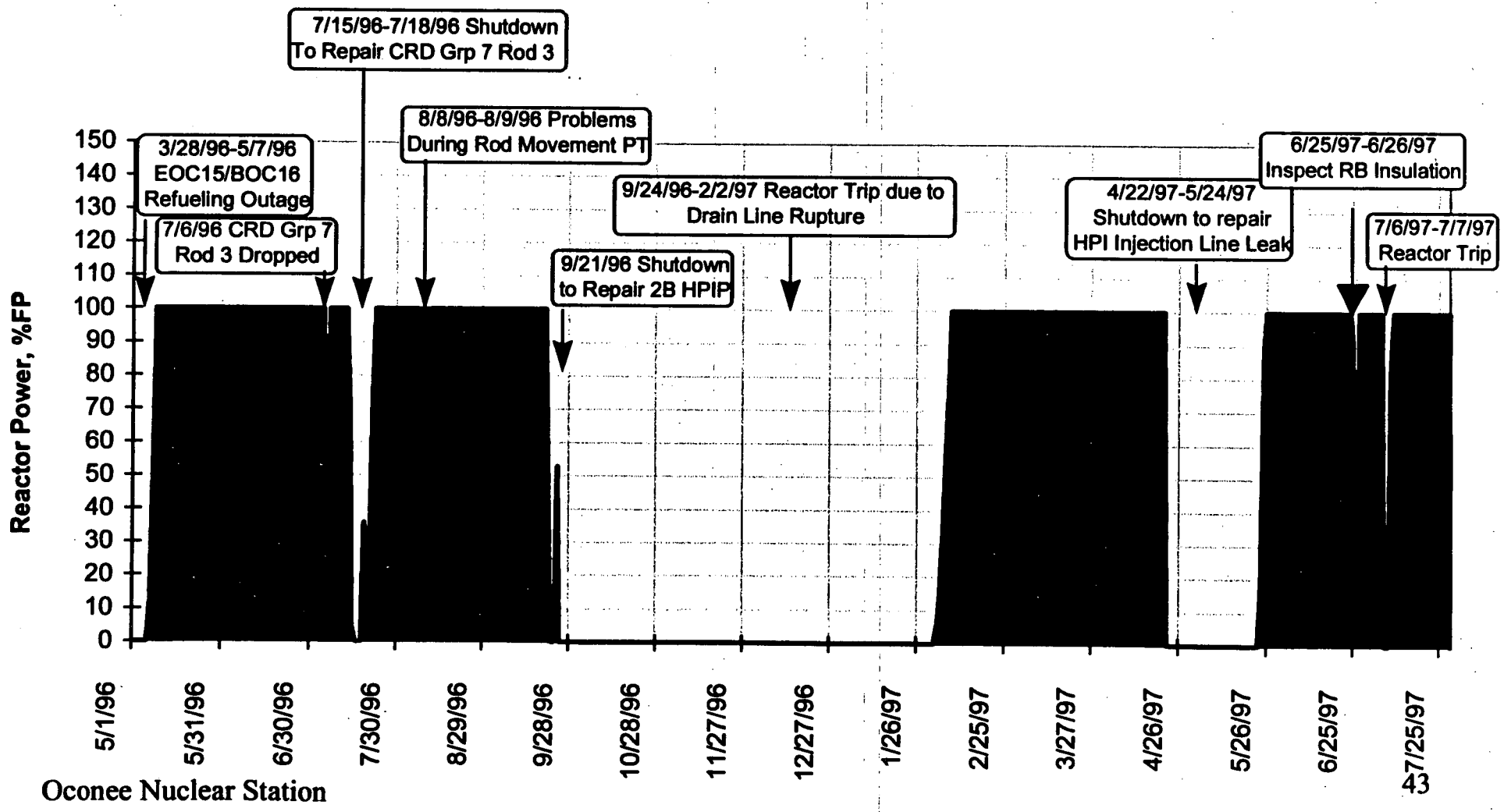
Improvement attained in these areas, and continuing improvements underway, are described later in this report.

During this SALP period, Operations was challenged to perform a number of plant shutdowns and startups, to manage extensive outage work, and to respond to several plant events. The power history charts on the next three pages reflect this operating history. Considerable skill and effort was necessary to return the units to service.

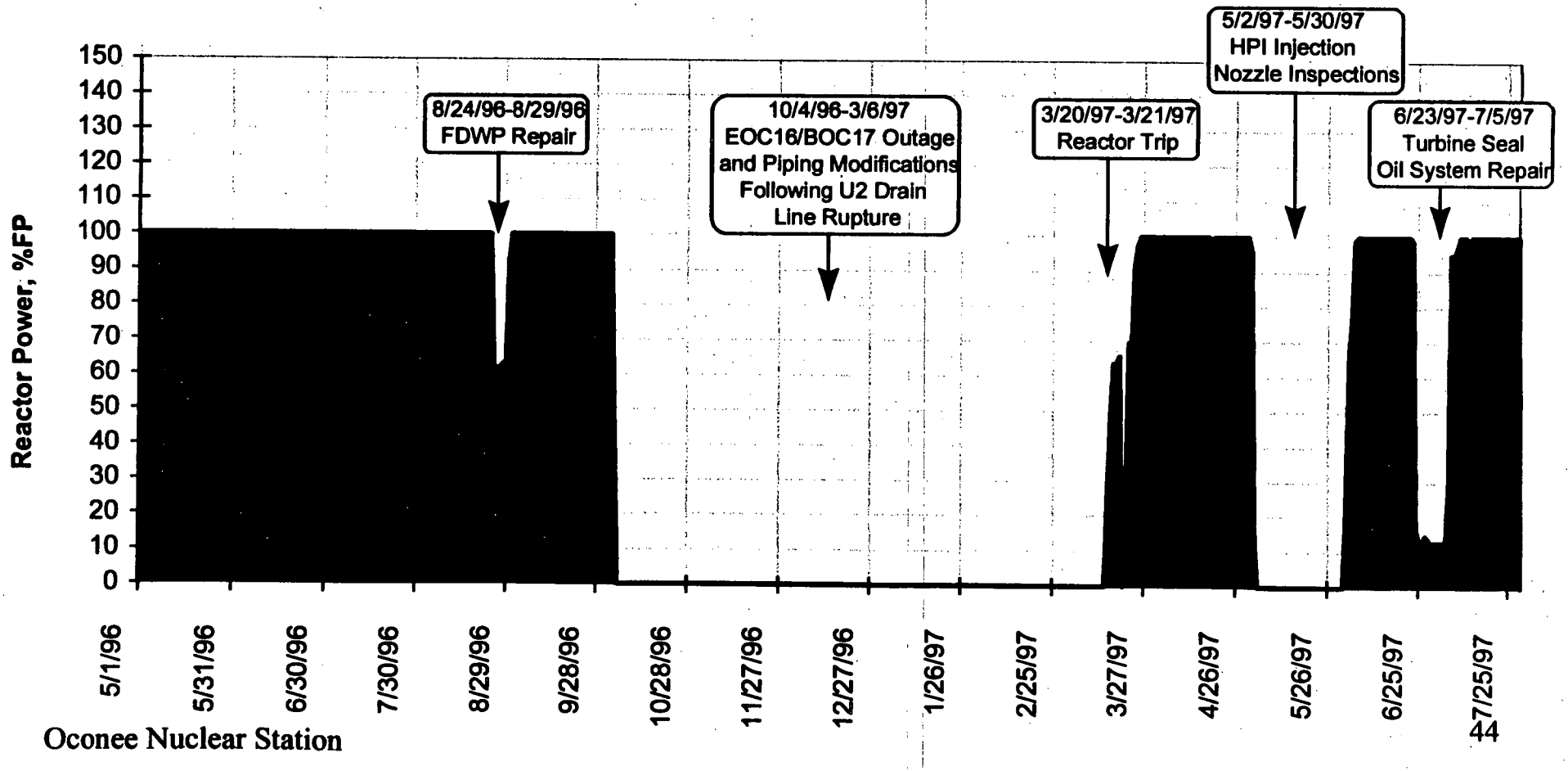
OCONEE UNIT 1
POWER HISTORY



OCONEE UNIT 2
POWER HISTORY



OCONEE UNIT 3
POWER HISTORY



OPERATIONS DIRECTION FOR CONTINUING IMPROVEMENT

Events during the period challenged Operations as the "last line of defense", and it is recognized that Operations was not successful in preventing events. To aid in prevention of events while longer term improvements occur, three elements of Temporary Defenses are in place for Operations. These are:

- Frequently scheduled oversight (with immediate feedback) from experienced managers outside of Oconee and outside of Oconee Operations.
- Increased Operations Management oversight during startups and shutdowns.
- Supplemental monitoring of Reactor Coolant System inventory during startups and shutdowns.

Operations plays a key role in Oconee's recovery plan, especially in the human performance and operational focus elements of that plan.

Overall, as Operations continues to improve performance (see Areas of Progress and Challenges), the philosophy used will be to quickly raise standards by combining critical self-assessment with benchmarking of strong performers.

OPERATIONS STRENGTHS

Reactivity Management

During this SALP period, Operations strengths manifested themselves in protecting the core while dealing with several events and equipment problems. A strong Reactivity Management program, along with event response and conservative decision making, maintained reactor safety during this period.

Oconee substantially completed the action plan from Duke Power's Reactivity Management Improvement Project. Seventy- nine of the eighty two initiatives in this plan are complete. Some examples follow.

All Oconee technical procedures were reviewed for potential reactivity management effects; 314 procedures in Operations, Maintenance, Chemistry, and Engineering were designated as important to reactivity management. These procedures were reviewed by a special team, and upgrades identified. Higher priority upgrades were implemented right away. Other reactivity management procedure enhancements are in progress.

A program for reactivity management review of maintenance work was established. All work orders are reviewed for potential reactivity management effects. Those which could affect reactivity management are flagged for special attention, including incorporation of reactivity management effects into pre-job briefings.

Site and departmental Reactivity Management Teams were established to improve Oconee's reactivity management programs and communicate important issues to management for action. For example, in a recent update the team reported a trend in which control rod instrumentation systems were causing repeated minor reactivity-related problems. In response, Engineering is developing a plan to upgrade this system.

The reactivity management trending program was revised to identify and trend low threshold problems, designating four reactivity management problem significance levels (N4 through N1). The highest level reactivity management PIP designator (N1) is triggered by relatively small reactivity effects, such as an unexpected 2% power increase. The reactivity management trending program uses the Oconee Problem Investigation Process (PIP). Reactivity Management Team members review all PIPs, and classify those which are reactivity management related as to the four categories. By trending and responding to low level problems, this program has helped prevent reactivity management events.

During this SALP period, there have been no reportable events attributed to reactivity management problems. The strong reactivity management program also helped ensure that other events did not lead to reactivity control problems. For example, reliable makeup sources of appropriate boron concentration supported response to events affecting reactor coolant inventory.

OPERATIONS STRENGTHS

Operations' Response to Plant Events

Oconee control room operators, Keowee control room operators, and Operations management responded to control plant events, making conservative decisions and controlling the plant in accordance with procedures. Conclusions to this effect were reached by special NRC and Duke investigation teams, including the Oconee 2 Heater Drain Line Break in September of 1996, the Oconee 2 Reactor Coolant System Leak in April of 1997, the Oconee 3 Loss of HPI in May of 1997, and the Oconee 1 Loss of Power from Lee Steam Station in June of 1997. Examples of effective operator actions during events follow:

•During an Oconee 2 secondary side line break in September of 1996, operators promptly tripped the reactor, and then diagnosed and isolated the break.

•When a high pressure injection line crack caused reactor coolant leakage on Oconee 2 in April of 1996, operators quickly detected the leakage by observing letdown storage tank level and containment sump response. The plant was shut down according to procedure, minimizing system pressure to mitigate leakage even though the crack was increasing in size.

•During the loss of high pressure injection pump suction on Oconee 3 in May of 1996, operators correctly used the "Procedure for Abnormal RCP Operation" to keep the in-service reactor coolant pump running. The operators also correctly avoided starting the third high pressure injection pump (HPIP 3C) after the running pump (HPIP 3B) and the auto-started standby pump (HPIP 3A) had been affected. Special procedures were developed, while the plant was maintained in a stable condition, before HPIP 3C was placed in service.

•When power to Oconee 1 was temporarily lost during a test of the dedicated power path from a Lee Gas Turbine, operators correctly followed the associated contingency plan as power was automatically restored. Confidence in the procedure and its contingency plan instructions for response to potential loss of power prevented unnecessary actions.

•During the Oconee 3 loss of high pressure injection pump suction, Operations shift personnel conservatively activated the Emergency Response Organization (ERO) to assist in event recovery.

•During each event mentioned above, Oconee operators utilized procedures as expected. Other examples of procedure use and adherence during events were:

- use of procedures according to expectations was verified for the five reactor trips during the period
- Keowee operators followed alarm response guides exactly during a loss of loss of auxiliary power in June of 1997
- operators manually tripped the Oconee 1 control rods, in accordance with management directives, when the main feed pump tripped at hot shutdown conditions in June of 1997

OPERATIONS STRENGTHS

Conservative Operating Decisions in Response to Equipment Problems

Though equipment problems affected operation during the period, Operations took a conservative approach to dealing with equipment problems which could decrease margins of nuclear safety or industrial safety.

When the Oconee 2 secondary side line break occurred in September of 1996, unrelated secondary-side piping design discrepancies were discovered. A conservative decision was made to shut down and repair Oconee 1 and 3, which were not affected by the line break event.

During the late '96-early '97 three-unit outage, to prevent the potential for loss of steam generator cooling or loss of steam generator chemistry control, a set of package boilers was obtained to supplement the installed auxiliary boiler. This was a more conservative approach than for initial Oconee startup, in which the installed boiler was relied upon.

In June of 1997, a conservative decision was made to bring the Oconee 3 generator off line to repair an apparent level control problem with the seal oil tank. These repairs could have been attempted on-line. The benefit of a more conservative approach became apparent when the actual problem was found to be leakage at the main generator seals.

In June of 1997, unqualified blanket-type insulation was discovered to exist on Reactor Coolant System piping on each of the three units. It was removed promptly. The insulation was conservatively reported to have affected containment sump operability, though testing of its actual effects are continuing. Oconee 1 startup was delayed to remove the insulation. Oconee 2 power level was reduced from 100% to 20% to remove the insulation. Oconee 3 was operating at a low power level at the time; and the insulation was removed in parallel with other work.

During this period, Oconee faced situations in which one or more units was shutdown and another unit was required to make repairs with the turbine-generator off line. At Oconee, stability and capacity of auxiliary steam sources is important for maintaining condenser vacuum to prevent loss of normal steam generator cooling, and to control steam generator chemistry of shutdown units. Depending upon overall plant configuration, safety was maximized on occasions by continuing low power operation of a unit to provide a redundant source of steam for all three units.

On occasions during this period, Oconee unit startups or mode changes were conservatively delayed for restoration of equipment beyond the requirements of Technical Specifications. As a matter of prudence, Oconee generally resolves non-TS operability problems prior to startups.

Oconee continues to cope with important reliability problems, such as reactor coolant pump vibrations. See "Areas of Progress - Operational Focus for Equipment Problems" for related information.

OPERATIONS
AREAS OF PROGRESS

Operations' Areas of Progress during the period included improved programs for dealing with special evolutions, several of which occurred during the period. Progress was also made in several areas which were identified for improvement during the previous period.

Planning for Special Evolutions

During this SALP period, Operations dealt with several opportunities to plan and execute infrequently performed plant evolutions. Planning and preparations prevented any of the infrequent evolutions from having an adverse effect upon nuclear safety.

Examples of Evolutions Undertaken:

- Managing Auxiliary Steam Supplies during Three-Unit Shutdown & Startups
- Integrated Electrical Systems Testing
- Integrated Control System On-Line Testing
- Mid-loop Operation
- Periodic Electrical Testing
- Oconee 1 Startup With Three Reactor Coolant Pumps

OPERATIONS AREAS OF PROGRESS

Planning for Special Evolutions

Oconee applies conservative decision making in thorough planning and oversight of infrequent evolutions in accordance with Nuclear System Directive 213 Control of Infrequently Performed Tests or Evolutions. This program, which implements the recommendations of INPO SOER 91-01, incorporates careful procedure preparation, special pre-job briefings, contingency planning, and management oversight. The Plant Operations Review Committee (PORC) reviews and approves associated procedures, pre-job briefing packages, and management oversight plans. Planning for many of these evolutions includes use of the plant simulator for procedure validation, as well as classroom and simulator just-in-time training for operators.

Pre-determined use of these programs has been established for some repetitive evolutions, including reactor startup, zero power physics testing, and core fuel loading. For these evolutions, applicable portions of management oversight, pre-job briefings, and just-in-time training have already been developed and are applied by procedure.

In addition to these programs for infrequent evolutions, Oconee uses special programs to control planned on-line maintenance and outage work. A "PRA matrix" controls systems taken out of service during on-line maintenance. This PRA matrix satisfies requirements of the Maintenance Rule. Oconee uses its "Shutdown Protection Plan" to control equipment taken out of service during outages. Any deviations from Shutdown Protection Plan requirements require PORC approval of infrequently performed evolutions.

Techniques Used:

- Simulator Modeling and Validation
- Just-In-Time Training, Including Simulator
- Special Pre-Job Briefings, Management Oversight, and PORC Review
- INPO SOER 91-01 Program Incorporated
- Pre-Determined Program for Some Periodic Evolutions
- Supplemental Management Oversight and Monitoring
- Oconee Shutdown Protection Plan for Outage Work
- Oconee Maintenance Rule Matrix for On-Line Work

OPERATIONS AREAS OF PROGRESS

Keowee & Fuel Handling Operations

- Keowee Hydro Station operators have been fully integrated into Oconee Operation's practices and standards, correcting a problem which existed previously. Keowee operators are a part of the Oconee Operations Group. Oconee Operations Management Procedures apply to Keowee, with special provisions for Keowee where needed. Keowee operators receive training from the Oconee Operations Training Group. Keowee technical procedures and Alarm Response Guides have been converted to the same format and standards as those for the rest of Oconee Nuclear Station. Successful transition of Keowee operators to Oconee Operations practices was evidenced in two key situations of interest to the NRC during this SALP period:
  - Keowee operators performed their roles successfully, according to procedure, during the Oconee Integrated Electrical Systems Testing in January of 1997.
  - Keowee operators explicitly followed Alarm Response Guides when responding to a loss of auxiliary power to Keowee Unit 1 during testing in June of 1997.

- Concerns regarding control of fuel handling operations have been addressed by upgrading procedural controls and by ensuring the fuel handling crew follows expectations for procedure use and adherence. An Operations Shift Manager was assigned as full-time supervisor of the Maintenance Fuel Handling Crew during the period. Also during the period, an Oconee SRO participated in the Duke Power Fuel Handling Quality Improvement Team. This team reviewed fuel handling issues at all three Duke nuclear sites and benchmarked best practices within the industry. Based on this team's recommendations, Oconee has initiated a series of actions to further improve communications during fuel handling, to strengthen Operations control over fuel handling activities, and to upgrade fuel handling equipment.
- A new fuel assembly was damaged during fuel handling just prior to this SALP period, before most of the improvements noted above had been made. There were no reportable events associated with fuel handling operations during this period, which included a refueling outage on Oconee 3.

OPERATIONS
AREAS OF PROGRESS

Operational Focus For Equipment Problems

- During this period, Oconee improved Operations' control over equipment issues by incorporating a number of good practices from the industry.
- Oconee formalized its Station Status Meetings based upon benchmarking leading plants. The Operations Shift Manager (OSM) leads the Station Status Meeting, providing direction to supervisory-level meeting representatives from Maintenance, Work Control (scheduling), Engineering, and other site groups. The OSM also reviews plant support needs with management at daily Site Direction Meetings.
- Operations established weekly and bi-weekly interface meetings (working lunches) between the Operations Superintendent and managers of key support organizations. In these meetings, improvements to plant processes and responses to equipment problems are reviewed to ensure that operators' needs are being addressed.
- Emulating several industry good practices, Oconee established a tiered structure to focus upon operationally important equipment problems. These programs support prioritization of work within existing processes for corrective maintenance, problem resolution, and plant modifications. These programs are:
  - "Plant Concerns", identified by the OSM, address immediate threats to safety or reliability. Plant Concerns are to be resolved within 48 hours. They require assigned support personnel to provide immediate feedback to the OSM.
  - "Action Register" items, identified by the OSM, are similar to "Plant Concerns" but are of lesser urgency such that they may be addressed over a period of a few days or weeks. Periodic updates to the OSM are required.
  - "OPS Focus" items, in accordance with Duke Power's "Operator Work Around" program, address longer term plant problems which adversely affect routine activities or emergency response by operators at designated watch stations. This program assigns responsibility to engineers for a running list of about 15-20 "OPS Focus" items.
  - "Top Equipment Problem Resolution" (TEPR) program, being implemented at this time, provides focus and resources to resolve Oconee's high level equipment issues which could affect nuclear safety or plant reliability. Selection of TEPR projects is by consensus of Operations Management with other Oconee technical managers, considering Maintenance Rule performance criteria and engineering projections of future performance problems.
- These improved practices apply an operational focus to equipment problems, and have contributed to the safe return of the Oconee units to service.

OPERATIONS AREAS OF PROGRESS

Tagging Control

- Several improvements to Oconee's safety tagging program were implemented during this SALP period, led by the Operations Work Process Managers' Group. These improvements implement Duke's departmental practices in accordance with the Work Control Quality Improvement Project and Nuclear System Directive 500 - Safety Tagging. Improved processes are described below.
- A dedicated operator team provides tag-out packages for scheduled maintenance, based upon review of work schedules by an SRO several weeks prior to the work. During outages, tag-out packages for station modifications, "Block Tag-Outs", containment closure control, and preventative maintenance work are placed in designated locations for easy access by shift operators. During on-line periods, tag-out packages for planned maintenance are sorted by unit and placed in a designated location.
- A computerized red tag database is used to generate safety tags. Operations personnel control this database, including component labels and component location descriptions. Process improvements were made such that Operations personnel correct labeling and location discrepancies in the work order data base ("Equipment Data Base"), making them consistent with the red tag computer program.
- Prior to the Oconee 3 refueling outage, electrical load centers and motor control centers were re-labeled as necessary to ensure that the breaker labels matched the prepared tag-outs. This re-labeling addressed causes of safety tagging problems identified earlier. Similar re-labeling is planned prior to the next Oconee 1 and 2 refueling outages.
- System wide training was provided when NSD 500 was issued. NSD 500 was improved and re-issued during the period. Further NSD 500 training is being developed.
- A self-assessment of Oconee tagging problems during the period identified areas for further improvement, such as documentation of low voltage electrical panel breaker loads and verification of "zero energy" conditions after tag-outs.
- These improvements helped control tagging problems during the extensive outage work in this SALP period. Response to assessments, and improved NSD 500 training, are expected to provide further improvement.

OPERATIONS
AREAS OF PROGRESS

Procedure Quality

- During this SALP period, Operations management has communicated the following expectations:
  - Users must have a low tolerance for procedure deficiencies.
  - Procedure workarounds must be identified and eliminated.
  - Lessons learned must be incorporated into our procedures.
  - These expectations were reinforced by the Operations Shift Managers' establishment of five "Operations Core Values" for emphasis on shift, including Procedure Use and Quality.

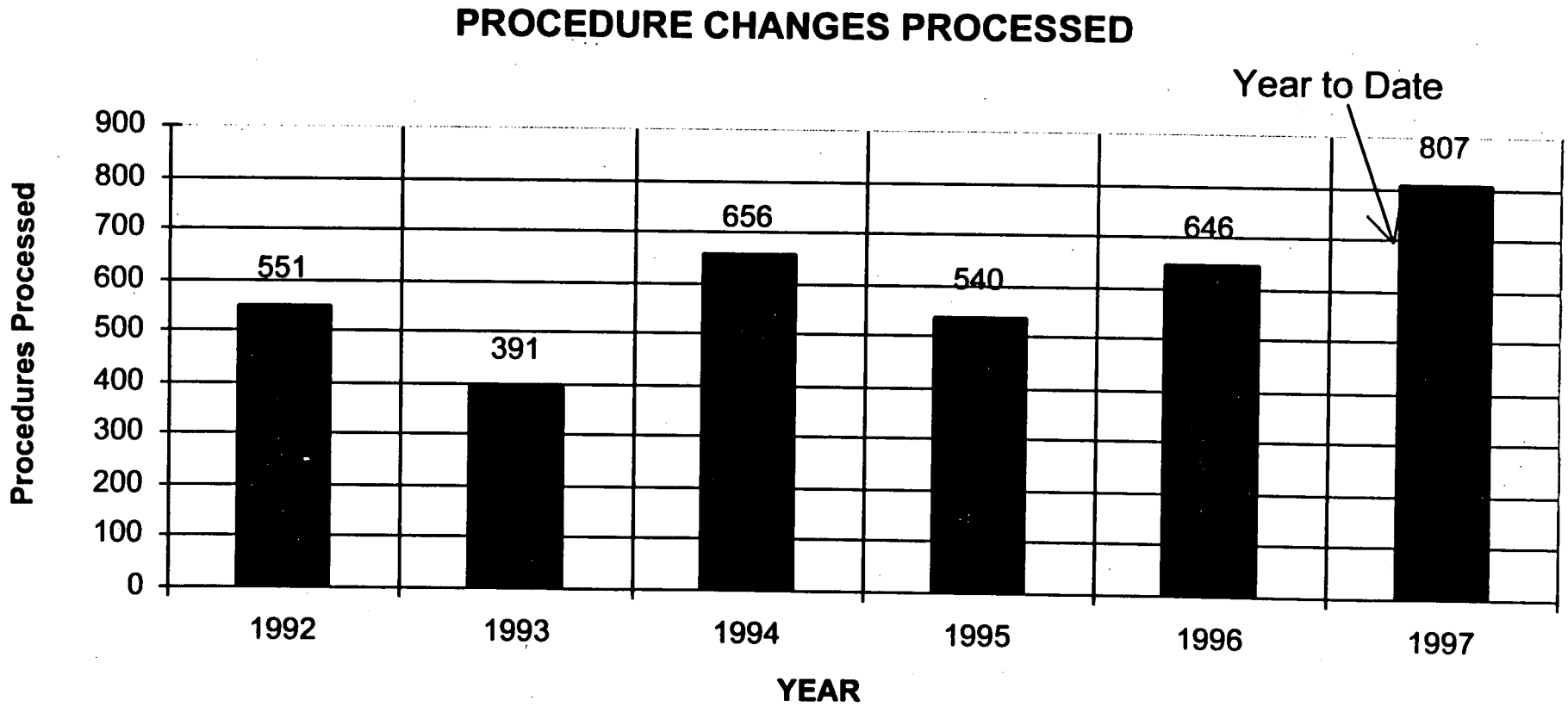
- The process for revising procedures is being improved so that deficiencies are expeditiously incorporated into procedures. The following improvements have been made to date:
  - Every operations procedure has a designated owner. When a procedure problem is encountered or an enhancement is identified, the procedure owner shares the responsibility of problem resolution. The owner is also responsible for ensuring that the user has the knowledge necessary to perform the procedure.
  - Shift personnel are heavily involved in procedure review, validation and verification.
  - The process for removing a procedure from service has been modified. If a procedure problem is encountered, operators can remove the procedure from service until the conditions that caused the removal are resolved.
  - Checklists for "Qualified Reviewer" and "Reactivity Management Review" have been incorporated into the procedure review process. The intent is standardization and quality improvement of procedure reviews.
  - A computer-based tracking system has been established for procedure enhancement requests, procedure revisions, and procedures removed from service.

OPERATIONS
AREAS OF PROGRESS

Procedure Quality (Continued)

- The following improvements are in progress or planned:
  - Procedures are being converted to "Electronic Control Copies" at this time. Procedures stored in the "Electronic Library" may be directly downloaded for use. This will streamline the process for procedure changes. In addition, the procedure enhancement tracking system is being improved to allow procedure users to input suggestions or identify problems. Once in the data base the procedure discrepancies can be prioritized and tracked.
  - A formal self-assessment of Operations' procedure processes is underway and will be complete by 10/31/97. In addition, best practices from other Duke plants and the industry will be benchmarked and incorporated at Oconee as appropriate.
  - All Oconee "Abnormal Procedures" (APs) are being benchmarked against those for other plants of similar design and re-issued with associated improvements. Of twenty five total APs, two have been benchmarked and revised for each of the Oconee units, four more APs will be completed this year, and the remaining nineteen APs will be benchmarked and re-issued by the end of 1998.
  - INPO has been contacted to conduct an assist visit to review Oconee's procedure quality, procedure usage, and the process for incorporating changes.
  - Due to the lower threshold for procedure problem identification and greater commitment to procedure improvement, the rate of Operations procedure revisions increased dramatically during the period. The lower threshold has also resulted in a larger number of procedures being formally removed from service due to identified discrepancies. The graphs on the next pages reflects these trends.

GRAPH OF OPERATIONS PROCEDURE CHANGES



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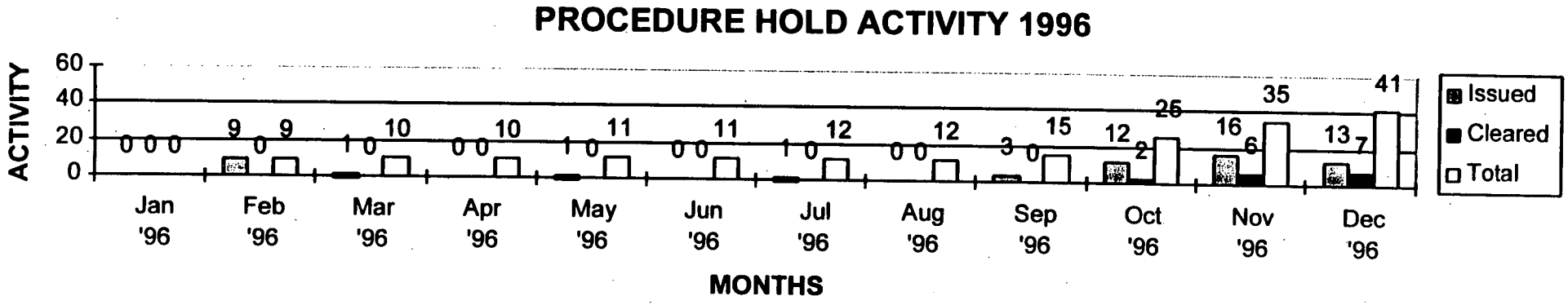
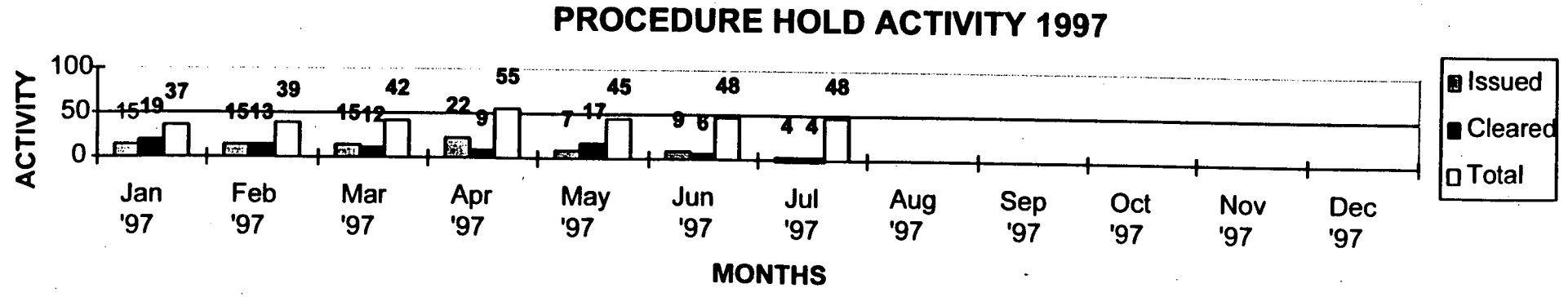




OPERATIONS AREAS OF PROGRESS

Log Keeping

- Maintenance of reactor operator logs in accordance with standards has been an area of concern at Oconee. In response to several instances of log-keeping deficiencies, the Operations Shift Managers selected log keeping as one five "Operations Core Values" for special emphasis by shift management. Thus, maintenance of operator logs is routinely emphasized in shift briefings, pre-job briefings, and in job observations by managers.

- The Operations Superintendent and other Operations managers routinely read the operator logs in the control room and provide feedback to reactor operators and supervisors. These informal reviews indicate improvement during the period.

- An assessment of logs kept during a 6/97 loss of power event was performed. This assessment showed that log keeping met overall requirements, and identified several areas for further improvement. These improvements, such as clarifying requirements for logging of site level information (e.g.., changes in Keowee, Lee Gas Turbine, or Standby Shutdown Facility status), are underway at this time.

- To provide greater accessibility and review of operator's logs, Oconee is coverting to an electronic log, using a standard program which is also being implemented at the other Duke sites. This conversion will be put in place during 1998.

OPERATIONS CHALLENGES

Operations' challenges include mispositioned components, a problem area in which substantial effort did not sufficiently prevent events during the five hundred plus days of outages during this period. Other areas for improvement were discovered by problem trending, event investigations, and training program evaluation.

Mispositioning Events

- Control of mispositioning occurrences has been a challenge for Oconee Operations. Earlier in the period, a trending program showed that continued emphasis had decreased mispositioning occurrences in Operations. When challenged by the large increase in overall component manipulations associated with multiple outages, the number of Operations mispositioning occurrences increased somewhat, then decreased as outage work was completed. Valve mispositioning contributed to events which affected control of reactor coolant inventory. Mispositioning trends at the site level (i.e., including mispositionings caused by groups other than Operations) indicated that sufficient progress was not being made.
- In March of 1997, Operations management called an Oconee 3 outage "stand down" due to mispositioning occurrences. Over a twenty four hour period, work was stopped for communication of expectations regarding component positioning and self-checking practices. Re-verification of valve alignments was performed for major plant systems prior to continuing startup.
- Oconee assessed its valve position self-checking practices versus practices at other plants. This assessment led to an improvement such that at least two separate indicators of valve position are now required when determining the position of a valve. Related changes to Operations directives were issued.
- A Mispositioning Continuous Improvement Team was formed for Operations, Chemistry, and Maintenance. This team performed common cause analysis for Oconee mispositioning occurrences over about a one year period. Industry consultants assisted the team, and best practices from other facilities were used to develop corrective actions. Over 75% of Oconee mispositioning occurrences were found to be caused by human errors associated with self checking practices or misjudgments. Management accepted the team's recommended corrective actions, which constitute a step-by-step plan to establish observable, detailed human performance and self checking practices for managers, supervisors and workers in each work group. These corrective actions are being implemented through the Oconee Human Performance Steering Team, individual group Human Performance Review Committee, and direct management involvement.
- The Human Performance element of the Oconee Recovery Plan, including STAR and QV&V, supports the corrective actions developed to prevent mispositioning events.

OPERATIONS CHALLENGES

Procedure Use and Adherence during Routine Operations

- Several instances of procedure use and adherence problems in Operations reflect an adverse trend. These problems have occurred during routine operation, but have not been evident during event response.
- Operations management has reacted strongly to this problem, as discussed in the series of actions noted below. Where appropriate, corrective discipline and remedial training have been applied.
- The Operations Shift Managers selected Procedure Use (and procedure quality) as one of the five "Operations Core Values" for special emphasis by shift management. Thus, procedure use and adherence, which has always been a point of emphasis in Operations, is now highlighted in shift briefings, pre-job briefings, and in job observations by managers.
- Operations directives for use of procedures was re-issued to clarify expectations for entry into procedures. Where the directive previously stated that operators may have to deal with situations not covered by procedures, the directive now clearly states that the plant must be operated by procedures.
- As a part of the Oconee Recovery Plan, one of the Operations "Temporary Defenses" is strengthened management oversight, with observations and direct feedback required during every shift work week (including nights and weekends). Operator behaviors relative to selected expectations, including those for procedure use and adherence, are compared to written standards. Immediate feedback to operating personnel is provided to correct any deviations from standards.
- The Human Performance portion of the Oconee Recovery Plan also addresses procedure use and adherence. A step by step plan to establish observable, detailed practices for managers, supervisors and workers is included.
- The 1997/1998 operator requalification training program also includes special training on procedure use and adherence.

OPERATIONS CHALLENGES

Reactor Coolant Inventory Monitoring

- During this SALP period, mispositioning events and instrumentation failures led to instances in which control room operators were not fully aware of reactor coolant inventory changes. One aspect of the corrective actions has been to dramatically improve reactor coolant inventory monitoring practices.
- The Operations Shift Managers selected Plant Monitoring as one of the five "Operations Core Values" for special emphasis by shift management. Thus, monitoring of the plant (with special emphasis upon reactor coolant inventory) is now highlighted in shift briefings, pre-job briefings, and in job observations.
- Failure to properly monitor reactor coolant inventory, in that operators failed to detect failed letdown storage tank instruments, was identified as a cause for the 5/3/97 Oconee 3 loss of high pressure injection pumps event. The Operations Superintendent and Shift Operations Manager instructed each Operations shift regarding the lessons learned from this event, including expectations for monitoring reactor coolant inventory.
- As a part of the Oconee Recovery Plan, Operations "Temporary Defenses" support reactor coolant inventory monitoring. Strengthened management oversight supports plant monitoring in a manner similar to that described for procedure use and adherence. In addition, when reactor power level or temperature is changing, supplemental monitoring of reactor coolant inventory is established using the computer equipment in the Emergency Response Organization facilities (TSC/OSC) adjacent to each control room.
- Improved tools for monitoring letdown storage tank conditions include the following:
  - Design problems related to the 5/3/97 Oconee 3 instrument failure have been corrected by modifications to letdown storage tank level and pressure.
  - A computer display of letdown storage tank level & pressure has been provided to the control rooms.
- Longer term improvements under development include:
  - Improvements in plant monitoring standards by the Operations Human Performance Review Committee, using industry best practices.
  - Improved guidance, computer tools, and training for monitoring reactor coolant inventory.

OPERATIONS CHALLENGES

License Examination Process

- Oconee's license examination process has a successful history:
  - Oconee carefully screens license class candidates prior to the NRC exam; 100% of Oconee license candidates passed for the three previous license exams
  - Oconee Operations Training personnel have extensive experience in review and validation of NRC-developed exams.

- However, in Oconee's first licensee-administered examination this year, the NRC disapproved the first exam submitted. Problems included a lack of discrimination between RO-level and SRO-level questions. Extensive efforts by both Oconee Training and the NRC resulted in an examination which was approved by the NRC and administered on schedule.
- Examination results were:
  - 100% pass (5 of 5) for SRO candidates
  - 100% pass (8 of 8) for RO candidates
- Oconee's assessment is that the cause of the examination problems was inadequate communication with the NRC, resulting in the examiner's standards not being met.

- Lessons learned are being applied as corrective actions for future exam development as follows:
  - schedule progress review meetings with the NRC and document results for follow-up
  - schedule additional time between examination submittals to accommodate potential changes
  - evaluate use of vendor-developed (vs. Oconee-developed) exams
  - standardize exam development processes for the three Duke sites

OPERATIONS CHALLENGES

Communication Standards

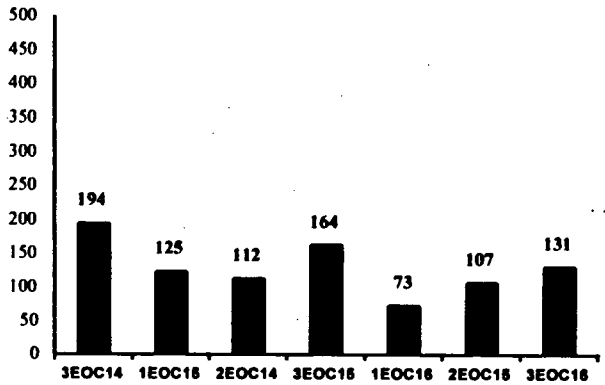
- Management observations of Oconee operators in the simulator and control room, as well as NRC feedback during a training inspection, identified an adverse trend in that operators had not been consistently meeting stated communications standards. These standards include:
  - three-way communication
  - use of unit number designators and train phonetic alphabetic designators
  - verbalization and repeat-back of alarms

- One aspect of the problem was that Operations directives stating communications standards, such as how to acknowledge alarms, had not provided clear guidance. Therefore, the associated Operations Management Procedure is being reissued at this time with improved instructions.
- As a part of the Oconee Recovery Plan, one of the Operations "Temporary Defenses" is strengthened management oversight, with observations and direct feedback required during every shift work week. Operator behaviors relative to selected expectations, including those for communications, are compared to written standards. Immediate feedback to operating personnel is provided to correct deviations from standards.
- Prior to identification of the adverse trend, an assessment of Operations communication practices had already been scheduled for the third quarter of 1997. This assessment is expected to clarify actions to raise Operations communications practices.

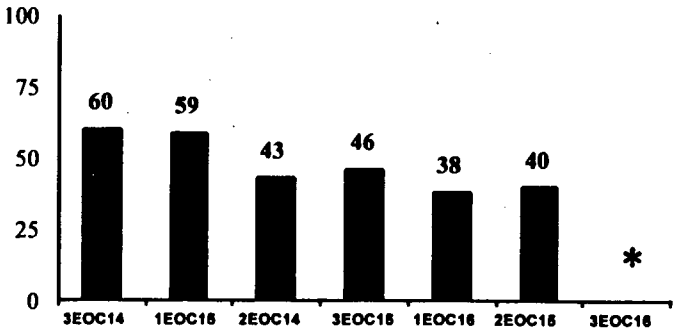
MAINTENANCE

MAINTENANCE STRENGTHS

•OUTAGE PERFORMANCE

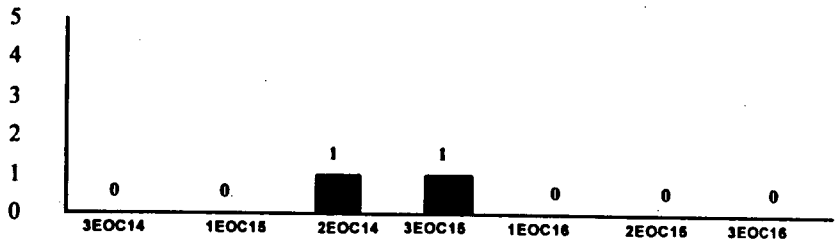


Exposure, Person-Rem

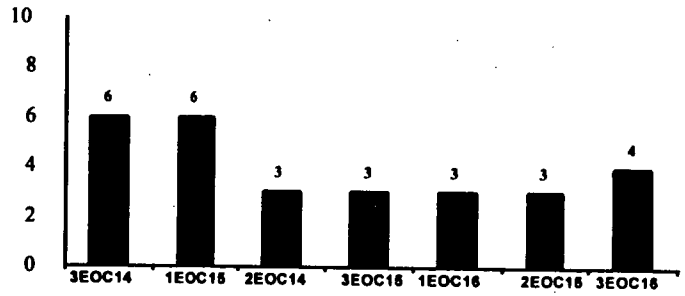


Duration, Days

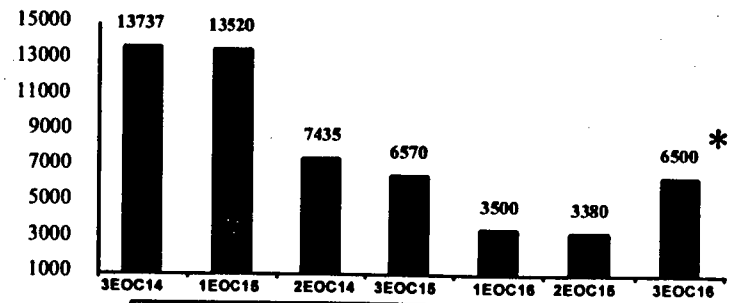
* 3EOC16 161 days due to late scope increase of Heater Drain Mods, B31.1 Corrections



Personnel Errors (LERs)



Personnel Injuries



Radwaste, Cubic Feet

* Significant scope increase with large asbestos removal project

MAINTENANCE STRENGTHS

Refueling Outage Achievements - Unit 2 EOC-15

Two refueling outages were completed during this SALP period, with a third scheduled for late September 1997.

The Unit 2 EOC-15 refueling outage began on March 28, 1996 and concluded on May 7, 1996 for a duration of 40 days. Significant measured results were achieved in the following areas:

Personnel Errors (LERs) - 0

Personnel Injuries - 3

Exposure, Person Rem - 106.9

Radwaste, cu. ft. - 3380

The 40 day duration was the shortest Unit 2 refueling outage in Oconee's history and the third shortest among all three Units. The 106.9 Rem radiation exposure was less than the previous Unit 2 refueling Outage and is second lowest for any Oconee outage. There were zero errors that resulted in a licensee event report (LER) and this equaled the previous best for an Oconee outage. The 3380 cu ft of solid radwaste is a record for Oconee representing the least solid radwaste generated.

The NRC Residents' Six- week Inspection Report for Inspection Period 96-09 concluded that Unit 2 EOC-15 outage was "extremely well managed and executed".

Major work accomplished during Unit 2 EOC-15 to enhance equipment reliability and improve equipment performance:

- Refurbished 6 CRDMs and replaced 10 CRDM thermal barriers to enhance trip time performance and reliability.
- 100% Eddy Current examination of the Steam Generators. Plugged 412 tubes. Pulled 4 tubes for metallurgical examination.
- Cleaned 33 Main FDW nozzles to correct pressure drop problems.

MAINTENANCE STRENGTHS

Refueling Outage Achievements - Unit 2 EOC-15

- Valve work performed:
  - –40 MOV Votes Test and 7 Motor Power Monitoring DP Tests
  - –Performed maintenance on 469 Valves
  - –Replaced the HPI Stop check valves
  - –Replaced the inlet and outlet Reactor Building LPSW valves and the 2A and 2B LPI Cooler outlet LPSW valves
  - –Replaced 103 valves with minor modifications
  - –Replaced the Main Steam Turbine By-Pass valves
- Upgraded the Reactor Coolant Pump vibration monitoring equipment
- Installed a strainer upstream of the Emergency Feedwater Pump Turbine regulator valve (2MS93)
- Performed HPI system full flow test
- Performed LPSW system integrated flow test
- Keowee switchyard isolation test was successfully performed during the start up
- Mid loop operations lasted only 8 hours and 50 minutes
- 45 Code welds were made and only 1 was rejected/repaired due to indications
- Shutdown risk management resulted in zero cases of high outage risks.

MAINTENANCE STRENGTHS

Refueling Outage Achievements - Unit 3 EOC-16

The Unit 3 EOC-16 refueling outage began October 4, 1996 and concluded on March 14, 1997 for a total duration of 161 days. Unit 3 EOC-16 incurred significant scope growth after a Unit 2 Heater Drain pipe rupture which included the Heater Drain system modifications, Secondary Side B31.1 inspections/repairs, and an Integrated Electrical ES test. Significant measured results were achieved in the following areas:

Personnel Errors (LERs) - 0

Personnel Injuries - 4

Personnel Exposure, Person Rem - 131

Radwaste, cu. ft. - 6500

The Unit 3 EOC-16 outage was conducted at the same time Unit 1 and Unit 2 had extensive forced outages to perform Heater Drain system modifications and Secondary Side B31.1 activities. Additionally, Oconee successfully performed the Integrated Electrical ES test during this outage period which was an addition to the original Unit 3 EOC-16 outage scope. Four injuries and zero errors (LERs) during 161 outage days are significant outage achievements. The exposure of 131 person-rem was less than the pre-outage target of 138 person-rem and was the lowest Unit 3 refueling outage exposure since 1978 - Unit 3 EOC-03, 124 person-rem. The 131 person-rem resulted from 92,895 RWP work-hours. This represented an improved average of 1.4 mrem per RWP-hour compared to the previous average of 2.4 mrem per RWP-hour from Unit 3 EOC-15.

MAINTENANCE STRENGTHS

Refueling Outage Achievements - Unit 3 EOC-16

Major work accomplished during Unit 3 EOC-16 to enhance equipment reliability and improve equipment performance:

- Heater Drain system modifications
- Secondary Side B31.1 piping branch connection inspections and repairs
  - 3000 reviewed
  - 300 inspected
  - 80 replaced or repaired
- Integrated Emergency Power ES test
- Replaced 10 CRDM stators to improve trip time performance
- Recaged 4 fuel assemblies
- Replaced the Operator Aid Computer
- Replaced the Integrated Control System
- 100% Eddy Current of the Steam Generators. 226 tubes were plugged. 4 tubes were pulled for metallurgical examination

MAINTENANCE STRENGTHS

Refueling Outage Achievements - Unit 3 EOC-16

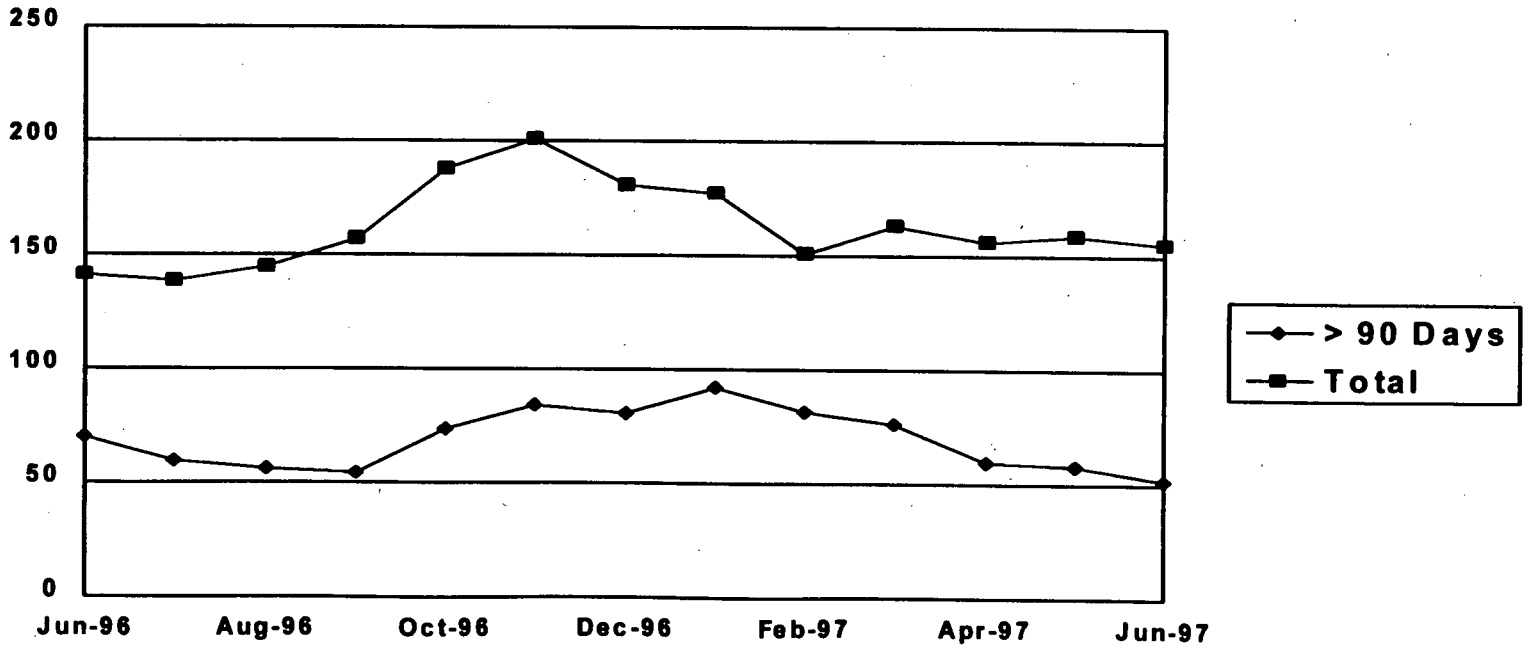
- Valve work performed:
  - Replaced the Main Steam Turbine Bypass valves
  - Replaced the HPI stop check valves
  - Replaced the inlet and outlet Reactor Building LPSW valves and the 3A and 3B LPI cooler outlet LPSW valves
  - Replaced 6 RC system high point vent valves
  - Replaced 83 valves as Minor Modifications
- Installed CCW system tie-ins for the Oconee Service Water modification
- Installed minimum recirculation lines on both LPSW pumps for the Oconee Service Water modification
- Performed modification to the Main Fuel Bridge hose reels and brackets
- Performed HPI full flow check valve test
- Performed HPI developed head test
- Performed LPI full flow test

MAINTENANCE STRENGTHS

Corrective Work Order Backlog

Oconee continues to put emphasis on low corrective non-outage work order backlogs. During this SALP period the Station's average non-outage corrective backlog has been maintained at an average of approximately 488 for all three units combined with a total current inventory of 466 as of July 1, 1997. On a per unit basis, this averages to approximately 155 work orders per unit. Oconee has steadily and successfully worked to maintain the older (those greater than 90 days old) outstanding work order backlog at a Station average of approximately 208, or 70 per unit. The following trend chart indicates a record of continuous focus with temporary backlog increases during outages. These numbers are only slightly higher than the 12 month averages that were compiled at this same time last year. The backlog peaked during the 3 simultaneous B31.1 code repair outages along with a Unit 3 refueling outage and has been on a downward trend since November of 1996.

Corrective - Non Outage Work Order Inventory per Unit



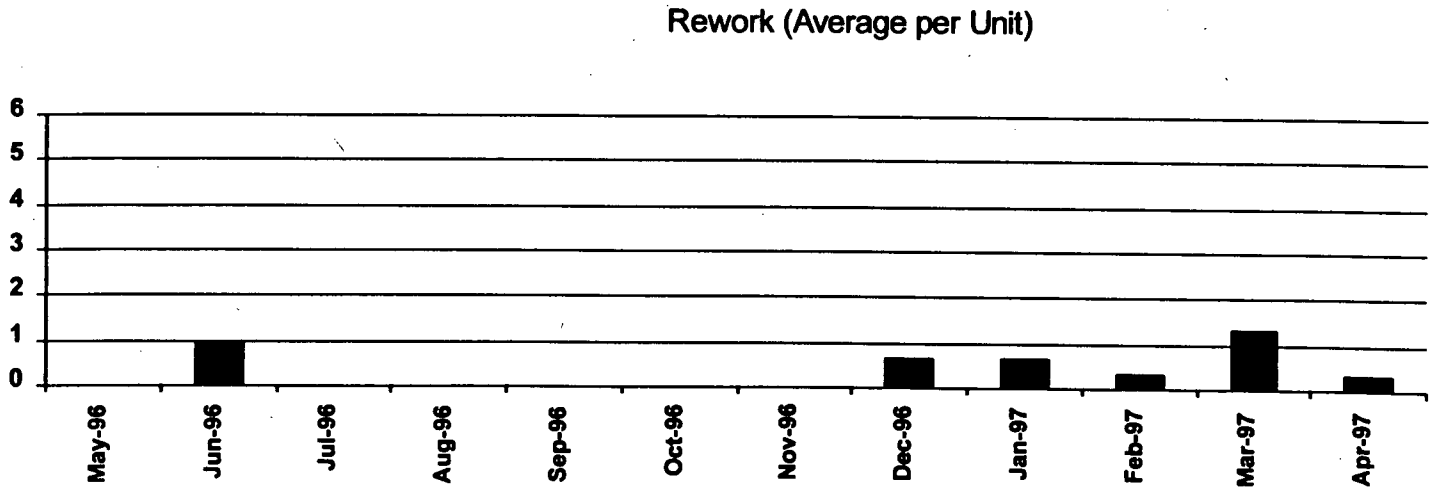
MAINTENANCE STRENGTHS

Maintenance Rework

Maintenance continues to track and monitor rework items in an effort to evaluate repeat maintenance and the cause associated with the findings. A rework item is identified by comparing maintenance performed within a two week period to maintenance performed in the previous 90 days. If the repeat work was a result of the previous maintenance, it would be considered a rework item. The definition includes failed functionals/retests or other failures identified by the creation of a new work order or the addition of another task to an existing work order. The rework program requires the participation of maintenance management, first line supervision, and maintenance personnel in performance of apparent root cause review of the rework items by functional area..

The goal of no more than an average of two rework items per month for all three units combined has been met and exceeded during this SALP period, inspite of the total of 548 unit outage days of maintenance work. One example of a problem identified by the rework program dealt with repeated failures of newly installed small bore screwed valves. These valves were failing soon after they were placed in service. To prevent this problem, new valves to be installed have a pre-installation pressure test performed. This helps ensure they will perform properly when placed in service, effectively eliminating this type of failure.

The rework process will continue as one of the methods to measure the quality of equipment maintenance and assist with the identification of areas for improvements.



MAINTENANCE STRENGTHS

SPOC

SPOC is the Single Point Of Contact for corrective work discovered on plant equipment. Problems identified on plant equipment by any person are processed through the SPOC maintenance team. The problems are initially screened by on-shift supervision consisting of a Maintenance I&E Supervisor, Maintenance Mechanical Supervisor and the Shift Work Manager (an on-shift Engineer with Operations experience and an SRO license). The SWM, with input from the Operations Shift Manager, sets priorities for SPOC teams ensuring operational focus.

In addition to screening and completing emergent work at the station, the SPOC team has periodic maintenance tasks to supplement their schedule. Tasks range from system/component maintenance to critical on line calibrations of various instruments.

SPOC is a multi-disciplined team that consists of 4 (four) I&E Technicians and 4 (four) Mechanics. SPOC works to immediately resolve most problems that occur during their shift. Rapid resolution of emergent problems can reduce LCO times, increase Safety System availability, and provide a strong operational focus. Unit Capacity Factor is increased by quickly resolving problems that could cause a power reduction or Unit trip. SPOC also provides around-the-clock fire brigade and Emergency Plan support for the Station.

The SPOC Teams perform as much emergent (Priority "E") work as possible. By working as many Priority "E" problems as possible, the amount of work that must "break" the day shift Maintenance teams' schedule is reduced. This also reduces the amount of overtime or carry over work that must be rescheduled and means less down time for systems/components vital to the operation of the plant. Data shows that approximately 65 to 70% of emergent work items are resolved or completed by SPOC teams.

SPOC also routinely resolves emergent items associated with Control Room Instrumentation Problems (CRIPS). CRIPS are a focus area for Oconee Nuclear Station in that these devices are important to promote the safe and efficient operation of our plant. By handling CRIPS as they emerge, overall operational risk is reduced.

SPOC personnel are involved in mult-skilled training that will further enhance their abilities to work on a wide variety of systems/ components. The net result will be teams that are not only composed of varied disciplines but also individual team members with varied skill sets.

MAINTENANCE STRENGTHS

Multi-Skilled Work Teams

Several initiatives have been completed within the valve area which have enhanced the ability of Maintenance to perform a greater scope of work more efficiently. Development of multi-skilled teams for Motor Operated Valves and Air Operated Valves continued. This approach allows the team to perform detailed trouble shooting, diagnostics, preventive and corrective maintenance and testing without "handoffs' between teams. Multi-disciplined teams were formed at first to eliminate handoffs between teams. Over the past several years as team members were cross trained and qualified to electrical, instrument/control, and mechanical tasks it has been possible to transition from multi-disciplined to multi-skilled. The Mechanical Technicians have received 474 hours of classroom training and the I&E Technicians have received 247 hours of classroom training to obtain the needed basic skills to cross qualify to tasks. Many additional hours of on the job training were utilized to qualify to specific functional area tasks.

- Other multi-disciplined and multi-skilled teams in Maintenance are HVAC, Cranes, Fuel Handling, Rotating Equipment, Predictive Maintenance and SPOC.

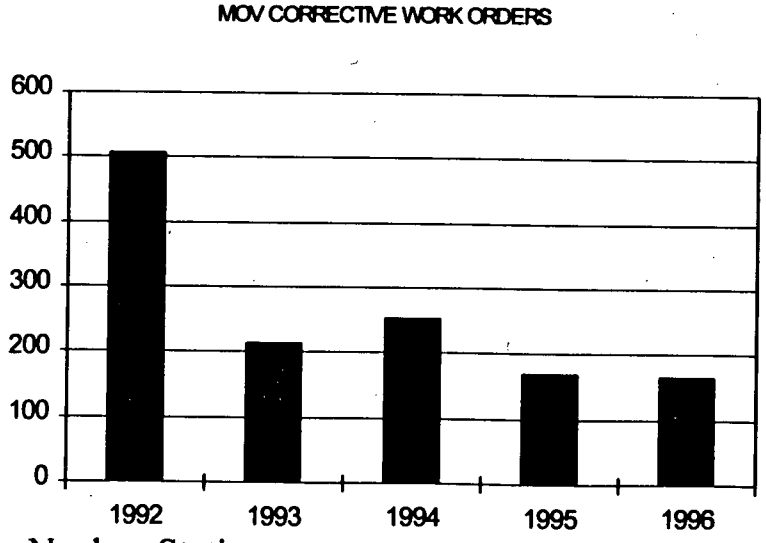
- In the area of Air Operated Valves (AOV's), the development of multi-skilled technicians is also paying dividends. The technicians are able to perform preventive and corrective maintenance of both valve and actuators including setup and calibration. The Fisher Flow Scanner is currently used by the team to perform diagnostics on AOV's.

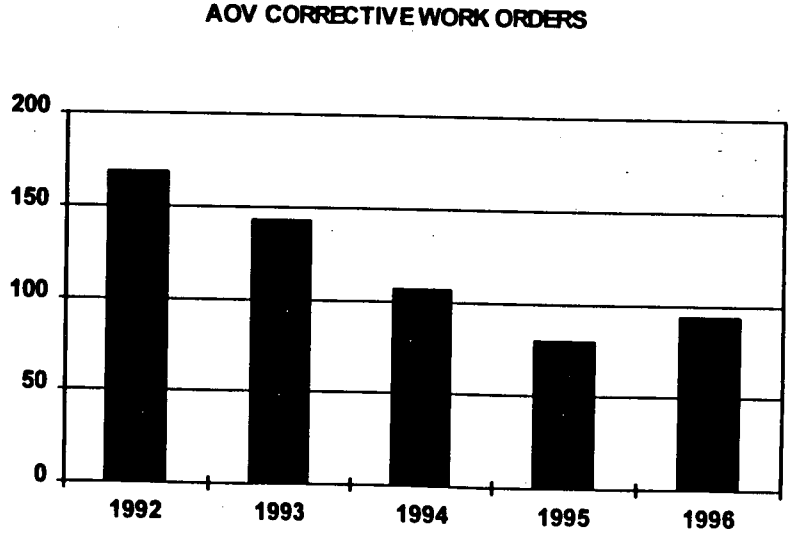
MAINTENANCE STRENGTHS

Multi-Skilled Work Teams (CONTINUED)

- In the area of Motor Operated Valves, the development of multi-skilled technicians has allowed the team to be self sufficient in the use of the MOV test bench, VOTES equipment, and Motor Power Monitoring to perform testing and diagnostics. As the team has developed skills in both electrical and mechanical disciplines, less technical support has been required and the total job quality has increased. An increase in troubleshooting abilities by the multi-skilled technicians is evident. The development of Motor Power Monitoring technology in the MOV area has been a positive step in performing MOV diagnostics with less radiation dose and less overall testing time. The development of a multi- skilled team in the MOV area has led to real efficiency gains. A 20% reduction of MOV resources for the refueling outages, a reduction in overtime, reduced hand-offs, and a reduction in exposure are several indicators of efficiency gains.

- The following charts show a reduction in the number of valve operator corrective work orders since the formation of MOV and AOV multi-skilled teams in March 1994





MAINTENANCE STRENGTHS

Predictive Maintenance

A continued strength for Maintenance is the use of Predictive technologies on various station components. The Predictive Maintenance Team consists of a team that is trained and skilled in numerous predictive technologies. These technologies include the use of vibration analysis, infra-red inspection, ultra-sound inspection, oil analysis, motor current analysis, video probe technology, laser alignment, and dynamic balancing. The Predictive Maintenance Team has numerous periodic surveillance work orders scheduled to provide monitoring on a pre-determined frequency for many of the station components. Both the scheduled and the emergent work allows the team to provide a proactive method to establish base line performance of components and the early detection of potential problems.

Predictive Maintenance Successes

There are several examples of establishing a base line and then detecting impending failures. These include:

- 3B condensate booster pump broken impeller found by vibration and video probe analysis
- Detection of overload heater problems in MOV valves via infra-red inspection
- Monitoring reactor coolant pump vibrations using vibration analysis
- Detection of overheated connections in switchyard with infra-red monitoring
- Ensuring valves are closed after testing using ultra-sound inspection
- Oil analysis has allowed continued use of oil in various components to avoid unnecessary oil replacement
- RPM data collection for HPI, LPI, BS, LPSW and MDEFDW pumps during the Integrated ES Test
- Found a bad bearing in High Pressure Injection Motor during testing at vendor shop prior to returning for use

The team continues to update their skills by attending various training classes and seminars. Everyone on the team is working to be qualified in the various technologies currently available. The team is also continuing to improve their equipment. Purchases have been made to upgrade to the latest technology available. As new technologies are purchased and put into use, the technology is transferred to the rest of the maintenance team to improve maintenance quality (example: new laser alignment technology).

MAINTENANCE STRENGTHS

Welding

A Corporate Quality Improvement Team was formed with its mission to improve the overall quality of the welding within Duke Energy but strongly targeted toward the nuclear facilities. From this plan, the following improvements were implemented at Oconee during this review period:

- All welds receive a final visual inspection performed by certified welding inspectors.
- Welders assigned to work on ANSI/ASME pressure piping must pass eye examinations, pass a limited access welding performance test, and attend and pass the Corporate and Nuclear Generating Department Welding Program training. All other welders must complete as a minimum the eye test and the tested welders training in order to weld at Oconee.
- A Welding Technical Support group was established at Oconee and at the Corporate level to focus on the resolution of current and future issues relating to the welding program and weld quality.
- Welding Working groups have been formed at both the site and corporate level to bring end users of the program together with the intent to continuously improve the welding program.
- Increased oversight during pre-job assignments to ensure the welder assigned to a particular task has the qualifications and skills to make the weld.

It should be noted that several other objectives developed by the newly formed Welding Technical Support group are either in the development stage or in the process of being implemented.

MAINTENANCE STRENGTHS

Welding (CONTINUED)

Welding Successes:

- Data from Oconee's last refueling outage shows 39 welds received RT inspection with 35 acceptable welds and 4 repairs.
- During the RCS thermal sleeve repairs and the letdown storage tank modifications, 8 RT welds were successfully made without requiring repairs.
- During the Heater Drain system B31.1 repairs, over 1200 welds received fitup and final visual inspection by certified inspectors with all acceptable.
- Use of automated welding equipment was implemented on a major project with approximately 600 successful welds. Random RT inspections of the welds were performed which exceeds minimum requirements.
- The Welding Technical Support group has submitted 9 procedure revisions to increase the focus on weld quality and adherence to the welding program.

Future Plans:

- A welding performance database has been developed and is currently being implemented to capture weld quality data at Oconee and the corporation. This will establish baselines for improved performance as well as identify areas which need improvement.
- Increase the technical knowledge of the Welding Technical Support group. Individual training plans for each group member have been established.
- Develop additional applications for automated welding processes.
- Develop and schedule mock up testing for all welders for both pressure piping and structural, to maintain or improve welding skills.

MAINTENANCE STRENGTHS

Continuing Training Improvements

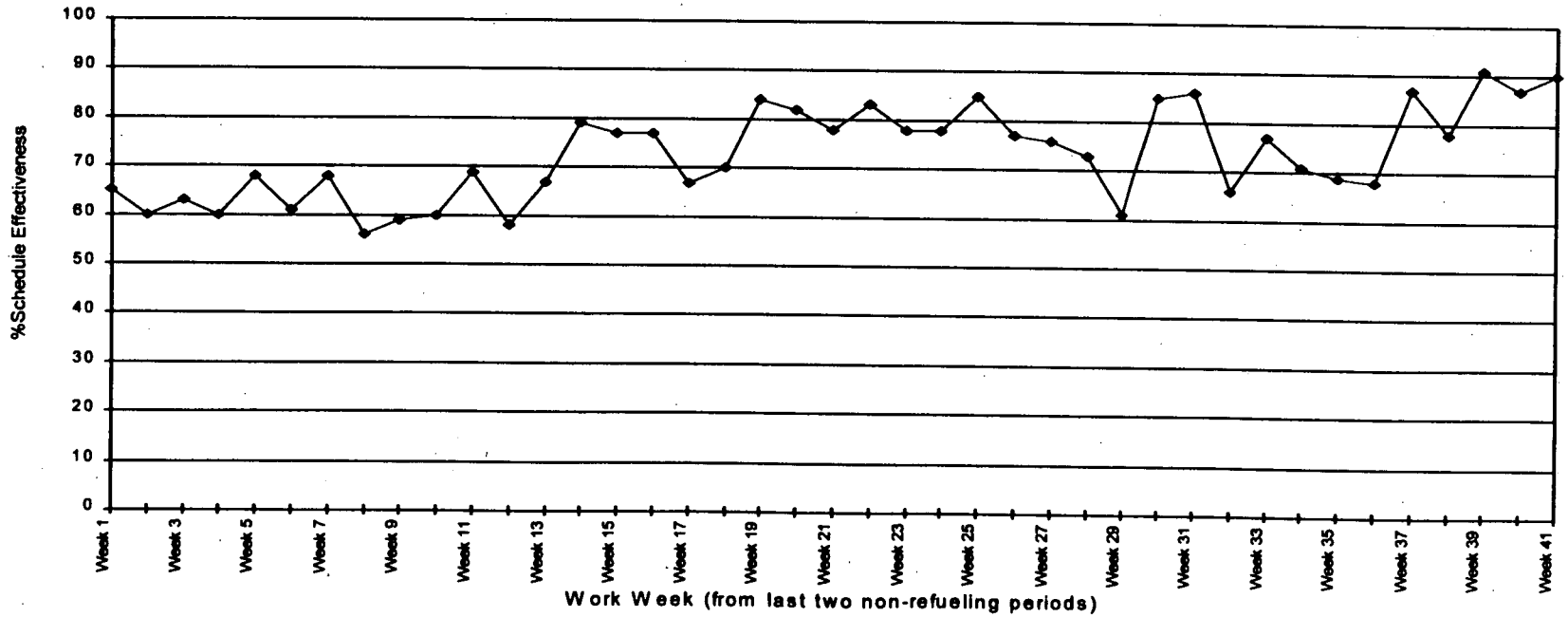
Maintenance has developed and implemented a well defined and structured "Continuing Training Program." Attributes of this more structured and detailed approach to training are as follows:

- The Maintenance workforce has been divided into forty (40) focused training duty areas. Duty areas are logical groupings based on the varying skill requirements within Maintenance. Most technical duty areas receive training on a scheduled quarterly frequency.
- Each duty area has an assigned instructor who leads in the development and presentation or coordination of customized training to meet the needs of the duty area.
- Training developed and presented is normally a combination of administrative and technical topics. Administrative topics cover common material for all teams such as work practices, revised directives, and operating experience. Technical topics are customized by team or duty area function. Subject matter experts within the duty area are commonly involved with the presentations.
- Human performance work practice topics are included in the training. Examples of these for the most recent quarter are Practical Factors Training and the use of a STAR Simulator.
- Supervisors attend technical duty area training with their teams each quarter. They also attend generic supervisor training on an annual basis. A portion of this training is presented by maintenance managers which allows for consistent delivery of management expectations and excellent feedback opportunities.
- Feedback from technicians and supervisors on quarterly training has been very positive. Many specific comments have indicated that this training provides the right focus within the individual area and that it will definitely lead to improved worker performance.

MAINTENANCE AREAS OF PROGRESS

Schedule Effectiveness

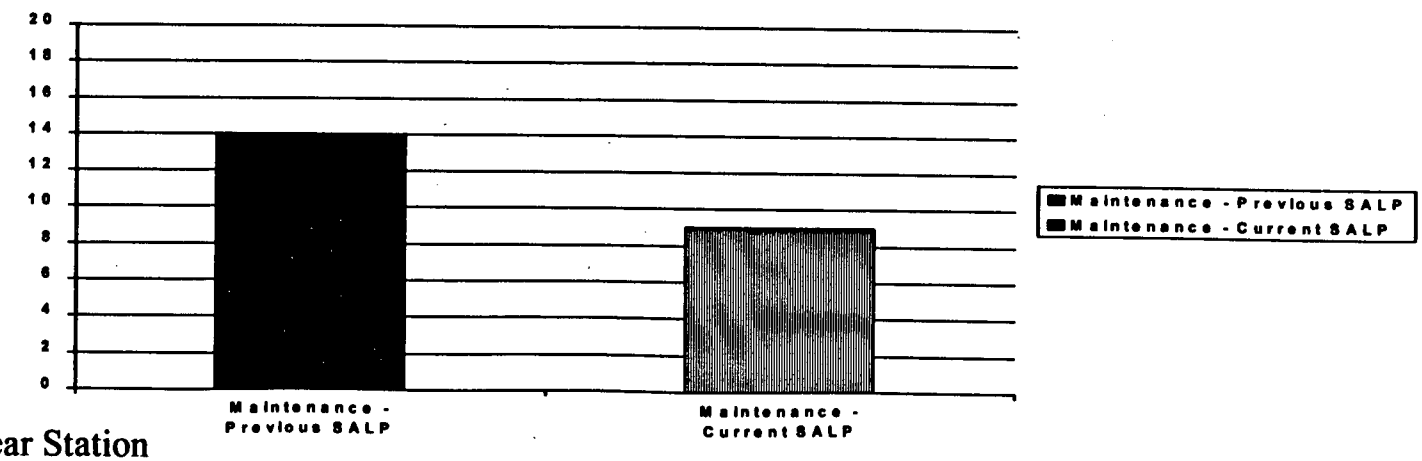
Schedule effectiveness has been a focus area during this review period. The intent of this focus area is to improve nuclear safety by assuring all risk related work has been evaluated and performed when expected as well as to build a foundation for improved productivity. The data below shows schedule effectiveness achieved during non-refueling outage periods. Lower data points generally reflect forced outage periods that impacted the normally scheduled work. A 1997 Goal of 90% Schedule Effectiveness has been achieved. Scheduling effectiveness is the percentage of work completed within a work week compared to the work that was committed for the week.The next area of increased focus will be identification of high risk work that warrants the development of detailed coordination plans using a structured approach.



MAINTENANCE AREAS OF PROGRESS

Safety

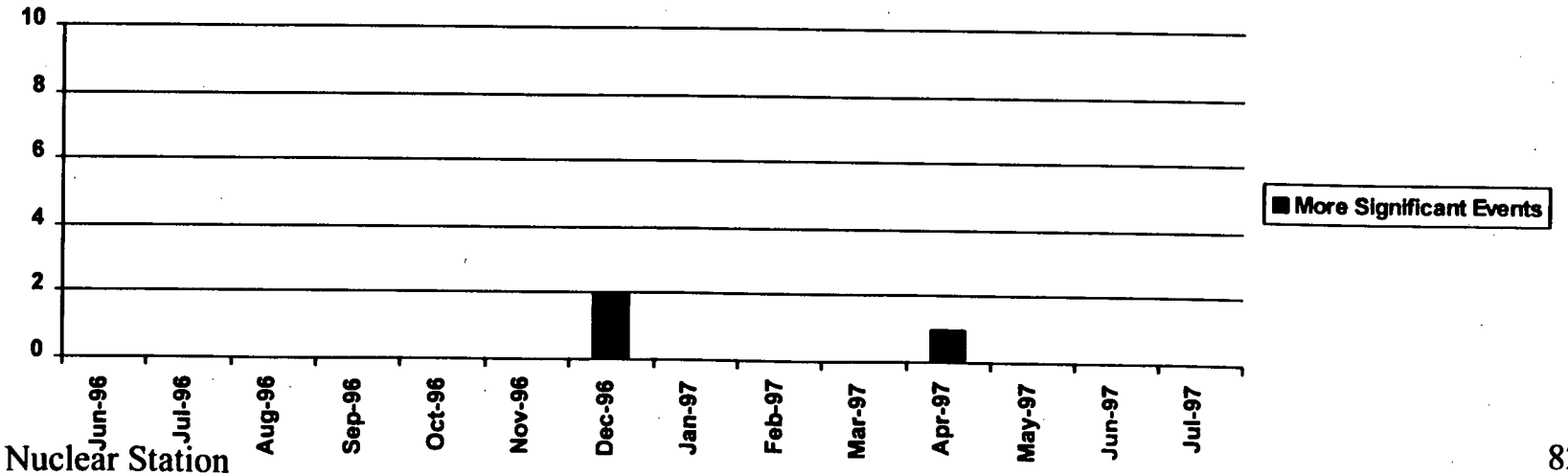
- Through assessment of Recordable Injury Data and Management Observations, it was determined that the Maintenance Organization needed to increase emphasis on safety performance. The number of Recordable Injuries in the Maintenance area shows a decline but an increased number of leading safety indicators such as improper use of Personal Protective Equipment (PPE) had been identified. The Maintenance Organization is focusing on an approach to improve safety through clear expectations and increased ownership.
- Maintenance is utilizing a behavioral based safety process to achieve a safe work environment. This process focuses on increasing employee ownership for the safety improvement efforts. The basic process involves the individual work teams assessing themselves to identify the effectiveness of what they currently have in place to ensure safe work practices are utilized. The team then identifies safety practices that are important to them for the type of work that they perform , such as PPE requirements, rigging requirements, lock out/tag out requirements, etc. The team develops a Safety Observation Checklist that will enable the team members to monitor themselves for adherence to safe work practices. This observation gives the team data on how they are adhering to safety practices that the team agreed to perform 100% of the time. The team also has a budget to reward itself for reaching team safety goals.
- Maintenance is projecting to complete implementation of this process by September 1997. Very favorable feedback has been received from the teams that have implemented this process and a stronger safety culture in these teams is evident.



MAINTENANCE AREAS OF PROGRESS

Procedure Use and Adherence

Maintenance has continued to stress the requirement of unconditional adherence to procedures and directives. The necessity of this has been demonstrated to all members of Maintenance, including management and supervision, via STAR Simulator training and Practical Factors training. The WANO evaluation of October 1996 indicated a need for continued emphasis on procedure use and adherence. Later in this period an INPO assist visit in March 1997 determined that progress had been made. A search of the PIP data base for the period from 1/1/96 to 1/7/97 indicated that 3 MSE's (More Significant Events) were attributed to Maintenance due to procedure use and adherence issues. During this period of time a three unit outage, and additional forced outages, were executed by Maintenance. These outages included the implementation of large-scale modifications including new control systems with new procedures to be executed for the first time. An additional indicator of detailed procedure adherence is the large number of procedure changes initiated by the maintenance teams to "correct" and "enhance" procedures, especially minor changes to correct "typos". Over the past two SALP reporting periods there have been no reactor trips or transients that were caused by maintenance procedure use and adherence problems or poor craft work practices.



MAINTENANCE AREAS OF PROGRESS

Self Assessments

To identify and eliminate work practice problems, Maintenance has increased its self assessment involvement in the following areas:

Peer Assessment Team: During the first quarter of 1997 Maintenance developed a new process to strengthen existing self assessments which include a dedicated Self Assessment Coordinator and a Peer Field Observation Team. The Peer Observation Team consists of full time positions staffed on a revolving basis by craft from the maintenance teams. The team performs daily in-the-field observations of Maintenance work activities using a 28 point checklist. This checklist was developed using INPO Criteria with additional Focus Areas from Industry and PIP trends. One of the benefits of the field assessments has been that work practices which do not meet expectations are immediately corrected. Because the assessment team is made up of peers, the constructive feedback has been more positively received. To date (8/1/97), the team has performed 34 field observations. The findings and trends from the Field Observations are reviewed with the affected maintenance team and then communicated to the Maintenance Managers on a weekly basis. Major issues or trends are then summarized in a Quarterly Report with problem resolution tracked through the Problem Investigation Process (PIP).

Special Interest and Maintenance Program Assessments: The Maintenance Assessment Coordinator also acts as the single point of contact for the other types of existing Maintenance Self assessments. The coordinator works with the Maintenance Managers to identify, staff, and schedule these assessments. These assessments may involve review of data by a subject matter expert looking for adverse trends (examples: Maint. Rework, Work Order Backlogs), and may involve establishing a team to do a focused assessment of a particular item (examples: FME, Post Maintenance Testing). Once completed, the Assessment Reports are reviewed by the coordinator for compliance with the Nuclear Department's Self Assessment Directive, and to assure that corresponding PIP's are generated to track and trend problem resolutions.

PIP Quarterly Reporting: Maintenance reviews the PIP database quarterly for trends in Event Codes and INPO Cause codes. A Root Cause Analysis is initiated through the PIP process when the data indicates there is an adverse trend. Maintenance began the first quarter of 1997 looking at an additional element in the quarterly trending. Maintenance has normalized the number of errors by comparing the number of Maintenance caused Events with the number of work hours. This has been performed to determine if error rate is improving or declining.

Common Cause Analysis: The site performs a common cause analysis semi-annually on the problems reported in PIP's. Maintenance has used the common cause analysis to identify problem areas and initiate improvements.

MAINTENANCE AREAS OF PROGRESS

Human Performance Improvement

Oconee Maintenance has maintained a continued focus on improving human performance with an emphasis on changing the culture toward stronger rule based decision making. A human performance common cause study was completed to better understand the maintenance specific reasons for human errors and to develop aggressive improvement initiatives:

- **Peer Self Assessment Team** - A team of technicians was trained on self assessment to observe daily work for work practice standards such as STAR, Questioning Attitude, safety, procedure use and adherence, and radiation work practices. Technicians are rotated on the team for 3 to 5 months. Reports are provided weekly with a quarterly summary report.

- **Maintenance Quality Feedback** - Weekly feedback information is provided to team members to review work practice successes and failures along with lessons learned from the previous weeks work. The information is covered in a special team meeting on Tuesday mornings by the supervisors of the teams. This approach provides rapid feedback to the teams and reinforces work standards with actual examples the entire craft organization can identify with.

- **Quarterly Continuing Training** - Continuing training has been given more structure with quarterly training for each maintenance team. The entire team participates in the training week along with the supervisor to review work practice standards, directive changes, operating experience, and technical topics for the particular function.

- **Human Performance Standing Items in Weekly Teamnotes** - Every week a dedicated section in the Maintenance Teamnotes focuses on a particular aspect of human performance including answering questions from technicians, human performance operating experience, and changes in work practice expectations.

MAINTENANCE AREAS OF PROGRESS

Human Performance Improvement (Continued)

• **Practical Factors Training** - This training was developed to challenge the maintenance teams and team members on their knowledge of work practices and human error reduction techniques. A "mock-up" job is given to the team to perform as they would any task in a normal work day. The mock-up work area is complete with pipes, valves, breakers, switches, valve operators, safety tagging, work package, work procedure, and scaffold. The mock-up job to be performed is full of traps and errors that the team must catch and correct to successfully complete the job. This method is superior to the traditional classroom approach to test the craft knowledge and actually demonstrate error reduction techniques and work standards.

• **Maintenance Human Performance Review Committee** - A Human Performance Review Committee was formed as part of a department wide human performance improvement initiative. The committee is made up of a cross section of maintenance personnel with a charter to monitor human performance results and develop improvement strategies including detection, prevention, and correction initiatives.

The trends of human performance related problem reports indicate that in spite of increased total problem reporting the numbers of errors normalized by opportunity for errors has actually declined (based on 548 outage days which is equivalent to 11 average refueling outages). A commitment to continued focus on human performance improvement will help assure that improvement and accountability continues in this critical area.

MAINTENANCE AREAS OF PROGRESS

Asbestos

Better control of asbestos work activities and asbestos program improvements have been achieved during this SALP period with a focus on aggressive asbestos abatement to improve worker safety. The heater drain piping mods, branch connection modifications, and safety related pump room material condition upgrades have resulted in record levels of asbestos removal.

Program Improvements:

- Improved site awareness relating to asbestos (All materials treated as asbestos unless proven otherwise)
- Asbestos organization defined and approved from cooperate level down
- Increased controls put in place with maintenance procedures and development of Nuclear Station Directive 115
- Potential for exposures has decreased due to increased awareness and asbestos program structure that has been put in place. Asbestos Program Leader established in Work Control so that all work can be monitored
- Enhancements to the program have enabled proper planning, use of qualified workers, exposure monitoring, work tracking, waste disposal completion and reporting compliance related activities to state organizations
- Clearly defined roles and responsibilities for those involved in managing the site asbestos program
- 3830 Linear Feet / 463 Square Feet of asbestos material removed from plant systems
- 4099 samples taken and analyzed onsite for the presence of asbestos

MAINTENANCE AREAS OF PROGRESS

Fuel Handling

A noticeable improvement has been achieved in the area of Fuel Handling. Major contributors of Fuel Handling improvements have been:

- An upgraded formal training program
- Active fuel handling procedures were reviewed and upgraded
- A former Operations Shift Manager was assigned to the team to provide increased leadership and to increase the Operation focus in the Fuel Handling Area
- Work practices were reviewed and any weaknesses were identified and strengthened
- Our Fuel Handling equipment is scheduled to be modified in 1998 to upgrade to current technology.
- Review of current fuel loading pattern, to reduce fuel assembly grid interactions and potential damage
- Fuel Handling Quality Improvement Team was formed with members from all three Duke Nuclear Sites and delivered a set of recommendations to improve performance equipment and consistency

Additional details on some of the more significant changes:

- **The Upgraded Fuel Handling Training Program** was developed and training for the team conducted. The training consisted of procedure reviews and lessons learned from the Problem Investigation Process and the Operating Experience Program. Reactor Engineering also discussed the aspects of a fuel assembly, its importance and hazards that could occur during Fuel Handling. The training also included team interaction and participation on the STAR simulator. This reinforced the need for clear communication, repeat backs, and having a questioning attitude. This training will continue on a periodic basis and will include personnel involved in Outage Fuel Handling just prior to the start of each evolution.

MAINTENANCE AREAS OF PROGRESS

Fuel Handling (Continued)

- **A Former Operations Shift Manager** is the supervisor for the Fuel Handling Team. He and the team have reviewed all active fuel handling procedures. Improvements have been made including a formal written Pre-job Briefing Form that is used for fuel handling work, a specific enclosure to safely shut down the fuel handling equipment, an enclosure to include a pre-checklist of items prior to any fuel work starting, and the use of fuel assembly move sheets that allow the team to assure correct assemblies are placed in the correct location. The supervisor continues to work with the team to improve work practices, use 3-way communication, and help increase the understanding of Reactivity Management and Operation Focus.

- **The Fuel Handling Equipment** will be upgraded in 1998 with more modern control systems and updated technology. This will improve reliability and material condition of these components. This will also resolve the human factors concern that was the root cause of "bumping" the dry cask shipping container during loading. Reactor Engineering is improving refueling processes by modifying the reload pattern to help eliminate possible grid strap sliding or tearing. More open water moves will be performed to protect the fuel by minimizing the amount of grid strap interaction with fuel assembly corners.

MAINTENANCE CHALLENGES

Post Maintenance / Modification Testing

A Post Maintenance/ Modification Testing Quality Improvement Team (PMT QIT) was formed to review the PMT process and establish corrective actions to improve program implementation. The team performed an extensive review of PMT history to gain understanding of the root causes of past problems and to assure that corrective actions and improvements are comprehensive. The major recommendations were as follows:

- Development of a Comprehensive Guidance Document for the specification of PMT activities
- The establishment of a PMT Working Group to monitor effectiveness and assure continuous improvement
- The establishment of a Test Coordinator function to provide test coordination
- The consolidation and adequate staffing of testing functions with clear roles and responsibilities
- The formalization and documentation of the Weld Process Control and testing requirements between different affected parties.
- The establishment of standardized scheduling ties for PMT's and reporting methods within the site schedules.
- Clarification of roles and responsibilities for all groups involved in the PMT process

The PMT process has involvement from the Engineering groups, Scheduling, Planning, Operations, and Maintenance areas and therefore requires very formal communication and handoffs. An implementation team has been formed with members from each of the key groups and is putting into place the short term and long term improvements.

MAINTENANCE CHALLENGES

Materiel Condition/Housekeeping

Materiel condition/housekeeping has become a major focus area for Oconee. Several program improvements have been put in place to strengthen and place higher priority on these issues including a formal structured housekeeping program with the areas of the station having designated owners. An upgrade program is also in progress with a focus on improving safety related spaces to a near "as new" condition. Upgrade of the Unit 1 and Unit 2 Low Pressure Injection and Building Spray Pump rooms has been completed under this program. Other aspects of the new program include:

- A dedicated site Materiel Condition/Housekeeping Coordinator has been put in place
- A Materiel Condition/Housekeeping Steering Team has been formed to prioritize identified work in this area, establish training needs, and monitor progress
- A materiel condition/housekeeping budget has been established to fund additional work in this area and to develop long range funding plans for improvements
- Site wide involvement has been strengthened through establishment of Area Owners from each department. Area Owners will perform inspections to identify and correct discrepancies found for areas of responsibility on a routine frequency

MAINTENANCE CHALLENGES

Equipment Reliability Improvement

Oconee has been challenged with a number of component and system reliability issues due to degraded performance or failures. As Oconee continues in the direction of plant license extension, equipment reliability is a key factor in plant safety as well as economic viability. Engineering maintains a Life Cycle Management Program for significant components with life cycle, obsolesence and reliability issues. This program documents equipment performance, replacement or upgrade plans and associated risk levels. Some of the major focus areas are:

- Reactor Coolant Pumps
- Large Motors
- 600 Volt AC Metal Clad Breakers
- Control Rod Drive Mechanisms

Other equipment that has been replaced or is currently being replaced includes:

- Power Batteries
- Turbine Bypass Valves
- Integrated Control System
- Reactor Coolant Pump Vibration Monitors
- HPI Stop Check Valves
- Operator Aid Computer

MAINTENANCE CHALLENGES

Equipment Reliability - Reactor Coolant Pumps

Over the past several years, some of the Oconee Reactor Coolant Pumps (RCP) have begun to indicate problems as indicated by higher vibration levels. Historically, preventive maintenance has been performed on the pump motors and seals, leaving pump maintenance to be performed when predictive maintenance techniques indicated corrective action was necessary. The Unit 2 and Unit 3 pumps were refurbished in the middle 1980's due to a number of design problems. Performance data now indicates the need to perform an inspection and replacement of the 1A1 RCP rotating assembly during the September 1997 refueling outage including a video inspection of 1A2 RCP. Results from the 1A1 RCP rotating assembly replacement and the 1A2 RCP inspection will be used to determine necessary actions for 1A2 RCP during 1EOC17 or 1EOC18; 1A2 exhibits similar but less significant signature vibrations. On U2, the 2A1 RCP has higher than normal vibration levels due to a bent pump shaft. The 2A1 RCP pump internals are scheduled to be replaced during 2EOC16 (spring 1998).

A mid term (next five years) program is being evaluated to perform planned refurbishments of the Unit 1, Westinghouse RCP's. The lessons learned from the Oconee RCP and industry operating history will be used to optimize the mixture of predictive and preventive maintenance with the goal being zero pump failures or forced outages.

MAINTENANCE CHALLENGES

Equipment Reliability - CRDM Replacement

- The Type 'A' Control Rod Drive Mechanisms (CRDMs) installed on Units 1 and 2 have been showing increased rod drop times. Technical Specifications delineates a maximum allowable time for 3/4 control rod insertion following a reactor trip signal. The time required for individual control rods to achieve 3/4 insertion have been increasing, and in a few instances have actually exceeded the Technical Specification limit. A short term program has been in place to refurbish these drives as trends show degradation that could lead to exceeding allowable drop times.

- A B&W Owners Group Task Force was established following these and similar occurrences at another B&W nuclear facility to determine the root cause and establish corrective actions. The cause was determined to be a build up of corrosion products within the passages of the ball check valves which are an integral part of the thermal barrier assembly at the lower end of the CRDM. The thermal barrier assembly separates the hot Reactor Coolant System water from the cooler water within the CRDM to prolong the life of the CRDM and associated external electrical components. This creates a temperature differential across the thermal barrier which causes the corrosion products to deposit. The function of the ballchecks is to open to reduce pressure differential during rod insertion allowing the rods to drop faster. The build up of the corrosion products prevents opening of the valves, increasing differential pressure and rod insertion times.

MAINTENANCE CHALLENGES

Equipment Reliability - CRDM Replacement Continued

- Corrective actions to satisfactorily prevent re-occurrence of the slow trip times were replacement of the thermal barrier assembly by a modified design to reduce corrosion product buildup to a level that would eliminate sticking of the ball checks (by increasing available flow area in the passages) and replacing the Type 'A' design CRDMs with the Type C design that is used on Unit 3. The Type 'C' design has been demonstrated to be not susceptible to the build up problem. Additional controls on the Reactor Coolant system chemistry were determined to not be practical given the stringency of the controls already established.

- Oconee has elected to implement the corrective actions in a staged manner. For the short term, CRDM trip times have been trended and projected during each shutdown and start up from a refueling outage, and during any forced outage. These times will be trended to determine a recommended repair schedule, either immediately or during the next refueling or forced outage. The repair schedule will be such as to prevent the CRDMs from exceeding the Technical Specification requirement. The repair will be to replace the thermal barrier assembly with the modified design, and clean any deposits from the leadscrew.

- For the longer term a Nuclear Station Modification (NSM) has been approved to replace the CRDMs with Type 'C', along with their associated stators and PI tubes. The NSM is scheduled to be implemented during 3 successive outages on each unit, Unit 1 starting EOC-18 (Summer 1999) and Unit 2 starting EOC-17 (Fall 1999)

MAINTENANCE CHALLENGES

Equipment Reliability - Motors

Motor reliability is a concern for the Duke Power generating stations due to higher than expected failure rates. Motor refurbishment schedules have not been adequate in preventing failures of large motors considered important to nuclear safety and reliable operation. Duke Power and Oconee Nuclear Station are committed to developing a strong and comprehensive motor program. A Multi-Site project between Oconee, McGuire, and Catawba, to develop a strong motor reliability program is in progress. The focus areas for this project are:

- Develop criteria to categorize motors by risk to nuclear safety
- Categorize all plant motors and establish critical motor list
- Enhance Preventive Maintenance guidance documents for each specific motor category. Frequencies for disassembly, cleaning, and inspection will be upgraded
- Major refurbishment criteria and schedules
- Strong partnership with manufacturers and refurbishment facilities including Duke monitoring at the facilities to assure quality standards are met.

Develop procedures for online motor predictive and diagnostic testing:

- Evaluate and purchase new technologies for motor testing including testing for insulation dielectric strength
- Review spare motor inventories and recommend additional purchases
- Enhance spare motor storage procedures
- Develop and enhance "Engineering Tools" such as; Engineering Support Programs, "Lessons Learned" database, Motor Troubleshooting Guidelines, Motor observation and parameter monitoring guidelines

Development and implementation of these tools and processes will increase motor reliability and ensure that station motors can perform the intended funtions.

MAINTENANCE CHALLENGES

Equipment Reliability - 600V AC Metal Clad Breakers

Oconee has approximately 350 (includes QA and non-QA) 600 V AC Metal Clad Breakers. The breakers have experienced increasing failures due to nearing the end of the recommended service life and due to grease hardening. A refurbishment program is in progress for these breakers which includes replacing the overcurrent trip device with a solid state device as well as cleaning, lubrication, and inspection of contact surfaces and mechancial mechanisms. Approximately 50% of the breakers have been refurbished, and the refurbishment program is expected to be completed in late 1998 or early 1999.

PLANT SUPPORT

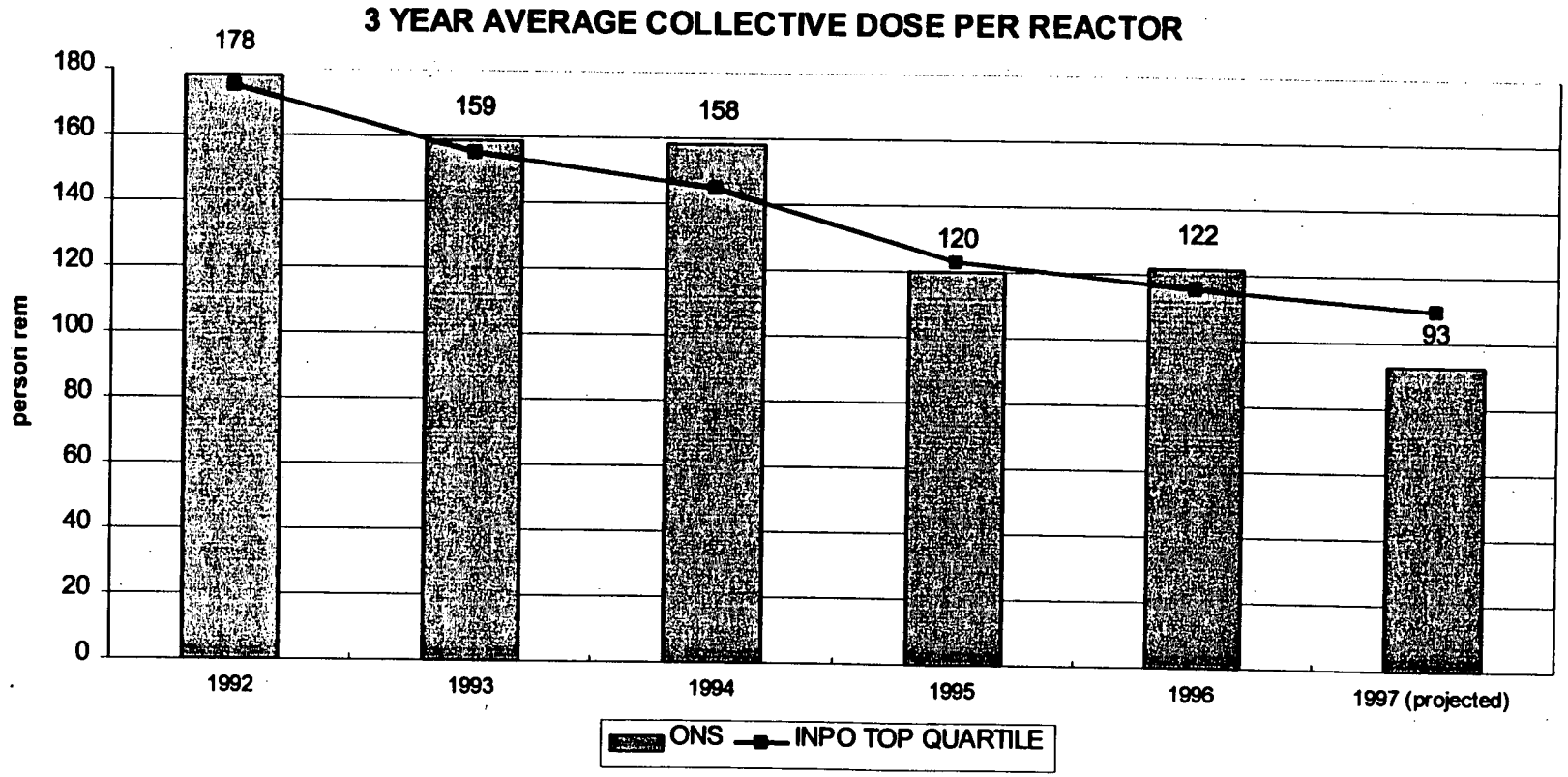
PLANT SUPPORT
RADIATION PROTECTION

RADIATION PROTECTION STRENGTHS

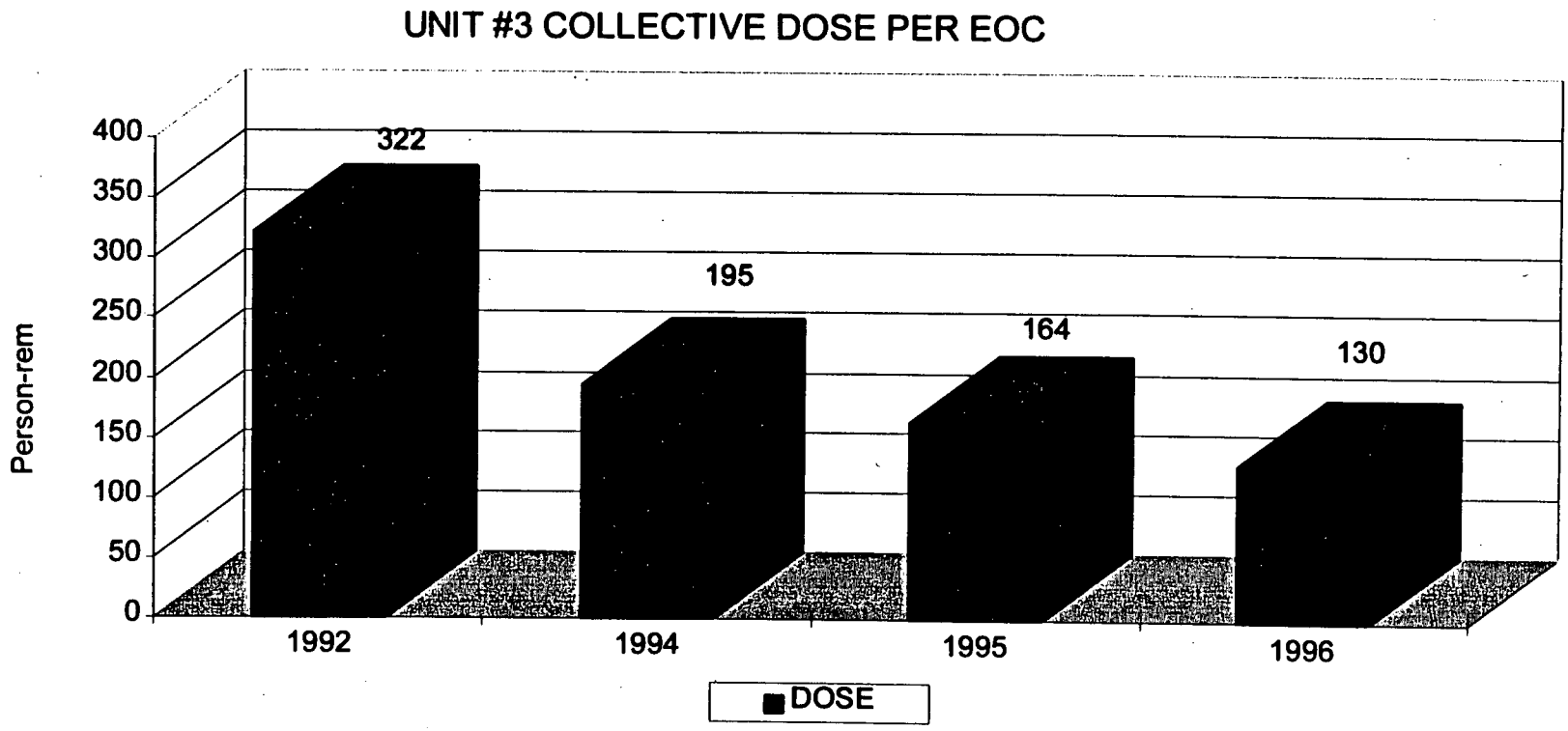
ALARA Program

- Oconee continues to make strides in dose reduction. Our current three year average for collective dose per reactor places Oconee in the first quartile for PWRs. Significant progress was made in reducing Unit 3 EOC16 outage dose. This outage was completed with the lowest exposure since 1978 for a total of 130.9 person-rem. The 1997 trend predicts the lowest exposure year in Oconee's history. Exposure reduction at Oconee is a direct result of management's commitment and support of:
  - an aggressive crud burst program, which includes ALARA hold points during unit shutdown
  - an aggressive hot spot reduction process
  - RP Technicians directly involved in planning and execution of outage activities
  - technology improvements in RP job coverage
  - teamwork between Operations and Chemistry to maintain excellent boron/lithium control which minimizes corrosion product transport
  - ALARA planning
  - pre-job briefs
  - management support of the ALARA Committee

RADIATION PROTECTION STRENGTHS



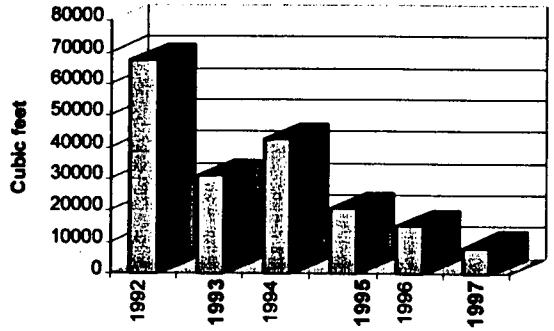
RADIATION PROTECTION STRENGTHS

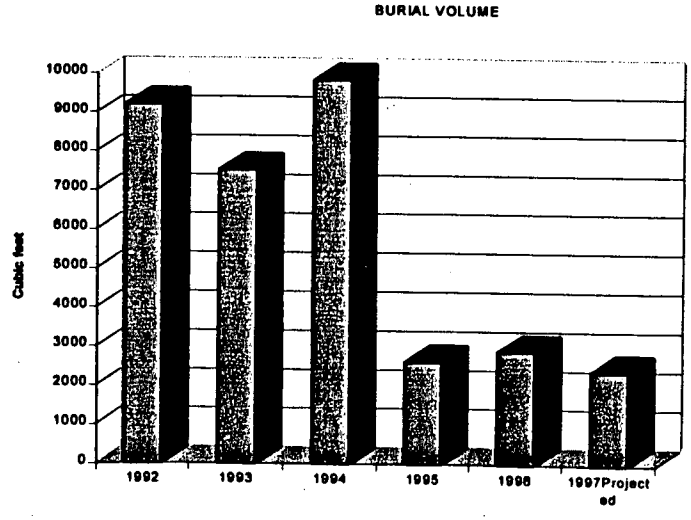


RADIATION PROTECTION STRENGTHS

Solid Radwaste Reduction

- Oconee's 1996 solid radwaste burial volume was 2899 cubic feet. This was 2291 cubic feet less than the target goal of 5190 cubic feet. The year to date (June 30, 1997), solid radwaste burial volume is 824 cubic feet. The year end projection is 2400 cubic feet which would be a record low volume. Proactive steps taken to reduce radioactive waste generated and burial volume are:
  - aggressively pursuing reusable (launderable) materials
  - consolidation of filter media
  - 50 to 1 reduction ratio in powdex resin by incineration
  - reduction in contaminated area floor space
  - aggressive enforcement to minimize material entering the RCA





RADIATION PROTECTION AREAS OF PROGRESS

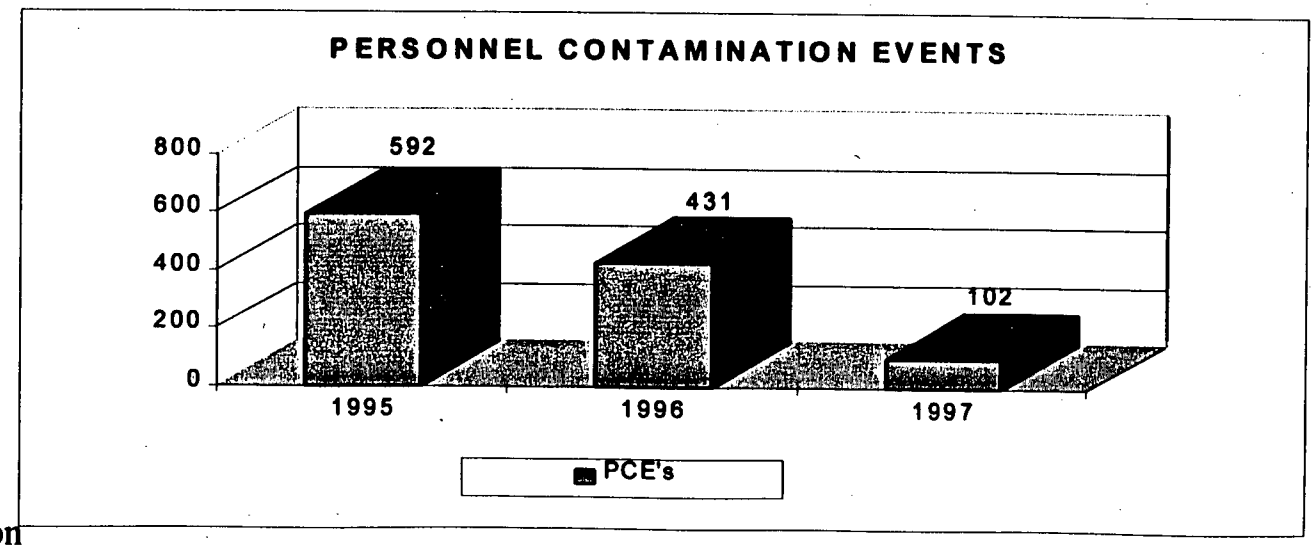
Radiological Work Practices

- This area has shown marked improvement during this SALP period. Results from management field observations indicate that the vast majority of the workers know and apply the correct radiological requirements inside the RCA. Radiological work practices have improved from the beginning of this SALP period.
- Actions taken in the Radiological Work Practices area includes:
  - increased management presence in RCA field activities to reinforce management expectations
  - implemented more aggressive accountability of violators of RP practices
  - retraining of station line management on basic RP practices and expectations
  - re-engineering of RCA exits so all exits look alike
  - improved contamination detection capability for hand held tools with the implementation of our Small Article Monitors (SAM's) at all our RCA exits

RADIATION PROTECTION AREAS OF PROGRESS

Personnel Contamination Events

- In order to reduce personnel contamination events, modifications to the Radiation Protection program have been made. The following changes occurred during this SALP period:
  - improved posting and control of radiological boundaries
  - lowered fixed contamination limits on protective clothing
  - lowered fixed contamination limits on tools stored in the hot tool room
  - improved daily cleaning and housekeeping of radiological controlled areas
  - performed follow-up inspections after work is complete to verify radiological housekeeping expectations are met
  - assessed high risk work daily and provided management oversite



RADIATION PROTECTION CHALLENGES

Increase the Use of Technology As a Quality Improvement Tool

- Quality improvement for Radiation Protection is linked to implementing new technology. Three Radiation Protection focus areas for the next SALP period are:
  - to improve the quality of survey records by using on line survey maps
  - to improve the quality of job coverage and control by using real time dose and visual data
  - to improve the quality of ALARA planning by making visual data readily available to all site personnel

- The software and hardware technology has been purchased. A team of RP personnel has placed over 4100 digital pictures of plant components on LAN and developed 340 survey maps. Field testing and software validation is currently underway.
- The challenge will be to implement these software projects effectively and to retrain RP and site personnel to fully utilize the new tools.

PLANT SUPPORT CHEMISTRY

CHEMISTRY STRENGTHS

Primary Chemistry Control/ Crud Burst Management

- **Excellent boron/lithium pH control**

The boron/lithium control program is a key element in minimizing corrosion in the reactor coolant system (RCS). By controlling boron, lithium and hydrogen concentration, crud transport and deposition can be controlled resulting in lower dose rates for the plant.

ONS maintains tighter boron/lithium control than is typical in the industry. A tight operating band of 0.3 ppm lithium (or less) is maintained during all phases of plant operation (startup, hotshutdown, power operation, etc.) in order to achieve a constant pH in the RCS. Many utilities do not implement this type of boron/lithium control until the unit is at power.

- **Reactor coolant system chemistry maintained within administrative guidelines 99.9% of the time**

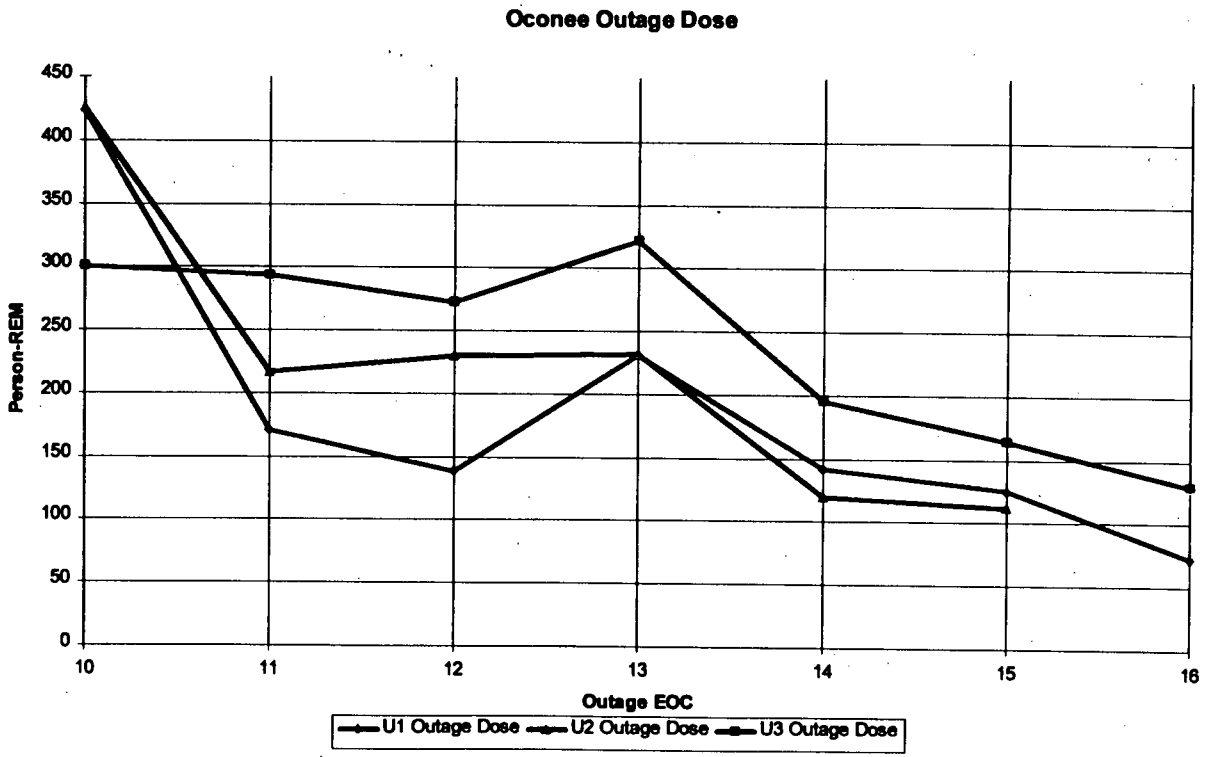
Maintaining other chemical parameters within specification aids in minimizing corrosion in the RCS which ultimately lowers crud transport/deposition and dose rates in the plant. Other parameters that Chemistry focuses on include: hydrogen, oxygen, chloride, fluoride, and sulfate.

RCS chemistry was maintained within administrative guidelines 99.9% of the time. 1996 out-of-guideline hours were a record LOW for ONS and are listed as follows: Unit 1 - 0 hrs.; Unit 2 - 5 hrs.; Unit 3 - 8hrs. Due to plant design, these out-of specification periods generally occur during startup. On a per startup basis, the 1997 performance is even better than 1996: Unit 1 - 9 hrs.; Unit 2 - 10 hrs.; Unit 3 - 0 hrs.

- **Crud burst optimized with specific hold times incorporated in the outage schedule**

Chemistry, Operations, and Work Control have worked closely together to place specific hold times in refueling outage schedules for crud burst/ALARA concerns. The hold points are based on the solubility of various species at certain temperatures. This 'Optimized Crud Burst Program' has been developed based on Duke and industry experience and has been adopted at all 3 nuclear sites as a 'standard operating practice'. Other utilities have adopted similar practices and have worked closely with Duke to enhance their programs. Outage dose continues to trend downward for all three Oconee units, based in large part on the 'Optimized Crud Burst Program.' Each unit's refueling outage (RFO) has been a RECORD for unit dose since EOC 13, and ONS has seen approximately a 50% reduction in person-rem during outages for Units 1 & 3 since EOC 14 (see graph).

OUTAGE DOSE


Oconee Outage Dose
Person-REM
450
400
350
300
250
200
150
100
50
0
10
11
12
13
14
15
16
Outage EOC
U1 Outage Dose
U2 Outage Dose
U3 Outage Dose

CHEMISTRY STRENGTHS

Liquid Waste Processing

- **Continued declining trend in liquid curies released**

  0.34 curies (excluding tritium and noble gases) were released in 1996. The projected release for 1997 is 0.23 curies. This will be an approximately 25% reduction in curies released since 1995.

- **Continued declining trend in radwaste liquid volumes**

  ONS released 2.2 million gallons in 1996 with multiple unit outages and projects to release less than 2.0 million gallons in '97. This would be a Site RECORD.

- **Continued declining trend in bead resin volumes**

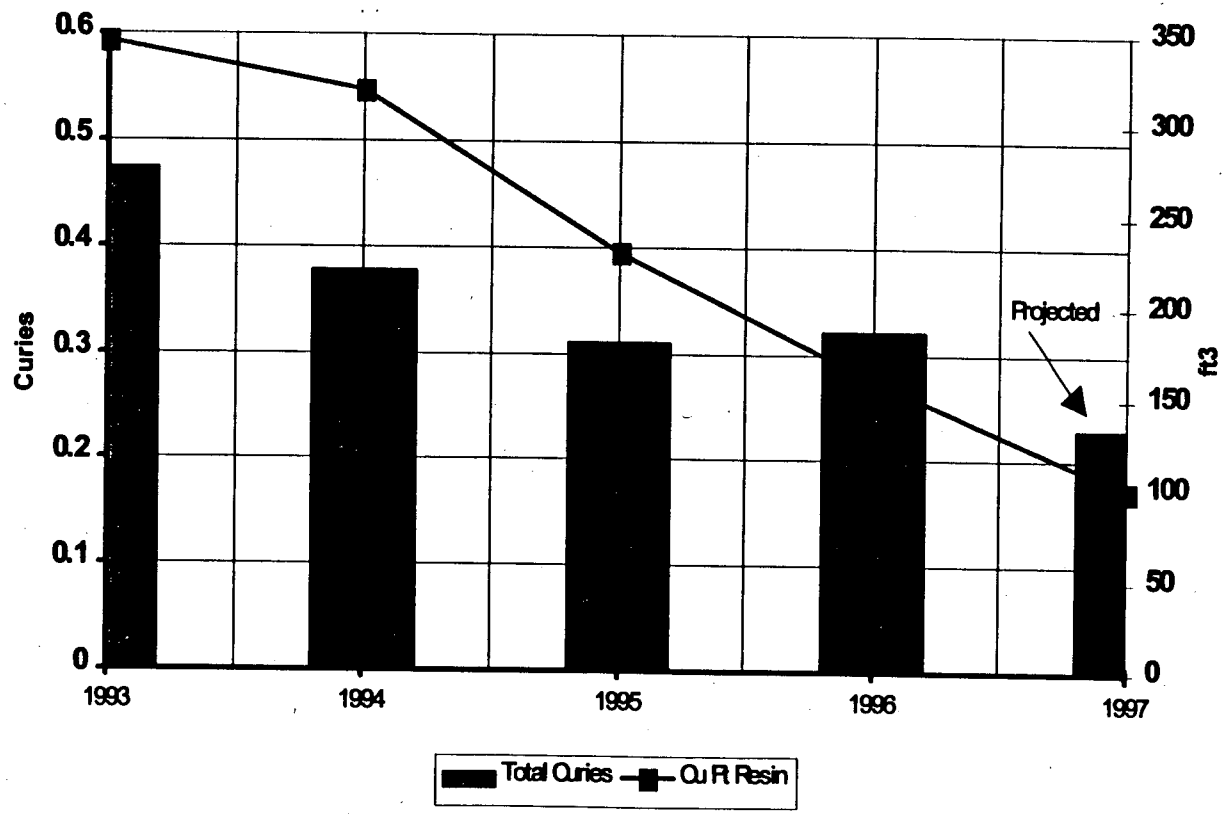
  Changes were made to the configuration and operation of the liquid waste demin system that resulted in continued reductions of curies and liquid waste volumes released offsite. At the SAME time LESS bead resin was used for processing. Spent powdex from the secondary side has been used in the past for much of these reductions. However, in '96 other changes produced these results as spent powdex was in short supply at times. Recirculation of waste streams to 'condition' the demineralizers, use of post filtration, and use of demin 'sub-sets' to process specific waste streams produced a RECORD for demin resin efficiency: 13,700 gal/ft^3. Only 160 ft^3 of bead resin was used in '96; a Site RECORD. By maintaining current performance, ONS will generate < 100 ft^3 of bead resin in '97. This will be more than a 50% reduction in bead resin generated since 1995.

  Additionally, changes were made in processing/sluicing spent powdex resin to increase the 'lifetime' of the media. Agitation times were reduced, lower volume loads used, and other minor changes which all lengthened the useful time of the spent powdex.

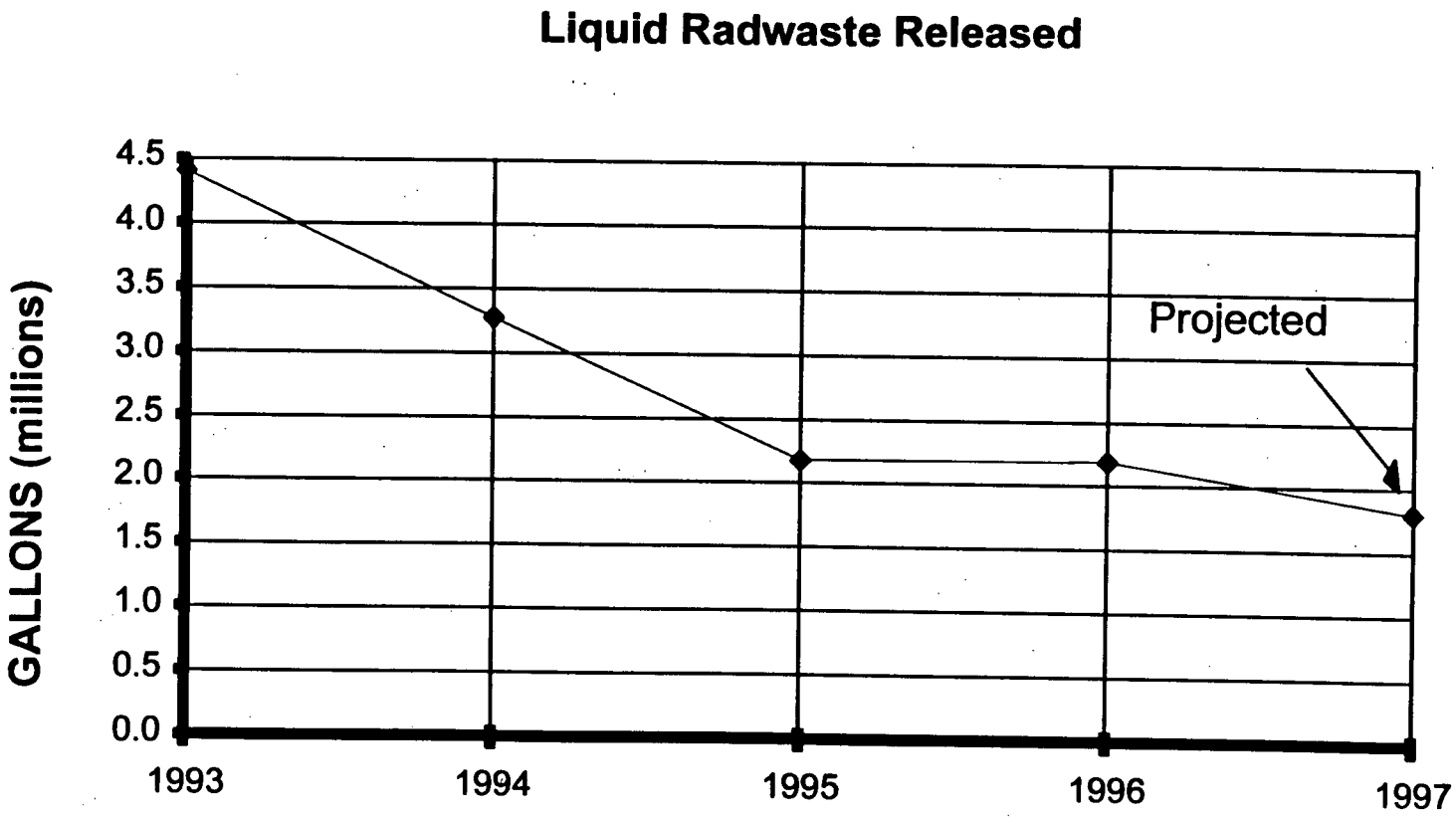
- **Environmental leadership awards**

  ONS Radwaste was recognized within Duke Power Company by receiving environmental leadership awards in 1995 and 1996.

SIMULTANEOUS REDUCTION IN RESIN & CURIES



LIQUID VOLUME



CHEMISTRY STRENGTHS

Use of Operating Experience

- **Use of operating experience (Byron - sampling procedures)**
- **Peer evaluators from other utilities used in annual self-assessments**
- **Involvement with INPO**
- **Assist visits**

Use of industry experience and interface with utility and INPO personnel are used to enhance Oconee Chemistry programs. For example, 1) sampling procedures were reviewed and changed to incorporate lessons learned from Byron where sampling problems were experienced while changing modes during startup, 2) outside utility peers participate in Oconee Chemistry self-assessments. From the '96 assessment, ONS Chemistry implemented changes to preclude inadvertent mixing of caustic and acid during bulk transfers, 3) Chemistry staff is being developed with a loaned assignment to INPO, 4) the Chemistry staff participated in assessments at V.C. Summer, North Anna, Surry, Catawba, and McGuire.

- **EPRI project for Liquid Waste Processing (Sb-125)**

ONS initiated a co-funded EPRI project with Duke R&D in 1996 to target removal of Antimony 125 (Sb-125). Sb-125 has been a problem for the industry and a major contributor to curies released at ONS in '95 & '96 (29% & 36% resp.). This research was presented in a paper given at the EPRI/ASME Radwaste Conference in Providence, Rhode Island during the week of July 20, 1997. Bench testing from the EPRI project shows that antimony could be COMPLETELY removed with pretreatment and filtration of the waste stream. Future plans would be to take the small scale test rig to full-scale production for normal waste processing.

- **Mn-56 experience**

Valuable operating experience was gained in Feb. '96 when high reactor coolant pump (RCP) vibrations were observed on Unit 1 (1A1 RCP). Mn-56 data was trended and Chemistry staff worked with the other Duke sites and another utility to understand the data. This experience was applied with the most recent vibration problems when Operations entered a loose parts monitoring procedure (LPM) during July '97. Chemistry initiated additional sampling per the Chemistry guidelines and used the data trends obtained in February (and the experience) to determine that there were no adverse chemistry trends: metal in the system, failed fuel, etc.

CHEMISTRY
AREAS OF PROGRESS

Secondary Chemistry Practices

- **Full wet lay-up of steam generators during unit shutdowns**

Full wet lay-up of the steam generators was implemented in the Fall of 1996. S/G's are returned to full wet lay-up following maintenance activities. Wet lay-up of the steam generators results in protection of the steam generator tubes during shutdown.

- **Dimethylamine addition to feedwater**

Dimethylamine (DMA) is being added to the feedwater system to chemically control steam generator nozzle fouling and feedwater control valve dP on Unit 2. A 50% reduction in feedwater iron was achieved and ONS is now adding DMA to Units 1 & 3.

- **Modifications to improve secondary chemistry control**

Chemistry worked with Operations and Engineering to test a moisture separator reheater (MSR) drain modification and a reverse osmosis unit in the water treatment room. A temporary modifcation was installed to allow a portion of the MSR drain flow to be blown down (simulating demineralization). This reduced secondary-side contaminant levels to a point where both MSR drains could be pumped forward resulting in a net gain of 4 megawatts power output per unit. A permanent modification will be made to all 3 units to install this demineralizer. A reverse osmosis (RO) unit was also tested to lower contaminant levels in makeup water. Testing showed > 90% rejection for silica which reduces contaminants to the secondary side. Plans are to install this modification in the water treatment room.

CHEMISTRY
AREAS OF PROGRESS

Human Performance

Chemistry has focused on human performance. An indicator of human performance is the number of mispositioned components in an area. Chemistry has seen a 50% reduction in mispositionings (mispos) since the last SALP period. All of the mispos were of minor significance. None led to an event. Some key items which have contributed to the 50% reduction in mispos include:

- Increased emphasis on STAR and QV&V
- Management & peer job observations (which also emphasize STAR and QV&V)
- Incuding a standing agenda item in weekly team meetings to share job observations and discuss human performance issues
- Including a standing agenda item in weekly team meetings to discuss PIPs with emphasis on those related to human performance and 'mispos'
- Conducting individual counseling sessions with employees to discuss human performance related to procedure use and adherence, work practices (including STAR and QV&V), and mispositioned components
- Establishing group and team measures in Chemistry work plans for all employees
- Established Chemistry Human Performance Review Committee with all levels of the Chemistry organization represented
- Participation on the Site Quality Improvement Team on mispositioned components

CHEMISTRY
AREAS OF PROGRESS

Interface With Operations

- **Participation in daily plant status meetings**

  Daily plant status meetings have been established at the beginning of each shift. Chemistry attends the meetings and provides a written turnover covering items impacting or potentially impacting Operations.

- **Demineralizer operation/management**

  In September of 1996, changes were implemented to Operations and Chemistry procedures to better define/control demineralizer operation and manipulation. Operations 'owns' the demineralizers and operates the associated valves, while Chemistry makes recommendations for alignments, etc.. Changes to alignments are clearly defined and tracked. A record of each manipulation is generated and placed in the Operations log book for tracking. All activities: deboration, delithiation, and purification are addressed.

- **Operations approval required of Chemistry removal & restoration (R&R) procedure**

  For equipment with operational control delegated to Chemistry, Operations has approved the R&R procedure and MUST approve any changes to the Chemistry R&R procedure. This process helps to maintain positive configuration control in the plant.

- **Chemistry sampling procedures have been changed to require specific communications to operations**

  Changes to ALL the primary sampling procedures were made which requires the chemist to call the control room and specifically state the sample being taken, when the flush is initiated, and where the flush is routed. After the sample is obtained, the chemist is then required to notify the control room that the flush is secured. This improves configuration control and keeps Operations informed of activities affecting plant operation.

CHEMISTRY
AREAS OF PROGRESS

Interface With Operations (Cont'd)

- **Water management/liquid waste minimization efforts**

Radwaste, Primary Chemistry, and Operations have worked together to minimize liquid waste volumes. Reactor coolant (RC) bleed 'drops' to waste have been minimized, and water from RC bleed hold up tanks (BHUT's) is often transferred between units or used for makeup to spent fuel pools and borated waster storage tanks (BWSTs) rather than dropping to waste. These efforts combined with emphasis on identifying and repairing leaks or leaking valves continues to maintain liquid waste volumes low.

Operations generates 'Liquid Waste Inventory Guidelines' that provides guidance for water movement between Primary systems/tanks. These guidelines are reviewed with the Operations shift with the purpose to limit liquid waste generation during plant operation. A copy of the guidelines is routed to Primary Chemistry for review. Chemistry is able to use this information during data review(s) or in daily reviews of system data when changes occur. This is a good independent check to ensure that the data agrees with expected system changes.

CHEMISTRY CHALLENGES

Control of IGA/IGSCC of Steam Generator Tubes

Control of intergranular attack/stress corrosion cracking (IGA/SCC) of steam generator tubes will be a challenge for chemistry in '97 and following years.

- **Formed BWOG Chemistry Committee to assist in addressing this issue**

- **Titanium dioxide additions**

  Current plans are to add titanium dioxide to unit 1 after the September 1997 refueling outage to mitigate corrosion of the steam generator tubes. The plan is to install the addition systems on units 2 & 3 following the work on unit 1.

PLANT SUPPORT
SECURITY

SECURITY STRENGTHS

Fitness for Duty Program - Effectiveness

- Program audits continue to validate the Fitness for Duty (FFD) program as an effective method of providing for the health and safety of employees and the general public.

SECURITY
AREAS OF PROGRESS

- **Enhanced Security Response Program**
  - Oconee made significant physical upgrades to provide security with improved adversary detection and delay capabilities.
  - Additional armed officers were added to the security force during 1996. Oconee is currently in the process of selecting additional officers to begin training in the summer of 1997
- **Security Officer Training Program**
  - Security officers have been provided with additional opportunities to increase their proficiency with assigned firearms during refresher training classes.
    - Tactical courses as a supplement to target shooting.
    - Firearms Advanced Training System (FATS) purchased to increase the shoot/don't shoot decision making skills of officers.
  - A "remedial" firearms training program was instituted as a means of identifying marginal shooters. These individuals are then scheduled for additional skills improvement training with certified firearms instructors.
- **Tamper Event Directive**
  - Security's response to tampering/sabotage events is being formalized in a Security Directive and a Nuclear System Directive.

SECURITY CHALLENGES

- **Security Computer and Access Control Program (Scac) Replacement Project**
  - Replacement of the Oconee Security Computer System and installation of a new protected area access control system (using biometric technology) will be a significant milestone.
- **Reduction of Perimeter False / Nuisance Alarm Rates**
  - Oconee continues work to reduce the false and nuisance alarm rate associated with the perimeter detection system.

PLANT SUPPORT
EMERGENCY PLANNING

EMERGENCY PLANNING STRENGTHS

Emergency Response Organization (ERO) Performance

- The ERO performed well during two actual emergencies

  On September 26, 1996 the ERO was activated in response to a failed heater drain line and associated personnel injuries. On May 3, 1997 the ERO was activated for the lose of HPI event. In both events the ERO responded and performed without error to support unit recovery and necessary medical assistance.
  AIT Inspection Report 50-269/97-06 dated 5/30/97 reported that "Plant Support findings included good performances in response to the event using the emergency plan to assemble necessary management, technical and emergency response personnel to support unit recovery after potential pump degradation was identified."

- Aggressive Drill/Training program

  Annually, five fully integrated drills are conducted to test the major elements of the Emergency Plan. All Operations shifts are involved. The TSC, OSC, and EOF are staffed and activated. All members of the ERO are scheduled to participate in drills annually as part of maintaining qualifications. An example of a typical integrated drill might be a tornado drill during tornado season. Drill messages would be sent to the ERO for three days before the drill date updating weather changes. Work groups would be provided guidance for work activities affecting the site and outdoor work. Drills are made more dynamic by integrating other emergency services with radiological protection.

- During audits and exercises, no violations or findings

  The facility managers critique their area following each drill and demonstrate ownership for improvements.
  During this period the ERO was evaluated during a biennial exercise (NRC, state and counties), a 1996 CFR Regulatory audit, and the 1997 NRC Operational Status Audit. There were no violations or findings from these evaluations and the organization performed at an efficient, professional level.

EMERGENCY PLANNING STRENGTHS

Services/Resources provided by the Fire Brigade, Medical Emergency Response Team (MERT) and the Hazmat Team.

- ONS Fire Brigade maintains twice the NRC required staffing. (24 hour coverage on-site)

  The ONS Fire Brigade is composed of 180 members from various work groups. An Operations SRO is the Fire Brigade leader on all shifts. Yearly ONS conducts 4 full participation drills per shift for a total of 20 drills. Each drill is immediately critiqued to review strengths and weaknesses.

- MERT maintains approximately 75 members (24 hour coverage on-site).

  Following the September 26, 1996 steam line break, 16 MERT members responded to the seven injured workers. The care given was credited with saving lives.

- Hazmat team responds to hazardous material spills and any oil to water event. (24 hour coverage on call)

  The Hazmat team is composed of 15 people from diverse work groups. In the past year the team has been activated twice successfully. Readiness is maintained by 2 drills/year. ONS Hazmat equipment and 2 Hazmat responders supported a million gallon diesel oil leak to a river in a nearby county.

EMERGENCY PLANNING AREAS OF PROGRESS

Severe Accident Management Program

The ONS SAMG program will be in place in December 1997, completing a NRC commitment. The B&W Owners Group generic guides have been rewritten to site specific guides. Lesson plans have been developed for the various levels of SAMGS participants. Initial instruction will be provided by a subject matter expert. Operations trainers are being trained.
A generic twenty hour computer based training package has been adjusted to make it site specific with diagrams and drawings of ONS.
Drills will be used to validate training, the guidelines, and to identify areas for future improvements.

Improved emergency notification siren availability to 97.57%

During this period siren availability improved by 2.5%. The electronic discriminator was modified and two antenna poles were raised to give line of site advantage for the signals. These changes reduced the occurrence of spurious false signals. Also, all hardware was repainted to improve the material condition of the sirens.

Local Agency training improvement

Emergency Planning worked with local counties to correct RP training weaknesses within local law enforcement that were identified by FEMA during a 1996 Exercise. Site EP developed a lesson plan that was approved by the State EPD. Site EP then delivered this training at the county EOC. Twenty officers were trained giving the county an excess of 40% over the plan requirement.

ERO position and facility training improvement

EP training is developing ERO position specific and facility specific lesson plans. Incorporated into the training; positions perform hands on use of tools assigned and all players are taught the ERO Expectations of Management. This detail training is improving the performance of ERO responders. The quality of this training was noted during the '97' Operational Status Audit by the NRC.

EMERGENCY PLANNING CHALLENGES

Standardization of Field Monitoring Procedures Between Sites

Duke Power Company has three nuclear sites within ~150 miles of each other. At this time, procedures used by field monitoring teams are not standardized.

With these procedures standardized, Duke would have approximately three times the present resources for field monitoring for an emergency at a single plant. This would allow for greater coverage per shift and long term coverage(24 hr/day).

With standardized procedures, technicians from other sites would be qualified to start work upon arrival with no training delays.

Radiation Protection Managers from all 3 sites have the lead to standardize the field monitoring procedures with completion expected in 1998.

OCONEE
CORRECTIVE ACTION
PROGRAM

CORRECTIVE ACTION PROGRAM STRENGTH

Operating Experience Database

The Operating Experience Database (OEDB) contains current INPO, NRC, and vendor external operating experience; industry emerging and actual issues; and provides access to Duke Energy Company's internal operating experience via searching the Problem Investigation Process (PIP) Database from OEDB.

The site staff uses the OEDB to remain abreast of their responsible areas, to prevent problems from occurring, and to solve problems such as developing PIP corrective actions. In addition, the OEDB is used to share information found in industry workshops and provide feedback on data errors found and success stories on OEDB usage.

CORRECTIVE ACTION PROGRAM STRENGTH

Problem Investigation Process Database

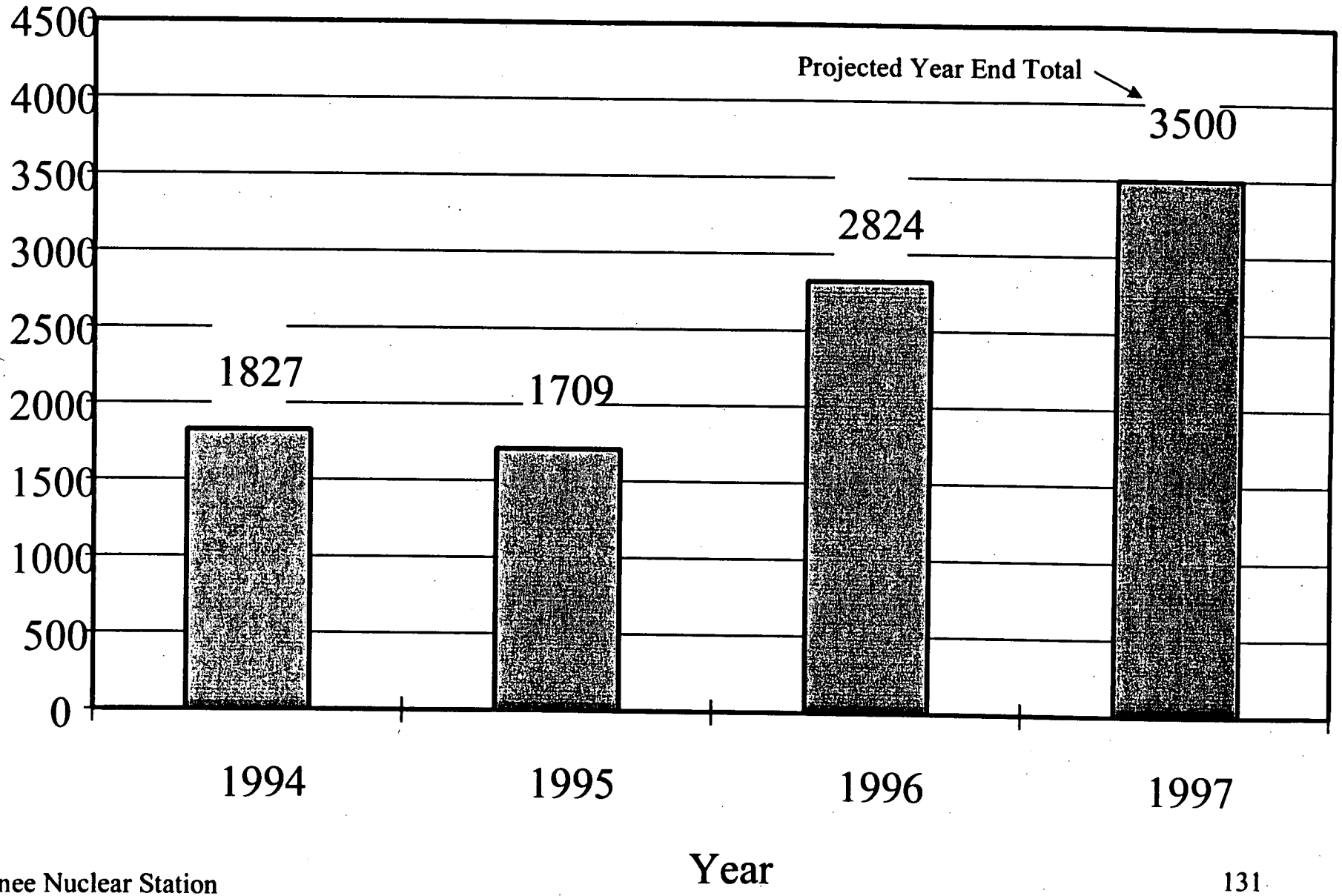
The Problem Investigation Process (PIP) Database was developed by Duke Energy as a user-friendly tool for capturing human performance and site problems. The database is accessible by anyone in Nuclear Generation connected to the Local Area Network (LAN) system by a personal computer. The database provides a means for capturing all levels of information such as root cause analysis, problem coding, problem significance, and corrective actions needed for correction of the problem. The following are some examples of the types of information entered into the database when they meet the initiating criteria established by NSD 208, Problem Investigation Process (PIP): safety issues, NRC commitments/violations, security issues, INPO issues, site modifications, ALARA problem reports, radiation protection issues, in-house events, audits, assessments, etc. Duke has been acknowledged for this user-friendly and advanced technological tool by other utilities and companies.

CORRECTIVE ACTION PROGRAM AREA OF PROGRESS

PIP Initiation

Oconee has been working with Failure Prevention International (FPI), now Performance Improvement International (PII), to assure that reliable data is obtained to support a quality corrective action program. Since 1995, the site has extended additional efforts to assure that the appropriate threshold is utilized to support accurate trending and common cause analysis of the data. The goal in this effort is to ensure that problems are identified at a low enough threshold to serve as precursors to major problems. The results of this effort are reflected in the growing number of PIPs initiated that will support improved trending and identification of adverse trends. Although progress has not been noted in all areas, the station has, overall, improved the corrective action data collection effort. Additional efforts will be extended to strengthen this item in all areas.

PIP GENERATION



CORRECTIVE ACTION PROGRAM AREA OF PROGRESS

Root Cause Analysis

Starting in 1995, ONS initiated both an immediate and long term improvement process for root cause analysis. FPI (now PII, Performance Improvement International) was selected and contracted by Duke Power Company to train our site employees (transfer knowledge and understanding) in a proven root cause methodology designed by their company.

Currently, to continue this improvement process, ONS management is refocusing on the site root cause core team concept (started in 1995) aimed at providing a select team of well-trained and skilled evaluators to perform detailed root cause analysis. The team is designed for selected members representing all major site work groups to receive specific training for performing quality cause analyses on human performance and organizational/programmatic failures. By first understanding the failure modes for "how humans fail" and for "how organizations/programs breakdown", the root cause evaluators can provide management with specific actions needed to correct underlying causes for failures. The sites Safety Assurance Division gives primary support to the site for this overall effort.

A cause analysis handbook has been developed and issued for Duke Power nuclear stations. This handbook is available for use by trained cause analysts for both human performance and/or equipment root cause analyses. The book provides detailed guidance to perform both root and apparent cause investigations in support of NSD 212.

A root cause checklist is now available and used to evaluate the quality of Human Performance and O&P root cause investigations. This tool provides a means for measuring and monitoring improvement plus can be used to provide feedback to the root cause analyst performing the investigation.

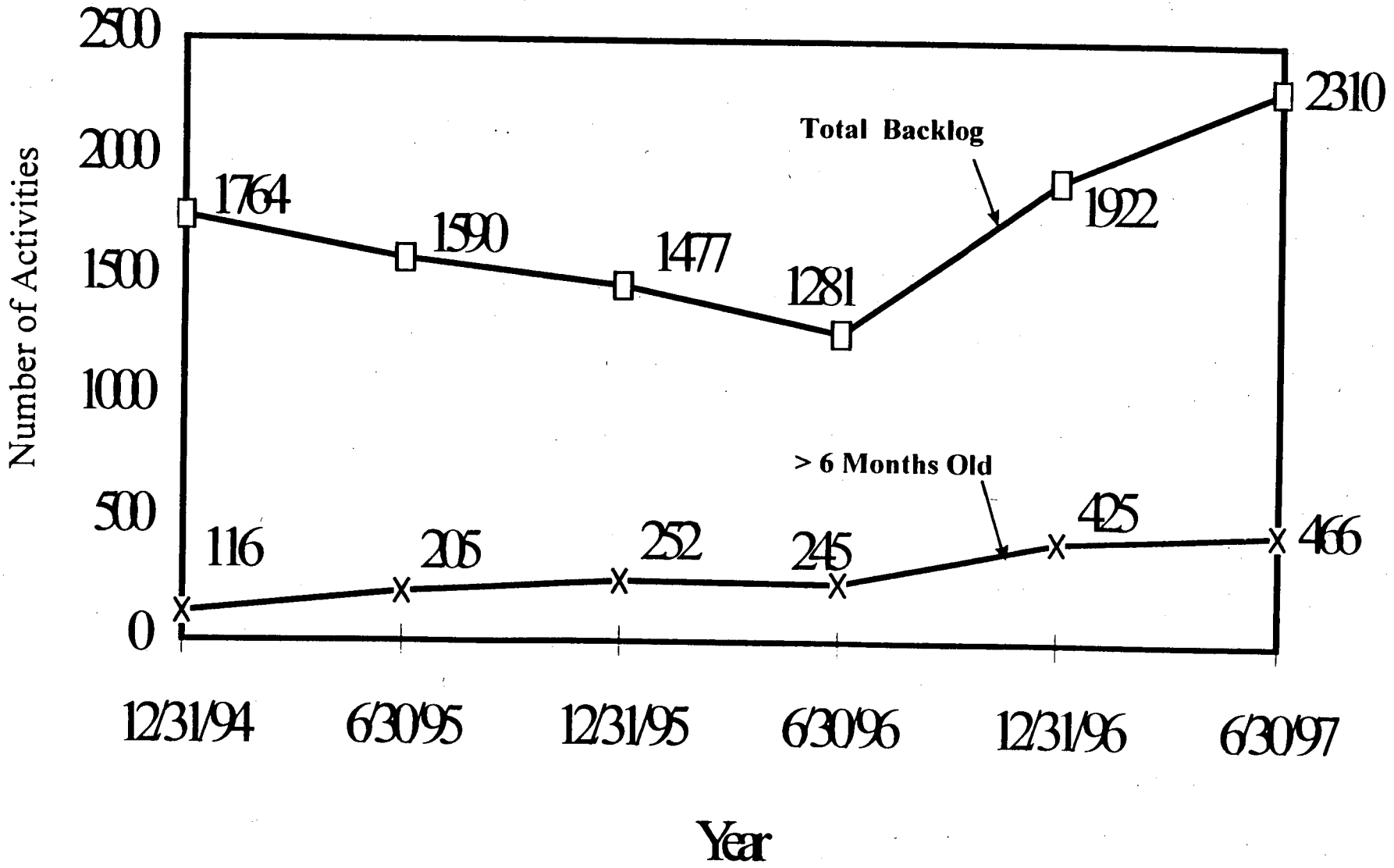
A Corrective Action Working Group (CAWG) has been chartered for the Nuclear Generation Department. This team has two ONS site members and meets monthly to address and initiate actions related to cause analyses and corrective action issues. This team recently prepared and provided an apparent cause worksheet to assist the evaluator when performing investigations. The effective use of this worksheet will ensure the evaluator collects and documents key information related to his/her assigned problem investigation. The needed information can then later be used to code inappropriate actions for common cause analysis performed at the site level. The CAWG was responsible for the development of the cause analysis handbook and recently issued the book to the nuclear sites.

CORRECTIVE ACTION PROGRAM CHALLENGE

Backlog Control

A potential by-product of enhancing PIP quality and low initiation threshold is backlog. Oconee has recognized that the PIP backlog has been growing and is designing barriers to prevent future growth and establish a downward trend. Goals are currently being established and integrated with other site priorities and issues that will require the backlog to be reduced. Barriers are already in place to assure that important site issues are not overlooked in the backlog. PIPs are classified into 4 categories with response or cycle time requirement associated with the level of importance. In addition, More Significant Events (MSEs), with a Past or Current Operability outstanding, are reviewed each working day by the management team.

CORRECTIVE ACTION BACKLOG



CORRECTIVE ACTION PROGRAM CHALLENGE

PIP Quality

Oconee has recognized the importance of PIP quality in the continued strengthening and enhancement of the corrective action program. PIPs are an integral part of the corrective action program and are used for trending and investigation of problems at the Site.

PIP quality is an essential part of the site recovery plan and measures are being developed to accurately track and measure our progress in this area. Assessments are being routinely conducted and additional screening efforts are being put in place to reinforce this issue. This issue will continue to receive management attention until improvement in line with management expectations is noted.

SUMMARY

- Balanced Self Assessment
- Too Many Events
- Recent Performance Requires Improvement
- Aware of Challenges
- Recovery Plan to Guide Improvement
- Close Communications With NRC