# INITIAL SALP REPORT

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-313;368/92-99

Entergy Operations, Inc.

Arkansas Nuclear One, Units 1 and 2

December 1, 1990, through February 29, 1992

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## I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance based upon this information. The program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to licensee's management regarding the NRC's assessment of their facility's performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on April 3, 1992, to review the observations and data on performance and to assess licensee performance in accordance with NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance."

This report is the NRC's assessment of the licensee's safety performance at Arkansas Nuclear One for the period December 1, 1990, through February 29, 1992.

The SALP Board for Arkansas Nuclear One was composed of:

Chairman

T. P. Gwynn, Deputy Director, Division of Reactor Projects (DRP), Region IV

Members

S. J. Collins, Director, Division of Reactor Safety (DRS), Region IV
R. E. Hall, Acting Director, Division of Radiation Safety and Safeguards (DRSS), Region IV
J. T. Larkins, Director, Project Directorate IV-1, NRR
J. R. Johnson, Deputy Director, DRP, Region II
S. R. Peterson, Project Manager IV-1, NRR
T. W. Alexion, Project Manager IV-1, NRR
W. D. Johnson, Chief, Project Section A, DRP, Region IV
L. J. Smith, Senior Resident Inspector, Arkansas Nuclear One (ANO), DRP, Region IV

The following personnel also participated in the SALP Board meeting:

J. Montgomery, Deputy Regional Administrator, Region IV
B. Murray, Chief, Facilities Inspection Programs Section, DRSS, Region IV
T. F. Westerman, Chief, Plant Systems Section, DRS, Region IV
M. A. Satorius, Project Engineer, Project Section A, DRP Region IV
R. E. Baer, Radiation Health Specialist, Facilities Inspection Programs Section, DRSS, Region IV
N. M. Terc, Emergency Preparedness Analysis, Facilities Inspection Programs Section, DRSS, Region IV
J. Keeton, Examiner, Operator Licensing Section, DRS, Region IV
R. Hermann, Office of the Executive Director for Operations

P. Ray, Operations Engineer, Performance and Quality Evaluation Branch, NRR
S. Campbell, Resident Inspector, DRP, Region IV
M. X. Franovich, Reactor Engineer Intern, Region IV
K. D. Weaver, Co-op Student, DRP, Region IV
R. Twigg, Project Engineer, Project Directorate IV-1, NRR

## II. SUMMARY OF RESULTS

### Overview

Significant improvement was noted in overall performance during this assessment period. Notable improvements were made in the plant operations and radiological controls areas and some improvement was accomplished in every area.

Active and aggressive oversight and management of site safety and equipment reliability was exhibited. Aggressive programs to improve performance were implemented. The nuclear safety aspects of plant operation were conducted in a superior manner and safety decisions were consistently conservative with a high sensitivity to shutdown risk. Substantial improvements were made in emergency operating procedures and operator training and qualification. Operations shift expertise was enhanced and operators maintained excellent plant control.

Excellent management involvement and support for the radiation protection program resulted in significantly improved performance. Senior management supported and was involved in the ALARA program. Exposure reduction techniques resulted in a decrease person-rem exposure and contaminated areas within the plant were reduced. The working relationship between the radiation protection department and other departments improved significantly and the effectiveness of the radiation protection managers and supervisors increased.

Management involvement in the maintenance area and oversight of maintenance activities were generally good while making a number of improvements. System engineers provided useful inputs to resolve equipment failures and reliability concerns. Continued effort was needed to improve maintenance procedures and control of maintenance activities. Outage planning improved substantially and maintenance at power was usually well planned. The backlog reduction effort and the operations focus during maintenance activity prioritization indicated a positive overall safety emphasis. Performance in the surveillance area has been superior.

The emergency preparedness program received excellent management support and the response facilities were maintained in a state of readiness. The emergency preparedness program continued to improve and was maintained in an excellent state of operational readiness. The newly assigned shift engineers were a positive addition to emergency preparedness.

Management provided excellent support for the security program, maintaining and improving the program. The security staff was professional and well trained and a good working relationship existed with the other departments. The fitness-for-duty (FFD) staff exhibited dedication and professionalism and

the addition of a full-time medical review officer for the program indicated management support for this program.

Performance of engineering and technical support improved with a more proactive approach to engineering and technical issues evident. Formation of engineering peer and system engineering groups was viewed as a strength. The identification of several design deficiencies by design engineering indicated a need for the licensee to continue to emphasize diligence and precision when relying on the adequacy of past design work. A significant engineering workload existed but the 3-year engineering backlog reduction project was on schedule. The licensee demonstrated an aggressive engineering attitude as an industry leader in selected technical problem resolution but less aggressive engineering effort was exhibited in licensing submittals for some existing plant issues. Training functions continued to improve with 100% pass rates on initial and requalification examinations.

Strong management effectiveness was demonstrated in operability determinations, self assessment, and corrective action programs. Continued implementation of the ANO Business Plan focused site initiatives and measured progress in improvement programs. Plant personnel exhibited a healthy questioning attitude that indicated a conservative safety attitude. Operability concerns were addressed in an aggressive, conservative manner. License amendment submittals were generally conservative and complete, with some instances of additional information being required prior to resolution.

The licensee's performance category rating for each functional area is provided in the table below, along with the ratings from the previous SALP assessment period:

| Functional Area | Rating Last Period (10/01/89 to 11/30/90) | Rating This Period (12/01/90 to 02/29/92) |
|---|---|---|
| Plant Operations | 2I | 1 |
| Radiological Controls | 2 | 2I |
| Maintenance/Surveillance | 2 | 2 |
| Emergency Preparedness | 1 | 1 |
| Security | 1 | 1 |
| Engineering/Technical Support | 2 | 2 |
| Safety Assessment/ Quality Verification | 2 | 2 |

*I Improving Trend - Licensee performance was determined to be improving during this assessment period. Continuation of the trend may result in a change in performance rating.

III. CRITERIA

The evaluation criteria, category definitions, and SALP process methodology that were used, as applicable, to assess each functional area are described in detail in NRC Manual Chapter 0516. This chapter is available in the Public Document Room files. Therefore, these criteria are not repeated here, but

will be presented in detail at the public meeting to be held with licensee management on May 6, 1992.

## IV. PERFORMANCE ANALYSIS

### A. Plant Operations

#### 1. Analysis

The assessment of this functional area consists chiefly of the control and execution of activities directly related to operating the plant. Evaluation of this functional area was based on routine inspections performed by the resident inspectors, a region-based inspection of the programmed enhancements in response to a generic letter on loss of decay heat removal for Unit 2, and a region-based team inspection of the Unit 2 emergency operating procedures.

The previous SALP report (NRC Inspection Report 50-313;368/90-47) rated this functional area as Category 2 with an improving trend and made no specific recommendations to licensee management. The previous SALP report described several aggressive programs to improve performance in response to the prior SALP and Diagnostic Evaluation Team (DET) reports which were implemented during this assessment period. Enforcement history was excellent.

As a result of these programs and others, the nuclear safety aspects of plant operation were conducted in a superior manner. Many new performance records were set during the assessment period. For example, Unit 1 completed a 236 day run prior to the start of the tenth refueling outage. Unit 2 set a record equivalent availability record of 80.5% during 1991 which included a refueling outage. Site management made a conservative decision to shut down Unit 2 and repair a failed excore detector prior to exceeding a consecutive days on-line record, exhibiting a safety first attitude. Similarly, when the Unit 2 Technical Specification (TS) allowed up to 10 gallon-per-minute (gpm) of identified leakage, the licensee prudently shutdown to replace leaking pressurizer code safety valves after the leak rate increased to .8 gpm. The licensee determined that if the code safety valve leak rate exceeded approximately 1.3 gpm the ability of the pressurizer heaters to make-up for this loss could be challenged.

Since the previous SALP period, the operator training and qualification effectiveness has shown marked improvement as demonstrated by the 100 percent pass rate on initial and requalification license examinations. The operations and training relationship continued to improve as evidenced by operations management involvement in operator training and excellent results on both initial and requalification examinations. The operations and the training organizations took effective corrective action to upgrade the Unit 2 emergency operating procedures (EOPs) in response to previously identified deficiencies. The operators were very knowledgeable of the upgraded EOPs and were extensively involved in the verification and validation process.

The operating staffs of both units effectively responded to several plant events. Operator attentiveness to control room indication and alarms was excellent. For example, a Unit 1 operator noted a change in auxiliary cooling

water pressure when a main generator hydrogen temperature control valve failed closed. He was able to avert potentially severe damage to the main generator by promptly dispatching an auxiliary operator to open a bypass valve. Operator response to abnormal main feedwater pump (MFWP) oscillations prevented a plant trip. In another event, Unit 1 operators effectively stabilized the plant following a loss of both MFWPs, automatic reactor scram and associated emergency feedwater initiation. Event and status summaries by the shift superintendent were well conducted several times during the response to the feedwater transient. The initial response of the operators to the Unit 1 instrument air line failure and subsequent main condenser vacuum transient was excellent. The response by Unit 2 operators to a failed auxiliary cooling water valve which resulted in a second train of emergency feedwater being inoperable and subsequent entry into TS 3.0.3 was superior. The response by Unit 1 operators to the fire system initiation during emergency feedwater pump testing was rapid and correct. In all cases, operators took the appropriate actions after a transient or degraded operating condition was identified. Operability determinations were prompt. Reportability determinations were generally correct. Post trip analyses were thorough and well done.

Compensatory measures taken to avert problems during off-normal situations were excellent. For example, during the upgrade of Foxboro instruments to meet seismic qualification requirements, the licensee assigned an extra reactor operator to the crew for the purpose of monitoring the plant status relative to the repairs. Both units conducted extended outages without loss of decay heat removal. The units used different methods for maintaining control of decay heat removal, but in each case the emphasis on the importance of the system was clear. In particular, during the eighth refueling outage, Unit 2 operations personnel aligned Startup Transformer SU2 such that a fast transfer would be possible if power was lost to Startup Transformer SU3 during switchyard testing and maintenance. This feature was not normally in service. The licensee's preplanned actions to minimize the possible risk of loss of shutdown cooling averted a total loss of offsite power to Unit 2 when power was subsequently lost to Startup Transformer SU2. Further, the management policies and guidelines contained within the Unit 1 "Shutdown Operations Protection Plan" (SOPP) reflected the licensee's sensitivity to risks associated with shutdown operations. The licensee's SOPP was a significant effort to incorporate industry recommendations and actions to increase safety of shutdown operations. The licensee's overall sensitivity to shutdown risk was high.

Neither unit experienced any unplanned engineered safety feature actuations or unplanned transients due to operator errors. Oversight activities by the licensee were effective. A few operator errors were identified by the licensee in the areas of maintenance planning, pump manipulation, equipment statusing, valve alignment and breaker manipulation. A maintenance planning error resulted in an automatic reactor trip on Unit 1. However, the licensee effectively addressed all operator errors within their corrective action system and they were not determined to be programmatic.

Log keeping practices were determined to be good. The licensee purchased computerized logging equipment to upgrade log keeping practices and began to

input the plant specific data. Procedures necessary to support the use of the equipment were also under development. The new equipment is designed to enhance the operator's access to previous data and precautions.

Equipment status was effectively maintained with some minor errors noted. The licensee implemented a new computerized hold card system during the assessment period. NRC inspection activities confirmed that switches and valves were properly aligned on the following systems: emergency feedwater, high pressure injection, Unit 1 decay heat removal, and emergency diesel generators.

Formal on-shift communications improved. Shift turnover frequently included representatives from other departments. Management frequently toured the control room and participated in the crew briefs. Control room access continued to be rigidly controlled. Operators maintained excellent plant control, not permitting activities which could degrade plant safety. Nuisance alarms were kept at a minimum, with both units operating with no main control board annunciators illuminated (black board) for significant periods. The continued commitment to reducing control room deficiencies enhanced the operators' response to the abnormal conditions which did occur.

Both units remained in a six shift rotation throughout the assessment period. The structure of the operating staff was upgraded by selecting shift superintendents to supervise each shift. The superintendents are licensed, degreed senior reactor operators (SROs) at a management level. The licensee had twelve SROs with college degrees for each unit. Shift engineers were assigned to each operating shift during March 1991. These are degreed engineers who serve as shift technical advisors. Each shift was manned with two to three personnel with college degrees. The shift engineers assisted the shift superintendent with operability determinations and emergency classifications; interfaced with the system engineering and design engineering organizations; and provided focus for problem resolution. The licensee continued with the assignment of an additional nonlicensed operator to each shift which enhanced operator availability during emergency conditions.

Housekeeping performance was good throughout the assessment period. For example, subsequent to the Unit 1 midcycle outage in April 1991, and the Unit 2 eighth refueling outage, management attention was directed toward housekeeping. Areas that during the outage were cluttered and dirty improved dramatically following the outages. The licensee continued its long term commitment to facility and equipment painting, improving the general appearance of the plant.

In summary, licensee oversight and management of site safety and equipment reliability was active and aggressive. Effective programs to improve performance in response to the prior SALP and Diagnostic Evaluation Team (DET) reports were implemented. The nuclear safety aspects of plant operation were conducted in a superior manner and safety decisions were consistently conservative with a high sensitivity to shutdown risk. Substantial improvements were made in emergency operating procedures and operator training and qualification. Establishment of shift superintendent and shift engineer positions enhanced shift expertise, resulting in improved control room supervisory watchfulness and sensitivity to plant events. Operators

maintained excellent plant control, not permitting activities which could degrade plant safety. Enforcement history was excellent.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None.

B. Radiological Controls

1. Analysis

This functional area consists primarily of activities related to radiation protection, radioactive waste management, radiological effluent control and monitoring, radiological environmental monitoring, water chemistry/radiochemistry, and transportation of radioactive materials.

During the previous assessment period, concerns were identified involving implementation of the radiation protection program at a day-to-day level, radiation worker accountability, effectiveness of the ALARA program, and the need to reduce person-rem exposures. The SALP report recommended that increased management attention be spent in the radiation protection area. During this assessment period, significant improvements were made in the radiation protection and ALARA programs. Strong management involvement and support for the radiation protection program were evident.

The radiation protection program was inspected twice by NRC region-based radiation specialist inspectors, in addition to the routine inspections performed by the resident inspectors.

Management provided excellent support for the radiation protection program by providing improved staff work areas, personnel access control for the radiological controlled area, and worker accountability. The working relationship between the radiation protection department and other departments improved significantly. The effectiveness of the radiation protection managers and supervisors increased, and they spent an increased amount of time in the radiologically controlled area observing work in progress and monitoring housekeeping. Radiation protection procedures were reviewed and revised to make them worker friendly. State-of-the-art dosimetry equipment, such as the digital dosimeter and teledose dosimeter, were added as part of the radiation protection program upgrade.

Management demonstrated strong support for ALARA activities such as increased staffing, detailed review of ALARA goals, active involvement in the source term reduction program, support and involvement in the ALARA suggestion program, and establishing an aggressive 5 year person-rem goal. The person-rem goal for 1991 was established at 408 rem, with 351 person-rem expended (both units). Personnel contamination events were also low. The quality of

the ALARA review packages was very good. ALARA representatives were assigned to each unit and the plant modifications department, and these persons worked well with maintenance representatives. Senior management support and involvement in the ALARA suggestion program resulted in worker involvement and significantly increased effectiveness.

Management has been instrumental in the reduction of contaminated areas within the plant. Efforts continued to reduce existing radiation levels in plant systems with plans to chemically decontaminate several systems during the 1992 refueling outage of Unit 2. Several dose reduction projects were completed, and several more were planned to reduce existing radiation levels. "Hot-spot" flushes, chemical decontamination, reactor head shields, use of specialized shielding, and painting of azimuth markings on the reactor building walls for easy identification of work locations were some of the ongoing dose reduction projects. An effective radiation work permit program was maintained. Several improvements were made in the condition report program to provide better tracking and resolution of radiological events.

The radiation protection department has a stable, well qualified staff. Personnel turnover was very low, and vacancies were quickly filled. Contractor radiation protection technicians were used during outages to supplement the plant radiation protection staff. The contractor radiation protection technicians received excellent training prior to performing work assignments. A new radiation protection manager (RPM) was hired to replace the previous RPM who returned to his position with the Institute for Nuclear Power Operations. The new RPM previously held a management position at the corporate office and was well qualified to fill the RPM position.

The radiological waste management area was inspected once. The liquid and gaseous waste effluent programs were well managed, and procedures to implement the program were well defined. Management designated a dedicated systems engineer to provide technical support for the air cleaning systems and the process and effluent radiation monitoring instrumentation to correct previously identified problems. Excellent agreement was noted during the comparisons between NRC and licensee offsite radiation dose calculation results from radioactive liquid and gaseous effluents.

The radiochemistry and water chemistry control programs were inspected twice. The licensee had developed and implemented excellent radiochemistry and water chemistry control programs based on regulatory and industry guidelines. The radiochemistry confirmatory measurements results were in 98 percent agreement which was equivalent to the excellent performance achieved during the previous assessment period. The results of the water chemistry confirmatory measurements from the secondary chemistry and radiochemistry laboratories indicated 100 percent agreement, which was an improvement over the previous assessment period. The licensee maintained state-of-the-art analytical instrumentation, and the chemistry procedures reflected current analytical techniques. Excellent maintenance, calibration, and quality control programs had been implemented for the chemistry laboratories and in-line chemistry process instrumentation. Industry chemistry control guidelines along with reactor manufacturers' water chemistry specifications were required by the plant chemistry procedures. The licensee had implemented an excellent data

3. Recommendations

None.

C. Maintenance/Surveillance

1. Analysis

The assessment of this functional area included activities associated with predictive, preventive, and corrective maintenance; installation and testing of plant modifications; the conduct of surveillance testing; containment integrated leak rate testing; inservice inspections (ISI); and inservice testing activities.

This area was inspected by both the resident inspectors and by region-based inspectors. Inspections included performance-based inspections of maintenance activities including the programmatic improvements in the maintenance and engineering processes; plant modifications; calibrations; measuring and testing equipment; piping support and restraint systems; a verification of containment isolation component exemption (VOICE) inspection; post-refueling startup testing; surveillance testing and calibration control processes; ISI activities; welding activities; and the eddy current examination of the Unit 2 steam generator tubes.

Management involvement in the maintenance area and oversight of maintenance activities were generally good, although efforts directed at procedure improvement and procedure adherence need to continue. Several events occurred during the assessment period which pointed to weak adherence to procedures and weak communications during maintenance. In one instance, failing to follow preventive maintenance instructions contributed to degrading both service water trains. Less significant examples include failure to notify the shift superintendent following inadvertent trip of a reactor protection system channel and failure to notify the shift superintendent that a fire barrier was fouled with test cables and was therefore inoperable. Also, Unit 2 high pressure safety injection (HPSI) pump maintenance activities were complicated by a confusing procedure and poor communications. This resulted in an additional effort to disassemble the HPSI pump and motor coupling and realign the unit. Several programs were in place to develop improved instructions.

A number of improvements were made in the maintenance process. An equipment failure trending program was established. Thermography, oil analysis and state-of-the-art vibration monitoring equipment were used for predictive and diagnostic maintenance. System engineers provided the engineering focus needed to resolve significant equipment failures and reliability concerns. Preventive maintenance activities were generally more comprehensive than those originally stipulated by the equipment manufacturers. The performance intervals were at a greater frequency and greater specificity was included in the preventive maintenance items.

Outage planning improved substantially. Both units maintained forced outage plans which were updated weekly. During the reactor shutdown for replacement of Unit 2 pressurizer code safety valves and battery fuse change-out, the

management program to monitor and trend chemistry water quality data. The licensee proposed an aggressive five year ALARA plan involving strict reactor coolant chemistry control for source term reduction.

The solid radioactive waste and transportation programs were inspected once. Excellent programs were maintained in these areas. Procedures had been established that addressed such areas as waste classification and characterization, procurement and selection of packages, preparation of packages for shipment, and delivery of the completed packages to the carrier. The programs were sufficiently staffed and effectively managed. A large volume (14,033 cubic feet) of radioactive waste had been shipped to burial sites in order to reduce the inventory of stored waste.

A comprehensive quality assurance surveillance and audit program was implemented for the radiological controls area which included qualified and knowledgeable auditors. The responses to audit findings were timely and technically correct.

The training department established comprehensive training programs in the radiological controls area, and the instructors were well qualified.

No significant enforcement issues were identified in the radiological control area. Duri g an engineered safety feature system walkdown, a high radiation barrier was identified that did not provide a proper protective barricade. The licensee promptly corrected the problem and verified the example was an isolated case. The licensee also promptly corrected a self-identified failure to properly post a high radiation area.

In summary, management provided excellent support for the radiation protection program, resulting in a very good level of performance in this area. Significant improvements were made in the ALARA and radiation protection programs. Senior management support and involvement in the ALARA program resulted in worker involvement and significantly increased program effectiveness. Exposure reduction techniques resulted in a decrease person-rem exposure. Radioactive liquid and gaseous waste effluents monitoring and control programs were effective. Contaminated areas within the plant were reduced. The liquid and gaseous waste effluent programs were well managed. Excellent solid radioactive waste control and radioactive materials transportation programs were maintained. Excellent water chemistry and radiochemistry analytical programs were maintained. The working relationship between the radiation protection department and other departments improved significantly and the effectiveness of the radiation protection managers and supervisors increased. Enforcement history was good, but two problems with high radiation area control were identified.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area with an improving trend noted.

operations crews coordinated the activities in a highly professional manner and were instrumental in the successful completion of the forced outage substantially ahead of schedule. Similarly, the Unit 2 excore detector replacement, while in hot standby, was successfully implemented ahead of schedule. The maintenance organization remained unitized during the assessment period which contributed to the effective management the non-affected unit during forced outages. The modification process was clearly defined and functioned well.

Maintenance at power was usually well planned. For example, the inspection and repair of Foxboro Specification 200 nest assemblies went very well. Inspection and corrective maintenance activities were made in a timely fashion. This challenging task was performed at full power and increased the vulnerability of the unit to unplanned transients due to the equipment being taken out of service. All repairs were safely completed ahead of schedule and were closely supervised. However, in one separate instance a maintenance planning error resulted in an automatic reactor trip.

An improvement program for installed instrument calibration procedures was implemented. The improved procedures were found to contain detailed instructions including the assurance that out-of-tolerance conditions were evaluated for reportability. Calibration activities for instrumentation components and systems were well documented and consistently identified the as-found and as-left data. The calibration program for Unit 2 instrumentation components and systems included the calibration of safety-related instrumentation not specifically controlled by TS. Several instruments used to demonstrate compliance with TS were omitted from the routine calibration program, and a violation was cited. The corrective action plan addressed immediate operability concerns and ensured that all TS compliance instruments were periodically calibrated for both units.

The control of measuring and test equipment was well defined. Personnel involved with the program demonstrated a good understanding of the controlling procedures. Test records were accurate and readily retrievable. The test equipment was properly calibrated, tagged, and stored to preclude the use of out-of-tolerance test equipment and to prevent access by unauthorized personnel.

New maintenance managers were assigned responsibility for each unit. They developed similar indicators to track maintenance performance for each unit. Initially, maintenance backlog reduction efforts were adversely impacted by both unit's refueling outages. However, following the refueling outages, the backlog size decreased. The licensee prioritized the backlog to ensure emphasis on the more important items. Licensed SROs determined the prioritization for maintenance activities on a daily basis. As a result, operations department objectives, such as operating with a black control board, were frequently attained. The backlog reduction effort and operations focus during prioritization was indicative of a positive overall safety emphasis.

The licensee had developed an improvement program for surveillance testing. When last reviewed (near the middle of the assessment period), the improvement

program was about half complete. At that time the licensee's surveillance testing program was found to be an improved and effective program as evidenced by the quality of revised procedures and the use of a TS surveillance-to-procedure matrix. Required surveillance tests were being scheduled and performed in a timely manner, and as a result of the improvement program only one TS surveillance was missed during the assessment period. This was a significant improvement from previous performance. Minor deficiencies were noted in the surveillance testing process which included an error in the surveillance-to-procedure matrix, inconsistencies in the references to procedure numbers, and further examples of previously identified procedure and work package deficiencies.

The snubber testing program for Unit 2 demonstrated a strong commitment to ensure the long-term operability of safety-related snubbers. This program had been well conceived and documented. The program was being implemented in a conservative manner by a knowledgeable and competent staff. A large number of minor hardware and drawing discrepancies were identified with ASME Section XI pipe supports. The licensee had committed to correct the majority of these discrepancies by December 31, 1995, as part of their isometric update project. The project was adequate in scope and depth to correct the types of problems noted with one exception. The spring can pipe hanger surveillance program did not address identification and removal of accumulations of debris in spring cans.

The coordinating test procedures for Unit 2 post-refueling startup testing were clear and incorporated the requirements of the TS and reload analysis report. Acceptance criteria were clearly stated in the tests reviewed and the data was formatted to clearly address the acceptance criteria. The test data reflected a relatively smooth startup. The measured thermal and reactor physics parameters were very close to the predicted values with the exception of rod worth. An engineering evaluation to justify the Group B and total rod worth being less than the acceptance criteria had been performed and approved. There was evidence of independent verifications, reviews, and approvals of test data. An invalid independent verification of the calculations for the measured critical position of Group B control element assemblies was identified by the NRC. Because the associated test was repeated, no adverse safety impact resulted from these errors. The licensee initiated action to preclude recurrence of invalid independent verifications.

The VOICE inspection determined that personnel performing leak rate testing were knowledgeable and well trained. Good programs were in use for containment integrated leak rate testing (CILRT) and local leak rate testing. The licensee had no exemptions to Appendix J of 10 CFR Part 50 leak rate testing requirements.

The welding program improved in the areas of process controls, training, and the qualification of personnel. Additional enhancements such as the development of a welding program manual were in process. The welders were knowledgeable of the program and conscientious in their implementation of the program.

The ISI program for Unit 2 was considerably upgraded in the area of tracking examination activities. The licensee was planning a similar upgrade for the Unit 1 program. The performance of ISI activities at both units was found to be effective.

In summary, management involvement in the maintenance area and oversight of maintenance activities were generally good. A number of improvements were made in the maintenance program in the areas of equipment failure trending and predictive and diagnostic maintenance. System engineers provided useful inputs to resolve equipment failures and reliability concerns. Preventive maintenance activities were generally comprehensive. Maintenance was generally completed in an effective manner, but continued effort is needed to improve maintenance procedures and control of maintenance activities. Outage planning improved substantially and maintenance at power was usually well planned, but in one instance a maintenance planning error resulted in an automatic reactor trip. The backlog reduction effort and the operations focus during maintenance activity prioritization indicated a positive overall safety emphasis. Performance in the surveillance area has been superior with only one TS surveillance being missed. The ISI program was improved as were instrument calibration procedures and the welding program.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

None.

b. Licensee Actions

Continue programs for procedure improvement and enhanced procedure adherence.

D. Emergency Preparedness

1. Analysis

This functional area includes activities related to the establishment and implementation of the emergency plan and implementing procedures, onsite and offsite plan development and coordination, support and training of emergency response organizations, licensee performance during exercises and actual events that tests emergency plans, and interactions with onsite and offsite emergency response organizations during planned exercises and actual events.

This area was rated as Category 1 in the previous SALP and continued improvement was evident during this assessment period. No recommendations were included in the previous SALP report; however, the previous SALP report did discuss commitments which were made to make program improvements by early 1991 in the areas of drills, technical support, information flow,

notifications, and training. The licensee took appropriate action to complete the commitments.

Evaluation of this functional area was based on the results of three inspections by the regional staff and observations made by the resident inspectors. The inspections included evaluation of one annual emergency exercise, one operational status inspection, and one inspection to review corrective measures for weaknesses identified during the 1991 exercise.

During the assessment period, four emergency events were declared. Three involved a Notification of Unusual Event (NOUE) and one an Alert. The first NOUE occurred on December 22, 1991, and involved reactor coolant leakage greater than TS limits requiring plant shutdown. The second event involved an Alert that was declared on February 23, 1991, because of a small fire in the turbine turning gear breaker cubicle. This classification was immediately downgraded to an NOUE. In the third event, an NOUE was declared because a leaking Unit 2 low pressure safety injection valve was detected during surveillance testing performed prior to startup following the eighth refueling outage. As a result of the leaking check valve a plant cooldown was initiated as required by the TS. The fourth event was an NOUE on November 2, 1991, involving a fire lasting greater than 10 minutes within the protected area. The licensee properly classified the events, provided the required offsite notifications, and responded well to all of these events.

The licensee initiated the shift engineer program during the assessment period. A shift technical advisor qualified engineer was made a part of every operating crew as a shift engineer. During previous periods the shift technical advisor were on call for 24 hours periods rather than continually available as a crew member. The shift engineers assisted the shift superintendents with emergency action level classification and reporting determinations.

The licensee's performance during the 1991 annual exercise was good. The emergency response organization effectively implemented the emergency plan. The licensee used its control room simulator in the dynamic mode to run the exercise scenario. This provided increased realism and challenge to the operators participating in the exercise. The licensee demonstrated the ability to protect the health and safety of the emergency workers and the public by identifying accident conditions, making accurate and timely notifications to offsite officials, taking protective actions onsite, making protective action recommendations to the state, performing sufficient technical reviews to mitigate accident consequences, and determining the magnitude of site releases. The self-critique involved extensive participation by management, identifying and characterizing accurately the major exercise weaknesses. The licensee's findings coincided with findings identified by the NRC inspection team.

The NRC team noted exercise weaknesses in specific areas: information flow into the control room; command and control, operational assessment, technical analysis in the emergency response facilities; investigative techniques; coordination and use of resources; and radiation protection and medical practices. Factors contributing to the exercise weaknesses included extensive

reorganization at the ANO site and the use of new technical personnel in key positions during the exercise.

As a followup to the exercise weaknesses, a regional initiative inspection was performed which concentrated on the corrective actions implemented as a result of the 1991 exercise findings. The quality and scope of the corrective measures implemented by the licensee were excellent. Root causes were identified and appropriate corrective measures taken. Retraining included practical walkthroughs and drills which were repeated periodically.

Two concerns identified during the early part of the assessment period involved poor familiarity of dose assessment team members with the computer programs used to perform dose calculations and lack of a comprehensive inventory program for emergency equipment and supplies. Appropriate actions were completed which properly addressed both of the concerns.

The licensee's emergency response facilities were maintained in a state of readiness. Comprehensive audits, with technical specialists as audit team members, were performed and audit findings were resolved in a timely manner.

The emergency response organization consisted of well trained and qualified individuals. The licensee responded effectively to internally identified problems in addition to those identified by NRC. The licensee maintained an excellent working relationship with state and local offsite response agencies and kept these agencies informed of the status of emergency planning and changes in the emergency plan. Federal Emergency Management Agency (FEMA) participation in the 1991 exercise was limited to a medical drill, and no significant issues were identified by FEMA.

In summary, the emergency preparedness program continued to improve and was maintained in an excellent state of operational readiness for responding to emergencies. Performance during the 1991 annual exercise was good with corrective measures for weaknesses identified during the emergency exercise being particularly notable. Response to actual events was very good, with proper classification and offsite notifications. The newly assigned shift engineers assisted the shift superintendents with emergency action level classification and reporting determinations. The emergency preparedness program received excellent management support and the response facilities were maintained in a state of readiness. The emergency response organization consisted of well trained and qualified individuals.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None.

E. Security

1. Analysis

This functional area consists of activities associated with the security of the plant including all aspects of access control, security background checks, safeguards information protection, and FFD activities and controls.

The previous SALP report noted a strong program in this area and made no specific recommendations for licensee action. Region based physical security inspectors conducted four security inspections and one FFD inspection. This area was also inspected on a continuing basis by the resident inspectors. Several minor violations were identified and cited. Followup inspections determined that corrective actions for all violations were prompt and effective.

Management provided excellent support for security. Examples of management support for the security program include the construction of a new firearms range, completion of various perimeter improvement projects, and completion of upgrades to the computer system. A good working relationship existed between security and each of the other departments.

Security management demonstrated superior professionalism, strong organizational talent, and a proactive attitude in anticipating and addressing problem areas. Disposition of technical issues was timely and excellent. When identified, the problem areas received immediate attention. Maintenance and testing of security equipment was prompt and effective in most cases.

During daily operations, the security force exhibited superior vigilance and responsiveness to routine duties. Security officer morale was very high. An indication of a strong training program was the performance of the security force during a demonstration of marksmanship skills. Several officers were randomly selected to participate in both pistol and shotgun courses without any special preparation or refresher training. The selected officers averaged significantly higher than was required to qualify with both weapons.

The licensee submitted revisions to the Industrial Security Plan, including deletion of a vital area from the physical security plan commitments. The revisions provided sound and conservative technical safeguards solutions indicating an understanding of the issues.

The dedication and professionalism of the FFD staff was a strength that greatly contributed to the licensee satisfying the general objectives of the FFD rule. Hiring a full-time medical review officer for the program indicated management support for this program.

An excellent security quality assurance audit program had been established. Audits were comprehensive, performance based, and included an excellent audit plan and checklist. The audit team included nuclear security expertise from other power reactor facilities. Audit findings were promptly resolved.

In summary, management provided excellent support for the security program, maintaining and improving the program. The security staff was professional and well organized, exhibiting superior vigilance and responsiveness during routine duties. Security force staffing and training were superior and a good working relationship existed between security and the other departments. The FFD staff exhibited dedication and professionalism and the addition of a full-time medical review officer for the program indicated management support for this program. Prompt and effective corrective actions were taken for each of the minor violations which were identified.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None.

F. Engineering/Technical Support

1. Analysis

This functional area consists of technical and engineering support for all plant activities. It includes all licensee activities associated with the design of plant modifications; engineering and technical support for operations, training, procurement of safety-related and commercial-grade items, and vendor interface activities; training; and fire protection/prevention.

This functional area was inspected on an ongoing basis by the resident inspectors and periodically by region-based and headquarters personnel. The previous SALP report made no recommendation to licensee management. However, the licensee had initiated a number of actions to address weaknesses previously identified in this functional area. Major initiatives included formation of the system engineering groups and movement of the design engineering staff to the site.

An engineering department organizational change has occurred whereby site engineering management now reports to corporate Entergy Operations, Inc. (EOI) in Jackson, Mississippi. Engineering oversight and direction continued to improve. During a Waterford 3 engineering and technical support inspection, it was observed that the final formalization of the transition of engineering at the three EOI sites was in progress with corporate directives to be issued early in 1992. During this assessment period, a new director of engineering was appointed from within the organization to maintain management continuity within the engineering organization.

The engineering organization participated in the formation of peer groups from all three EOI sites which were being initiated to provide engineering direction. The formation of the peer groups was viewed as a strength for the further enhancement of the EOI engineering activities.

The system engineer concept was working well. All positions were filled and engineers were routinely assigned to solve priority problems. The operations staff commented that they were particularly pleased with the support provided them by the system engineers. They functioned in part as problem resolution expediters and technical experts. System engineering was credited for improving plant performance. The system engineers have also improved safety. For example, system engineers were instrumental in improving the Unit 2 emergency feedwater pump reliability, in identifying and resolving the seismic qualification inadequacies of the Units 1 and 2 Foxboro instrument panels, and establishing operating procedures for the Unit 1 HPI pump lubricating oil system to prevent potential common mode degradations.

Design engineering identified and corrected important safety issues. For example, the licensee discovered a significant design deficiency on control power transformers for ventilation fans associated with the Unit 2 emergency diesel generators during the electrical drawing upgrade program. The deficiency was caused by inadequate vendor drawing controls during a previous SALP period. The licensee also discovered seismic qualification problems with the Unit 2 4160 Volt switchgear and vital DC breaker fuse coordination problems for both units during an internal electrical distribution safety functional inspection (EDSFI). The licensee carefully evaluated concerns identified during the internal EDSFI. They appropriately prioritized the engineering analysis to ensure operability concerns were promptly identified. The success of these efforts in combination with the configuration control program were indicative of improved engineering and technical support.

Design deficiencies were involved in the root cause for half of the LERs reported in this functional area. This indicated a need for the licensee to continue to emphasize diligence and precision when relying on the adequacy of past design work.

The licensee exhibited a conservative approach to design changes and modifications. Design change packages were highly detailed, professionally prepared, and accurately assembled. The same care and attention were afforded temporary modifications. Procedural controls were followed precisely and either met or exceeded regulatory requirements.

An NRC EDSFI determined that the licensee's internal EDSFI was a critical self-assessment and had identified and initiated corrective actions for a number of design issues. The inspection identified a few additional problems; the most significant was the limited capability of the second source of offsite power. The licensee's corrective actions were generally scheduled in a timely manner but were somewhat longstanding because of a significant engineering workload. Engineering evaluations were found to be generally adequate and complete. The licensee's responses to the EDSFI were noted to be technically sound and thorough in most cases.

The engineering staff contained the expertise that would normally be required to deal with facility problems. The licensee's use of consultants to perform an in-depth self-assessment of the Unit 2 electrical systems was considered to be appropriate in providing an independent evaluation.

Submittals in support of licensing activities had good engineering and technical quality. The licensee's submittals included documents in support of license amendment requests, corrective actions related to operational events and LERs, and responses to NRC Bulletins and Generic Letters.

Excellent technical support was provided to resolve generic safety issues. Of particular note was the support the licensee provided for the analysis of Generic Issue 57 regarding the effects of fire protection systems on safety-related equipment, an issue concerning concrete wall seismic response, and the shutdown risk efforts. The licensee demonstrated an aggressive engineering attitude as an industry leader in selected technical problem resolution. For example, the licensee successfully conducted a special research testing project with a vendor to develop reliable and economical design methods for using Maxi-bolt undercut anchors as fastening devices. Another example of aggressive engineering work was the licensee's participation as a lead plant in developing a line-item improvement to the TSs on movable control element assemblies. However some examples of less aggressive engineering effort on existing plant issues include lack of timeliness in completing the fire barrier penetration seal review and incomplete submittals regarding the ISI program.

The licensee implemented a formal training program for engineering and technical support personnel. The program included training in performing root cause analyses and safety evaluations. The training program was noted to be an indication of the management commitment to improve the performance of the engineering staff.

The design configuration information management system (DCIMS) was placed in service, providing enhanced computer document indexing and retrieval capabilities to the ANO staff. Twenty-four upper level documents (ULDs), which define the design criteria requirements and bases, were drafted. System reviews, which validate the completeness, consistency, and accuracy of design documentation, were started on several ULDs. Design documentation was being organized, indexed, and entered into DCIMS.

The EOP upgrade program continued. Included in this upgrade was the development of a formalized setpoint document and technical basis documents for both Units 1 and 2. The setpoint document reviewed for Unit 2 appeared comprehensive with good traceability to the setpoints' technical basis. The technical basis documents for the EOPs were well structured and contained adequate technical justifications for any deviations from the vendor's guidelines. Verification and validation efforts were still in progress to address balance-of-plant environmental concerns.

The 3-year engineering backlog reduction project was on schedule. However, the licensee did not meet its goal for updating noncritical drawings and design documentation following the back-to-back refueling outages.

Engineering/technical support management and resource allocation to training functions continued to improve. Operations and training had a strong, effective working relationship as evidenced by 100% pass rates on initial and requalification examinations administered at both units.

No violations were cited in this functional area during the SALP period. Noncited violations were self-identified and positive corrective actions were taken by the licensee, demonstrating the proactive approach that ANO was taking toward corrective action and self-assessment.

In summary, performance of engineering and technical support improved during this SALP period. A more proactive approach to engineering and technical issues was evident. Formation of engineering peer groups was viewed as a strength for the further enhancement of the EOI engineering activities. Formation of the system engineering groups was a positive initiative which was paying dividends in safety and equipment reliability. Design engineering identified and corrected important safety issues. The identification of several design deficiencies by design engineering indicated a need for the licensee to continue to emphasize diligence and precision when relying on the adequacy of past design work. Design change packages were highly detailed, professionally prepared, and accurately assembled. The licensee's internal EDSFI was a critical self-assessment and identified and initiated corrective actions for a number of design issues. A significant engineering workload existed, but the 3-year engineering backlog reduction project was on schedule. Submittals in support of licensing activities had good engineering and technical quality. Excellent technical support was provided to resolve generic safety issues and the licensee demonstrated an aggressive engineering attitude as an industry leader in selected technical problem resolution. Less aggressive engineering effort was exhibited in licensing submittals for some existing plant issues. Formal training enhanced the ability of engineering and technical support personnel to perform root cause analyses and safety evaluations. Engineering/technical support management and resource allocation to training functions continued to improve with one result being the 100 percent pass rates on initial and requalification examinations administered at both units.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

None.

G. Safety Assessment/Quality Verification

1. Analysis

This functional area consists of all licensee review activities associated with the implementation of licensee safety policies, including licensee activities related to exemption and relief requests and other regulatory initiatives. In addition, it includes licensee activities related to the resolution of safety issues, safety committees, and self-assessment activities, and the effectiveness of the licensee's quality verification function in identifying and correcting substandard or anomalous performance.

in identifying precursors of potential problems, and in monitoring the overall performance of the plant.

NRC inspection efforts in this area consisted of the core inspection program, regional initiative inspections, and NRR program reviews. The regional initiative inspections included an evaluation of the corrective action and self-assessment programs, an evaluation of the licensee's implementation of their business plan, and evaluations of the licensee's actions in response to industry and NRC identified problems.

The corrective action program was revised to provide better focus on significant problems. Overall, the licensee's self-assessment and corrective action programs were determined to be good. Management's effectiveness in ensuring quality was evident through its involvement in the corrective action program. For example, the Unit 2 corrective action review board (CARB) rejected the initial disposition recommended for long-term correction of a shutdown cooling flow control valve failure because more action was appropriate. This form of management intervention was considered a strength, because such scrutiny should encourage thoroughness in assessing and correcting conditions adverse to quality. The feedback from the various review committees and from the quality assurance audits provided critical self-assessments and was considered to be a program strength. The approved corrective actions were conservative and technically sound.

A comprehensive quality assurance surveillance and audit program was implemented for the radiological controls, emergency preparedness, and security areas. Audits included qualified and knowledgeable auditors and findings were resolved in a timely manner.

The program for handling external information was comprehensive and functioning well. The licensee implemented procedures to ensure that the provisions of 10 CFR Part 21 were adequately fulfilled.

Appropriate use of the ANO Business Plan to address the issues identified in the DET inspection resulted in all remaining DET inspection concerns and findings being closed during this SALP period. The Business Plan continued to be a strong working tool for licensee management to focus site initiatives and measure progress in their improvement programs.

The licensee thoroughly investigated causes of significant events and took appropriate actions to correct the immediate deficiency, identified similar conditions which needed correction, and implemented appropriate actions to prevent recurrence. Licensee Event Reports were well written, describing the major aspects of the events and providing information on previous similar events and planned corrective actions. The corrective actions for the seismic qualification deficiencies of the Foxboro instrumentation modules and for the corrosion degradation of valve stems were determined to be comprehensive and appropriate.

Plant personnel consistently addressed operability concerns in an aggressive manner and, in general, made conservative determinations until each concern

was resolved. Licensee management kept the NRC completely informed of initial concerns as well as its followup plans for resolution.

Plant personnel routinely exhibited a questioning attitude For example, during a Unit 1 borated water storage tank level transmitter surveillance, a reactor operator stopped the technicians who were about to remove annunciator cables and questioned the effect this would have on the remaining channels' operability. The questioning of the procedure regarding operability of the remaining channel by the operator was recognized as a strength. Questioning attitudes on the part of a system engineer and two instrument mechanics led to the discovery and repair of seismically unqualified Foxboro instrument panels. The licensee's sensitivity to the potential for common mode degradation due to excessive Unit 1 HPI pump oil leakage, root cause determination, and immediate corrective actions were considered to be a strength.

TS relief proposals were carefully analyzed in most cases. In one case regarding an inoperable excore detector in Unit 2, the licensee determined a proposal for relief to have potential adverse safety consequences. This demonstrated the commitment of the licensee to plant safety. There were occasions, however, during preliminary discussions of TS relief, when the licensee had not fully considered the analysis necessary to justify the relief.

Numerous license amendments were issued for each unit. In most cases, licensee submittals demonstrated a clear understanding of safety issues and a conservative approach in technical problem resolution. However, in some cases, the submittals were incomplete and required additional information and clarification before final resolution was achieved. Responses to NRC requirements, bulletins, and generic letters were timely, although certain proposed exceptions to NRC staff positions did not always provide an equivalent level of protection.

Reports initiated by the licensee provided excellent performance trending. Clear equipment and human performance goals were established and performance was tracked.

The licensee produced timely, complete, and technically sound 10 CFR Part 50.59 safety evaluations. In a 10 CFR Part 50.59 change, the licensee made several modifications to the original Unit 2 diverse emergency feedwater actuation system conceptual design. The modifications documented in the licensee's 10 CFR Part 50.59 review package as system enhancements did not change the functional requirements for DEFAS and were acceptable.

One violation was identified in this functional area. The violation pertained to the acceptance of piping which contained manufacturing imperfections which did not conform to the procurement requirements.

In summary, strong management effectiveness was demonstrated in operability determinations, self-assessment, and corrective action programs. The Business Plan continued to be a strong working tool for licensee management to focus site initiatives and measure progress in their improvement programs. Plant personnel exhibited a healthy questioning attitude that indicated a

conservative safety attitude. Operability concerns were addressed in an aggressive manner and, in general, conservative determinations were made until each concern was resolved. License amendment submittals were generally conservative and complete, with some instances of additional information being required prior to resolution. Thorough 10 CFR Part 50.59 reviews were conducted when appropriate. The program for handling external information was comprehensive and functioning well. Reports initiated by the licensee provided excellent performance trending.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Review the interface between engineering and licensing during a regional initiative inspection.

b. Licensee Actions

None.

V. SUPPORTING DATA AND SUMMARIES

A. Major Licensee Activities

1. Major Outages

The ninth refueling outage was completed for Unit 1 on January 5, 1991. Significant work completed included modifications to the HPI system, necessary for a license modification to return to 100 percent power.

A planned mid-cycle outage was completed for Unit 1 on April 23, 1991. This outage was conducted to repair the exciter on the main generator and to complete modifications deferred from the ninth refueling outage.

The tenth refueling outage for Unit 1 commenced February 29, 1992, and was ongoing at the end of the SALP period.

Unit 2 completed the eighth refueling outage on April 20, 1991. Major work completed included reactor coolant pump seal replacement, steam generator inspections and cleaning, addition of a nonsafety-related, motor-driven auxiliary feedwater pump.

Two short, unplanned outages were conducted in October 1991. The first outage, completed October 14, 1991, replaced a failed excore neutron detector. The second outage, completed October 29, 1991, replaced leaking pressurizer code safety valves.

2. License Amendments

During the SALP period, a total of 27 license amendments were issued for the licensee with 8 common, 7 for Unit 1 only, and 12 for Unit 2 only.

3. Significant Modifications

Unit 1 completed significant modifications to its HPI system during the ninth refueling outage. These modifications were necessary to return to 100 percent power. Unit 1 had been restricted to a maximum of 80 percent power during the latter portion of its eighth cycle due to identified inter-system LOCA concerns.

ATWS protection circuitry was installed in the reactor protection system during the Unit 1 ninth refueling outage.

Modifications were being implemented to enhance the 161 kilovolts offsite power supply. The NRC EDSFI team identified that this source of power could be challenged during peak offsite distribution system loads.

B. Direct Inspection and Review Activities

NRC inspection activity included 40 inspections, one of which was a major team inspection, with an expenditure of approximately 4491 direct inspection hours.