APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/93-04
50-368/93-04

Operating Licenses: DPR-51
NPF-6

Licensee: Entergy Operations, Inc.
Route 3, Box 137G
Russellville, Arkansas 72801

Facility Name: Arkansas Nuclear One (ANO), Units 1 and 2

Inspection At: Russellville, Arkansas

Inspection Conducted: March 7 through April 17, 1993

Inspectors: L. Smith, Senior Resident Inspector
S. Campbell, Resident Inspector
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Accompanying personnel: K. Weaver, Engineering Aide

Approved: _____ 6/1/93
T. F. Stetka, Chief, Project Section D Date

Inspection Summary

Areas Inspected (Units 1 and 2): This routine resident inspection addressed onsite followup of events, operational safety verification, radioactive waste treatment, effluent and environmental monitoring, monthly maintenance observation, bimonthly surveillance observation, Three Mile Island action plan requirement followup, followup of previous inspection findings and licensee event reports (LER).

Results (Unit 1):

- Failure to recognize the applicability of Technical Specification 3.7.2.A, when Unit 1 experienced a loss of power to bus A-4, was a weakness. The licensee took prompt and effective immediate corrective actions to correct the problem. The recommended longer-term actions were considered appropriate (Section 2.1).

- The licensee determined that a lack of drains on the valve actuator limit switch compartment was a contributing cause for the inoperability of the emergency feedwater pump turbine. The failure to design for an environment which had the potential for introducing condensate into the limit switch compartment was a deviation from paragraph 1.4.4 of the Safety Analysis Report (313/9304-01) (Section 9.1.9).

- An increase in reactor building sump fill rate was aggressively analyzed and determined by the licensee to be related to a feedwater leak. The licensee ruled out erosion or corrosion as the probable cause based on earlier ultrasonic test data and the fact that a flange leak had been recently repaired in the feedwater system. The feedwater leakage monitoring program, which was established to identify increasing leakage, was determined to be acceptable (Section 3.1).

Results (Unit 2):

- The condition report addressing the operability of the Unit 2 emergency feedwater pump turbine steam supply valve was satisfactory, however, the timeliness for initiating the report was considered to be a weakness (Section 3.2).

Results (Units 1 & 2):

- The licensee's response to unplanned plant transients to maintain both units in a stable condition was good.

- The radioactive waste treatment program and the effluent and environmental monitoring programs were conducted in accordance with applicable requirements. The quantities of radionuclides released in the gaseous and liquid radioactive waste effluent were within the Offsite Dose Calculation Manual (ODCM) limits (Section 4).

- There were a total of eight unplanned radioactive releases reported in the licensee's semiannual effluent release reports for the period January 1, 1991, through December 31, 1992. It was also reported, as required, that one effluent monitor had been out of service in excess of Technical Specification allowed outage time during the period reviewed. This occurred on Unit 1 during Refueling Outage 1R10 and was reviewed by the licensee in a condition report (Section 4.6.1).

Summary of Inspection Findings:

- Deviation 313/9304-01 was opened and closed (Section 9.1.9).

- Three Mile Island Action Item III.D.3.4 was closed for both units (Section 7).
- Violations 368/8319-01 and 313/8918-01 were closed (Section 8).
- Unresolved Items 313/8928-02 and 368/9213-02 were closed (Section 9).
- Inspection Followup Items 313/8404-01; 368/8404-01, 313/9009-01; 368/9009-01, 313/9010-02; 368/9010-02, 368/9010-04, and 313/9303-01 were closed (Section 9).
- Inspection Followup Items 368/9010-03 and 313/9011-01 were reviewed and remain open (Section 9).
- LERs 368/90-006, 313/90-008, 368/90-014, 368/90-015, 313/90-020, 368/90-020, 313/90-021, 368/91-008, and 368/91-013 were closed (Sections 10 and 11).

Attachment:

Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

1.1 Unit 1

At the beginning of this inspection period, the plant was in hot shutdown while the licensee performed repairs and investigated the cause of an unplanned reactor trip which occurred on March 5. The plant returned to 100 percent power on March 8. On March 9, the plant experienced a turbine runback to 63 percent power due to the temporary loss of power to Nonvital Bus A-2, which resulted in a loss of a condensate circulating water pump and a decrease in condenser vacuum. The plant returned to 100 percent power on March 10. On March 27, the plant reduced power to 85 percent at the dispatcher's request and returned to 100 percent power on March 29. On April 9, the plant reduced power to 85 percent at the dispatcher's request and returned to 100 percent power on April 12. On April 16, the plant reduced power to 85 percent at the dispatcher's request and remained at that power level through the end of the inspection period.

1.2 Unit 2

At the beginning of this inspection period, the plant was at 100 percent power. On March 19, the unit experienced a main turbine setback to 780 megawatts, which caused the operators to manually runback the plant to approximately 80 percent power due to a ground in the Main Feedwater Pump Turbine 2K-2D circuitry that was caused by water spray from the fire system during fire system maintenance. The unit returned to 100 percent power the same day. On March 31, the unit reduced power to 73 percent to a repair condenser tube leak and returned to 100 percent power on April 1. At the end of this inspection period, the plant was at 100 percent power.

2 ONSITE EVENT FOLLOWUP (93702)

2.1 Unit 1 - Loss of 4160V Bus A-4 and Subsequent Emergency Diesel Generator Start

At 3:48 p.m. on March 9, 1993, Unit 1 experienced a loss of power to Vital 4160V Bus A-4, while shifting the power supply source to Non-Vital 4160V Bus A-2 from the Startup Transformer 1 to the unit auxiliary transformer. The Startup Transformer Supply Breaker A-213 to Bus A-2 did not automatically open when the Unit Auxiliary Transformer Supply Breaker A-212 to Bus A-2 was closed because the logic contacts to trip open Breaker A-213 did not properly close. Bus A-2 locked out on high current and both supply breakers opened. Since Bus A-2 was the normal power supply for Vital Bus A-4, the loss of power to Bus A-4 caused the feeder breaker from Bus A-2 to Bus A-4 to open and Emergency Diesel Generator K-4B to automatically start and energize the bus. Subsequently, Bus A-2 was reenergized from Startup Transformer 1. Since both buses were reenergized and remained operable, the

safety impact on the plant was minor. An automatic turbine runback occurred due to the loss of a condensate pump. Operators also manually decreased reactor power to maintain condenser vacuum due to the loss of a circulating water pump. Reactor power was stabilized at 63 percent.

At 5:12 p.m. the licensee reported in Event Report 25213 that Unit 1 was not in any Technical Specification action statement as a result of the transient. At approximately 6 p.m., the inspector questioned the licensee concerning the applicability of Technical Specification 3.7.1.B, which required that all 4160V switchgear, 480V load centers, and 480V motor control centers in both of the engineered safeguard actuation system distribution systems be powered from either one of the two startup transformers or the unit auxiliary transformer. Following questions by the inspector, the licensee entered Technical Specification 3.7.2.A, which required that a plant shutdown be initiated within 12 hours. The logic contacts were repaired and Technical Specification 3.7.2.A was exited at 7:40 p.m. on March 9, 1993, after restoring a normal electrical lineup. Reactor power was returned to 100 percent at 4:15 a.m. on March 10, 1993.

A night order to address the failure to recognize the applicability of Technical Specification 3.7.2.A was issued as an immediate corrective action. The night order was issued and will be communicated to all crews during subsequent shift turnovers. The licensee committed to conduct training on Technical Specification 3.7 requirements and emphasize the need to refer to the text of Technical Specifications rather than relying on memory. The failure to recognize the entry into a Technical Specification action statement was considered to be a weakness.

2.2 Unit 2 - Plant Setback

On March 19, maintenance personnel removed the cover off Sprinkler Isolation Valve 2FS-60 in preparation for replacing the packing gland per Job Order (JO) 00850393. As the technician removed the cover, a slow leak developed. The leakage increased while the technician left the area to report the leakage to the control room. When the technician returned, the water was observed spraying on Main Feedwater Pump B Electrohydraulic Control (EHC) Cabinet 2C-106.

A main turbine setback occurred that ran the plant back to 80 percent power as a result of wetting the terminal contacts inside Cabinet 2C-106. The setback caused the Loop 2 reactor coolant system T_{cold} temperature to increase to 558°F and Technical Specification 3.2.6 for T_{cold} greater than 554.7°F was entered. The Technical Specification was exited within the 2-hour time limit when the temperature dropped below 554.7°F as a result of boration and operation of the steam dump and bypass control system. The operators stabilized the plant at 80 percent power and Condition Report 2-93-0074 was written.

2.3 Conclusions

Since Buses A-2 and A-4 were promptly restored and remained operable following the deenergization of Bus A-2, the safety impact to the plant was minor. However, the licensee's failure to recognize the applicability of Technical Specification 3.7.2.A was a weakness. Overall, the licensee's response to the unplanned events to maintain both units in a stable condition was good.

3 OPERATIONAL SAFETY VERIFICATION (71707)

The inspectors routinely toured the facility during normal and backshift hours to assess general plant and equipment conditions, housekeeping, and adherence to fire protection, security, and radiological control measures. Ongoing work activities were monitored to verify that they were being conducted in accordance with approved administrative and technical procedures and that proper communications with the control room staff had been established.

During tours of the control room, the inspectors verified proper staffing, access control, and operator attentiveness. Technical Specification limiting conditions for operation were evaluated. The inspectors examined the status of control room annunciators, various control room logs, and other available licensee documentation.

3.1 Unit 1 - Increased Reactor Building Sump Fill Rate

A walkdown of the reactor building was performed by the licensee following the March 5 reactor trip. A leak was identified on the lower flange of a feedwater header inlet connection to Once-Through Steam Generator (OTSG) B. The leak was repaired using Furmanite techniques and observed to be not leaking prior to restart. Five days following the return to power, an increase in reactor building sump fill rate was identified. Based on the results of chemistry samples, it was determined that the feedwater system was the source of the water. The licensee suspected that the Furmanite repair on the feedwater header inlet connection was the source of the leak.

To verify that there were no other leakage areas within the reactor building portion of the feedwater system (e.g., from a piping crack), the licensee reviewed their erosion/corrosion monitoring program. The licensee's program used a computer model to select feedwater system piping components most susceptible to erosion and corrosion. Seven components were identified as being susceptible to erosion/corrosion and, as a result, were tested ultrasonically during the last outage. All were found to have wall thicknesses above original manufacturer's specifications. On that basis, the licensee ruled out erosion or corrosion pipe cracking or wall thinning as being a probable source of the leak.

The reactor building sump fill rate was monitored three times a shift. The 5-day rolling average was also calculated to ensure data scatter would not obscure any real increases in leakage. The shift estimates of feedwater leakage ranged from .35 gpm to .75 gpm with no visible increasing trend.

Using the 5-day rolling average, the leak appeared to have increased slightly, approximately .2 gpm in 40 days. Chemistry samples were taken from the sump on a weekly basis to continuously confirm that feedwater was the source of the increased leakage. Operations personnel also requested that additional samples be taken when possible changes in fill rates were detected. The licensee believed it would be possible to detect a real step increase of .5 gpm over the currently measured values within one shift. The licensee's monitoring program was determined to be acceptable.

3.2 Unit 2 - Plant Tours

On March 17, the inspector observed that the thermal blanket around Emergency Feedwater Pump Steam Supply Valve 2CV-1050-2 was not attached by all of the straps. Only one strap secured the blanket to the valve operator. A placard attached to the blanket stated that the insulating blanket was required for environmental qualification purposes. Although the inspector brought this observation to the licensee's attention on March 17, a CR was not initiated until March 19.

Design Change Package DCP 83-2009 added the blanket to protect the valve operator from temperatures in excess of 250°F resulting from a postulated main steam line break inside the main steam safety valve room. The motor and the limit switch compartment, which were vital components for the operation of the valve, remained covered by the blanket; but, the blanket was loose around the valve yolk. Since the vital portions of the valve remained covered, the operability of the valve would not be impacted in the event of a main steam line break and was not required to be reported.

A JO (JO 00890989) was initiated to repair the blanket. The licensee informed the inspector that the original design change package to install the blanket was based on earlier estimates of room conditions following a main steam line break. When the estimates of the room conditions were determined to be overly conservative, similar blankets on Unit 1 were removed. The licensee stated that the blanket may no longer be required. An evaluation was proposed by the licensee to assess the impact on environmental qualification considerations for not installing the blankets around the operators.

While the condition report was satisfactory, the timeliness for initiating the condition report was considered to be a weakness.

3.3 Unit 2 - High Pressure Safety Injection Hot Leg Injection Orifice Bypass Valve 2CV-5103-1 Failed to Stroke Full Closed

On March 30, Technical Specification Action Statement 3.5.2 was entered when flow orifice bypass Valve 2CV-5103-1 failed to stroke fully closed during the quarterly valve stroke test. The position indicating plate, which was mounted between two nuts on the valve stem, worked its way down the valve stem. When the valve was stroked closed, the lower stem nut impacted the valve packing, stopped valve travel, and apparently caused a 30 drop per minute leak from the retainer assembly packing. The system engineer stated

that the companion valve had a lock wire installed between the position indicating plate and the two stem nuts. The licensee also stated that the last reassembly of this valve was performed by contract personnel.

After the repair, a full valve operation test and evaluation system (VOTES) diagnostic test was performed and a high stem factor was measured. The licensee determined that the high stem factor was related to a misalignment of the valve stem. The valve stem was realigned and the disc-to-seat thrust was remeasured. The minimum disc-to-seat thrust, as initially required by design engineering, was not achieved. The design calculations were reperformed using current calculation methods and the valve was determined to be operable. The inspectors reviewed the basis for the revised calculations and concluded that the valve was operable, but only marginally. The licensee planned to perform additional maintenance on Valve 2CV-5103-1 during the next planned outage, which was scheduled to start on April 30, 1993.

To provide contingency measures which would be applicable if hot or cold leg injection flows were not within acceptable bands following the establishment of hot leg injection, Procedure Change 4 to Revision 1 of the Emergency Operating Procedure 2202.010, "Standard Attachments," was developed. This procedure change would provide an alternate method to establish hot leg injection if Valve 2CV-5103-1 failed to close during an accident situation.

There has been a concern in the past regarding the control of contractors during the performance of valve maintenance. This issue is already being tracked as Inspection Followup Item 368/9317-01, which was opened in NRC Inspection Report 50-313/93-17; 50-368/93-17. The inspectors will continue to observe the licensee's control of contractor personnel and track their observations as a part of this outstanding inspection followup item.

3.4 Conclusions

The Unit 1 feedwater leak monitoring program was determined to be acceptable. The condition report, addressing the operability of the Unit 2 emergency feedwater pump turbine steam supply valve when a protective blanket was identified as being partially detached, was satisfactory; but, the timeliness for initiating the condition report was a weakness. Further evaluation of the control of contractors during valve maintenance is planned as a result of a failure of Valve 2CV-5103-1 to stroke closed and will be tracked under Inspection Followup Item 368/9317-02. The inspectors reviewed the basis for the revised design calculations and concluded that Valve 2CV-5103-1 was operable, but only marginally so. The change to Procedure 2202.01 was viewed as appropriate.

4 RADIOACTIVE WASTE TREATMENT AND EFFLUENT AND ENVIRONMENTAL MONITORING (84750)

4.1 Organization and Management Controls

The organization and staffing regarding the radioactive waste effluent program was reviewed to determine agreement with commitments in Chapter 12 of the Unit 1 Updated Safety Analysis Report (USAR), Chapter 13 of the Unit 2 USAR, and compliance with the requirements in Technical Specification 6.5.2.8 for Units 1 and 2. The inspector also reviewed the licensee's organization, management controls, and assignment of radiological environmental monitoring program (REMP) responsibilities to verify compliance with the requirements in Units 1 and 2 Technical Specification 6.2.

4.1.1 Discussion

The inspector verified that the organizational structure of the chemistry department, which was responsible for the implementation of the radioactive waste effluent program, was as defined in the USAR and Technical Specifications. Management control procedures were reviewed for the assignment of responsibilities for the management and implementation of the radioactive waste effluent program. The chemistry department was assigned the responsibility for preparing radioactive waste release permits, evaluating the radioactive waste effluent releases, calculating the radiation doses resulting from the releases to the environment, and maintaining radioactive waste effluent release data. The inspector determined that the duties and responsibilities of the chemistry department specified in the administrative procedures were being implemented. The inspector interviewed several chemistry technicians and determined that they were familiar with the requirements of the radioactive waste effluent program.

The inspector reviewed the staffing of the chemistry department and noted that, since the previous NRC inspection of the radioactive waste effluent program conducted in July 1991, there was only one minor change, a title change from Supervisor, Chemistry to Senior Chemistry Specialist. The chemistry department staffing was determined to be adequate and in accordance with licensee commitments.

The onsite ANO chemistry/environmental staff was responsible for collection, documentation, and shipment of the radiological environmental samples collected around the ANO site, except for certain sampling of fish, bottom sediment, and milk from some locations for which the licensee used a contractor.

The System Chemistry staff, located in Little Rock, was responsible for all radiological analyses of ANO environmental media samples, except for the ANO environmental thermoluminescent dosimeters (TLD), which were processed by ANO's staff onsite. The System Chemistry staff was also responsible for radiological analyses of environmental media samples from the Waterford-3 and Grand Gulf sites.

The inspector verified that the organizational structure of the ANO and System Chemistry staffs, with responsibilities associated with the REMP, satisfied the Technical Specification requirements. Since the previous NRC inspection of the REMP, conducted in March 1990, there had been organizational changes which changed the name of the Environmental Services Section to System Chemistry, with personnel changes at the managerial and supervisory levels. The ANO and senior System Chemistry scientists/chemists associated with REMP activities remained the same. However, System Chemistry added two contract chemist positions associated with REMP activities since the last inspection. The current organizational structure and staffing associated with the REMP appeared to be consistent with Technical Specification requirements.

The inspector verified that the assignment of administrative control responsibilities for the management and implementation of the REMP was as identified in the Technical Specifications.

4.1.2 Conclusions

The chemistry department's organizational structure and staffing met the Technical Specification requirements. The radioactive waste effluent management program was being implemented in accordance with station procedures. The chemistry department had experienced one minor title change and no turnover of technical personnel. The organizational structure and management controls of the REMP were in accordance with the procedures. Despite major organizational changes since the last inspection of the REMP activities, there had been no adverse effects.

4.2 Training and Qualifications

The training and qualification programs for the chemistry technicians and waste control operators responsible for implementing the radioactive waste effluent program was reviewed to determine agreement with commitments in Chapter 12 of the Unit 1 USAR, Chapter 13 of the Unit 2 USAR, and compliance with the requirements of Technical Specifications 6.3 and 6.4 for Units 1 and 2. The qualifications and training of the ANO and System Chemistry staff associated with the REMP was also reviewed to determine compliance with the requirements in Units 1 and 2 Technical Specifications 6.3 and 6.4.

4.2.1 Discussion

The inspector reviewed the training programs for the chemistry technicians and the waste control operators including: training procedures, lesson plans, personnel training records, and qualification cards. It was determined that the licensee's training programs were being implemented in accordance with station procedures.

The inspector reviewed individual staff computerized training records and qualification cards for selected chemistry technicians and waste control operators responsible for performing radioactive waste effluent program

activities. It was verified that the chemistry technicians and waste control operators responsible for performing radioactive waste effluent program activities had completed the required training to perform their assigned duties. The staffing levels of the chemistry and operations departments appeared adequate to perform the duties required by the radioactive effluent programs.

Training for the ANO chemistry/environmental staff involved with the REMP sampling program was conducted by the ANO chemistry/environmental section as on-the-job training. The inspector verified that the ANO chemistry/environmental staff was qualified in accordance with Technical Specification requirements and each individual involved with REMP activities had received the required training.

Training for the System Chemistry staff performing analyses of environmental media samples was conducted in the central laboratory in Little Rock as on-the-job training by the senior System Chemistry staff. The System Chemistry chemists/scientists assigned to perform analyses associated with the REMP were qualified in accordance with Technical Specification requirements and had received training on newly revised analytical procedures.

4.2.2 Conclusions

The licensee had implemented good training programs for chemistry technicians, System Chemistry staff, and waste control operator personnel. The chemistry department, System Chemistry, and operations department had adequate, well-qualified staffs to meet staffing requirements.

4.3 Quality Assurance Program

The quality assurance audit and surveillance programs regarding the radioactive waste effluent program and REMP activities were reviewed to determine agreement with commitments in the USAR for Units 1 and 2 and compliance with the requirements in Technical Specifications for both units.

4.3.1 Discussion

Audit and surveillance reports of quality assurance activities related to the radioactive waste effluent program and REMP, performed during 1991 and 1992, were reviewed for scope, thoroughness of program evaluation, and timely followup of identified deficiencies. The audits were performed in accordance with quality assurance procedures by qualified auditors, with assistance from technical specialists who were knowledgeable in radiological environmental monitoring programs, radiological waste effluent programs, and ODCM requirements at nuclear power facilities. The inspector found the quality assurance audits to be comprehensive and satisfactory to evaluate the licensee's performance in implementing the radiological effluent programs.

The licensee used a contractor laboratory to perform iron-55 radiochemistry analyses on radioactive waste effluent composite samples. The licensee also

used a contractor to perform in-place filter testing and laboratory charcoal absorber analyses on the station's air cleaning systems. The inspector noted that an audit had been performed on the contractor who performed the in-place filter testing and laboratory charcoal absorber analyses. The audit was reviewed and found to be adequate.

The inspector reviewed the audits of REMP activities conducted since the previous NRC inspection in March 1990. Audits had been performed in 1991, 1992, and 1993. The inspector reviewed the audit schedules, procedures, and checklists and noted that the quality assurance audits were designed to determine compliance with the Technical Specifications, REMP, and System Chemistry procedures. The inspector also noted that the audit teams included qualified personnel knowledgeable in radiological environmental analytical activities.

The inspector verified that the audit findings were provided to management and corrective actions for the findings had been addressed and documented in a timely manner in accordance with quality assurance procedures. The inspector verified that the REMP audits appeared to be comprehensive and have sufficient depth to satisfy the requirements of Technical Specifications.

4.3.2 Conclusions

Quality assurance audits of the radioactive waste effluent program, radiological environmental monitoring program, and ODCM had been performed as required. These audits were comprehensive and satisfactory to evaluate the licensee's performance in implementing the radiological effluent programs and radiological environmental monitoring program. Audits of the contractors used to perform radioactive waste effluent program Technical Specification required surveillance analyses were performed as required.

4.4 Liquid Radioactive Waste Effluent

The inspector reviewed the liquid radioactive waste effluent program, including liquid waste processing, liquid waste sampling and analyses, procedures for control and release of radioactive liquid waste effluent, surveillance tests, liquid effluent instrumentation and radiation monitor tests, and calibrations to determine agreement with commitments in Chapter 11 of the USAR for both units and compliance with the requirements in Sections 3.25, 4.29, and 6.14 of the Technical Specifications for Unit 1; Sections 3, 4.11, and 6.4 for Unit 2; and the ODCM.

4.4.1 Discussion

The licensee's implementation of the radioactive waste effluent program and ODCM was reviewed to ensure compliance with sampling and analyses requirements, analyses sensitivities, analytical results, surveillance tests, radwaste operations procedures, offsite dose results from radioactive liquid effluent, and operational tests and calibrations of equipment and radiation monitors associated with the radioactive liquid waste processing systems.

Selected procedures governing the release of liquid radioactive waste effluent were also reviewed. These procedures provided for the following: recirculation and sampling of the radioactive liquid waste; chemical and radionuclide analyses prior to release; calculation of effluent release rate, effluent radiation monitor setpoints, projected offsite radionuclide concentrations, and offsite doses prior to release; recording of dilution parameters during the release; and verifying effluent discharge flow rates and effluent volume discharged.

The inspector reviewed a representative number of batch radioactive waste liquid release permits performed in 1992 and the first quarter of 1993. It was determined that the processing, sampling, and analyses of liquid radioactive waste effluent, and the approval and performance of batch liquid radioactive waste discharges, were conducted in accordance with Technical Specification and ODCM requirements. Quantities of radionuclides released in the liquid effluent were within the limits specified in the ODCM. Offsite doses were calculated according to the ODCM and were within Technical Specification limits. The inspector verified the licensee was performing the ODCM requirements for gross alpha analysis, strontium-89 and strontium-90 analyses, and iron-55 analysis on composite samples of batch liquid radioactive releases. The licensee had not made any major equipment or design modifications to the radioactive liquid waste management systems since the last NRC inspection in July 1991.

The inspector reviewed the liquid radioactive waste process and effluent radiation monitor source check, channel check, functional test, and calibration records. All records reviewed indicated that the radioactive liquid effluent monitoring instrumentation was being properly maintained, tested, and calibrated in compliance with ODCM requirements.

4.4.2 Conclusions

The licensee implemented a liquid radioactive waste effluent program in accordance with the Technical Specifications and ODCM. The quantities of radionuclides released in the liquid radioactive waste effluent were within the ODCM limits. Offsite doses to the environment, from the liquid radioactive waste effluents, were calculated using ODCM methodologies; and the dose results were within ODCM limits. No major equipment or design modifications were made to the radioactive liquid waste management systems. Liquid radioactive waste effluent instrumentation and radiation monitors were being tested and calibrated in compliance with ODCM requirements.

4.5 Gaseous Radioactive Waste Effluent (84750)

The inspector reviewed the licensee's gaseous radioactive waste effluent program including gaseous waste processing, gaseous waste sampling and analyses, procedures for the control and release of gaseous waste effluent, and gaseous effluent radiation monitors to determine agreement with commitments in Chapter 11 of the USAR for both units; and compliance with the

requirements in Technical Specifications 4.25, 4.29, and 6.14 for Unit 1 and Technical Specifications 3/4.11.2 and 6.14 for Unit 2; and the ODCM.

4.5.1 Discussion

Licensee's implementation of the radioactive waste effluent program and ODCM was reviewed to ensure compliance with sampling and analyses requirements, analyses sensitivities, analytical results, surveillance tests, radwaste operations procedures, offsite dose results from radioactive gaseous effluent, and operational tests and calibrations of equipment and radiation monitors associated with the radioactive gaseous waste processing systems.

Selected procedures governing the release of gaseous radioactive waste effluents were also reviewed. These procedures provided for the sampling and analysis of the radioactive gaseous waste effluent, calculation of effluent release rate, calculation of projected offsite radionuclide concentrations and doses, calculation and verification of gaseous effluent radiation monitor setpoints prior to release, recording of dilution parameters during the release, and verification of effluent discharge flow rates and effluent volume discharged.

The inspector reviewed selected radioactive gaseous waste release permits for 1992 and the first quarter of 1993. It was determined that the sampling and analyses of the gaseous effluent were conducted in accordance with procedures. Quantities of gaseous and particulate radionuclides released were within the limits specified in the ODCM. Offsite doses were calculated according to the ODCM methodologies and were within the required limits. Particulate effluent composite sample analyses for gross alpha, strontium-89, and strontium-90 had been performed and met ODCM requirements. It was determined that no major equipment or design modifications had been made in the radioactive gaseous waste management systems since the last NRC inspection in July 1991. Gaseous radioactive waste process and effluent instrumentation and radiation monitor source check, channel check, functional test, and calibration records were reviewed. All records indicated that the instrumentation and effluent radiation monitors were being properly maintained, tested, and calibrated in compliance with approved procedures and the ODCM requirements.

4.5.2 Conclusions

The licensee was implementing a gaseous radioactive waste effluent program in accordance with Technical Specifications and the ODCM. The quantities of radionuclides released in the gaseous radioactive waste effluent were within the ODCM limits. Offsite doses to the environment from the gaseous radioactive waste effluent were calculated using the ODCM methodologies, and the dose results were within ODCM limits. The licensee had not made any major equipment or design modifications to the radioactive gaseous waste management systems. Gaseous radioactive waste effluent instrumentation and radiation monitors were being tested and calibrated in compliance with the ODCM requirements.

4.6 Report of Radioactive Effluent

The licensee's reports concerning radioactive waste systems and effluent releases were reviewed to determine compliance with the requirements of 10 CFR Section 50.36(a)(2), Technical Specifications, and the ODCM.

4.6.1 Discussion

The inspector reviewed the licensee's semiannual effluent release reports for the periods January 1 through June 30, 1991; July 1 through December 31, 1991; January 1 through June 30, 1992; and July 1 through December 31, 1992. These reports were written in the format described in NRC Regulatory Guide 1.21, Revision 1, June 1974, and contained the information required by Technical Specifications and the ODCM. The licensee reported eight unplanned gaseous releases during the period reviewed. Six of the releases occurred in 1991; two occurred in 1992. Appropriate review of the unplanned releases were performed by the licensee. One effluent monitor was out of service in excess of Technical Specifications during the time period. This occurred during Refueling Outage 1R10 and was reviewed by the licensee in a condition report. The licensee's changes to the Process Control Program and ODCM, made during the period reviewed, were found to be properly documented in the appropriate Semiannual Radioactive Effluent Release Reports as required by Technical Specifications. The changes to the Process Control Program and the ODCM had received Safety Review Committee approval prior to their implementation. Minor design modifications were made to the radioactive waste effluent management systems. The design modifications received appropriate review before implementation.

4.6.2 Conclusions

The licensee submitted their Semiannual Radioactive Effluent Release Reports in a timely manner, and these reports contained all the required information presented in the format described in NRC Regulatory Guide 1.21. There were eight unplanned radioactive releases. Changes to the process control program and the ODCM had received appropriate approval prior to implementation and were properly documented.

4.7 Air Cleaning Systems

The inspector reviewed the air cleaning ventilation system testing program to determine compliance with Technical Specifications 3.9, 3.13, 3.15, and 3.2 for Unit 1 and Technical Specifications 3/4.7.6, 3/4.9.4, and 3/4.9.11 for Unit 2.

4.7.1 Discussion

The inspector reviewed the licensee's procedures, surveillance tests, and selected records and test results for maintenance and testing of the air cleaning ventilation systems, which contain high efficiency particulate air filters and activated charcoal absorbers. The inspector verified that the

licensee's procedures and surveillance tests provided for the required periodic functional checking of the ventilation systems' components, evaluation of the high efficiency particulate air filters and activated charcoal absorbers, and the replacement and in-place filter testing of the filter systems. Selected records and test results for 1992 and 1993 were reviewed. The in-place filter testing and activated charcoal laboratory tests were performed in accordance with approved procedures by a contract laboratory, and all test results were verified to be within Technical Specification limits. The inspector noted that the Technical Specification requirement for testing the various ventilation systems' activated charcoal absorber material prior to 720 hours of operation following previous laboratory testing was being tracked.

4.7.2 Conclusions

The air cleaning and filter ventilation systems conformed to the commitments in the USAR and Technical Specification requirements. The licensee's safety related ventilation systems had been tested in accordance with Technical Specification requirements, and all test results were within Technical Specification limits.

4.8 Radiological Environmental Monitoring Program

The licensee's REMP was reviewed to determine compliance with the requirements of Unit 1 Technical Specifications 4.30 and 6.12.2.5 and Unit 2 Technical Specifications 3/4 12 and 6.9.4.

4.8.1 Discussion

The inspector determined that the procedures for administration of the REMP, collection of environmental samples, and analytical analysis were written with sufficient detail to ensure Technical Specification compliance.

The inspector reviewed the annual radiological environmental reports for 1989, 1990, and 1991 and determined that the Technical Specification sampling and analysis requirements had been met. The inspector noted that the annual land use census conducted for 1989, 1990, and 1991 were timely and were included in the respective annual radiological environmental reports.

The inspector reviewed the licensee's ODCM and determined that minor changes had been made and approved by the ANO Safety Review Committee. Some of the changes were to update the status of the environmental monitoring sample locations, update the status of the monitors used by the radiological effluent release software, remove tables from the body of the ODCM, and add and delete some milk and food products sample stations in Table 4.1.

System Chemistry participates in the U.S. Environmental Protection Agency's (EPA) Environmental Radioactivity Laboratory Intercomparison Program. The inspector reviewed System Chemistry's results of the cross-check sample

analysis comparisons and found most of the results to be within the EPA's acceptance criteria of three standard deviations of the known values supplied by the EPA.

The Entergy Services, Inc.'s central laboratory facilities in Little Rock, Arkansas, were inspected, including the environmental sample receiving and storage areas, environmental sample preparation laboratory, radiochemistry laboratory, and the radiochemistry counting room. The laboratory areas were equipped with the necessary chemicals, labware, and analytical instrumentation to perform the required analytical procedures. The radiochemistry counting room appeared to be equipped with sufficient counting instrumentation to perform required Technical Specification surveillances. The central laboratory facilities, equipment, and supplies were adequate to accomplish the REMP laboratory requirements.

Selected environmental media sampling stations were also inspected. The required equipment was in place, calibrated, and operational at the time of the inspections. During the inspections, the inspector verified that the locations were as described in Table 4.1 of the ODCM.

The inspector reviewed the ANO Environmental TLD program. The licensee used a four element, two lithium-borate and two calcium-sulfate (Panasonic Model 802) type TLD. The licensee had approved procedures for the processing and dose reporting from environmental TLD badges. The inspector verified that the locations for the environmental TLD's were as described in Table 4.1 of the ODCM.

4.8.2 Conclusions

Annual radiological environmental reports contained the required information and indicated that Technical Specification sampling and analysis requirements had been met. Only minor changes that were properly approved were made to the ODCM. The System Chemistry laboratory used to perform the environmental analyses was well equipped to perform the required analytical procedures. Sampling and TLD locations were verified to be at the locations described in the ODCM.

4.9 Meteorological Monitoring Program

The inspector reviewed the licensee's meteorological monitoring program to determine compliance with the requirements of Unit 2 Technical Specifications 3.3.3.4 and 4.3.3.4, and the recommendations of NRC Regulatory Guides 1.23 and 1.97 and the American National Standards Institute-American Nuclear Society (ANSI-ANS) Standard 2.5-1984.

4.9.1 Discussion

The inspector inspected the meteorological tower and noted that the associated instrumentation appeared to be operating properly. The data recording equipment, calibration procedures, and calibration records were reviewed. The

inspector verified that the meteorological tower instrumentation was calibrated quarterly during 1990, 1991, and 1992.

4.9.2 Conclusions

The meteorological equipment operated properly and was calibrated at the required frequency.

4.10 Quality Control of Radiological Analytical Measurements

The System Chemistry program for calibration and quality control of radiological analytical measurements was reviewed to determine compliance with the requirements of Unit 1 Technical Specification 4.30, Unit 2 Technical Specifications 3/4.12, and the recommendations in Regulatory Guide 4.15.

4.10.1 Discussion

The inspector reviewed the System Chemistry quality control procedures, counting instrument's calibration data and performance check data, and other documentation of instrument performance. The inspector observed several performance checks. The quality control procedures and the data and records associated with the quality control of the counting instrument appeared to be adequate.

The licensee used a contractor to perform sampling of fish, bottom sediment, and milk from some locations. All analyses of the ANO environmental media samples were performed at the Entergy Services, Inc. System Chemistry central laboratory in Little Rock, except for the TLDs, which were processed by ANO staff onsite. The licensee's audit program for contractor activities associated with the REMP appeared adequate.

The inspector reviewed the licensee's event reports and the 1989, 1990, and 1991 Annual Radiological Environmental Monitoring Reports for reportable occurrences dealing with the REMP to determine compliance with reporting requirements of Unit 1 Technical Specification 6.12 and Unit 2 Technical Specification 6.9. The inspector found no reportable events.

4.10.2 Conclusions

Quality control procedures and quality control of the counting instruments were good.

5 MONTHLY MAINTENANCE OBSERVATION (62703)

Station maintenance activities for the safety-related systems and components listed below were observed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, and industry codes or standards and in conformance with the Technical Specifications.

5.1 Unit 2 - Troubleshooting Hydrogen Recombiner 2M-55A

On April 15, 1993, troubleshooting was performed on Hydrogen Recombiner 2M-55A to determine the reason it would not load above 46 KW. Previous failures were found to be caused by blown fuses in the control cabinets for the hydrogen recombiners. Troubleshooting was performed in accordance with instructions specified in JO 00892651.

The inspector witnessed the troubleshooting work on Hydrogen Recombiner Power Cabinet 2C-181, which was located in the Unit 2 controlled access area outside the reactor building personnel hatch. The interior of the cabinet was clean and easily accessible. A health physics technician surveyed the area prior to the electrical maintenance personnel working in the cabinet. The cover to the power cabinet was removed and the power cabinet circuitry was checked for voltage and resistance. In addition, the fuses, which were the cause for the previous failures, were examined. Maintenance personnel determined that the fuses were intact and the circuitry was functioning properly. Quality control personnel witnessed the troubleshooting activity.

5.2 Conclusions

Even though the licensee did not find the source of the problem during the initial troubleshooting of the fuses and circuitry, the observed maintenance activities were appropriate. Further troubleshooting activities were planned.

6 BIMONTHLY SURVEILLANCE OBSERVATION (61726)

The inspectors observed the Technical Specification required surveillance testing on the systems and components listed below and verified that testing was performed in accordance with Technical Specifications and the licensee's implementing procedures.

6.1 Unit 2 - Control Element Assembly (CEA) Exercises (JO 00889502)

On March 9, Procedure 2105.009, Revision 14, "CEDM Control System Operations," Supplement 2, was performed. This procedure compared the CEA position on the control board pulse counter and the new plant computer pulse counter outputs for proper agreement. Because of previous CEA position indication channel failures, the licensee proposed the use of the new plant computer as an alternate means of providing CEA position indication.

The new plant computer and the Critical Applications Program System computer received the same CEA pulse input signals. The pulse counter display on the main control board received CEA position information from the Critical Applications Program System computer. The new plant computer provided an equivalent means of displaying CEA position indication using the display screen in the control room. Comparison testing performed during the CEA exercise confirmed that the new plant computer was an acceptable alternative

for displaying the CEA position indication. The CEA exercise performed in conjunction with the comparison was performed carefully and in a conscientious manner.

6.2 Unit 1 - Emergency Feedwater Initiation and Control (EFIC) Channel C Monthly Test (JO 00889868)

Procedure 1304.147, "Unit 1 EFIC Channel C Monthly Test," Revision 10, was performed on March 17. EFIC Channel C was placed in maintenance bypass position and a monthly test on the trip bistable setpoints was performed.

During performance of Step 8.3.4, Section H, for the Steam Generator B bypass permissive, the step required the technician to mark Steps 1 and 2 of Section H not applicable if Channel C was in steam generator pressure bypass. The technician incorrectly noted the steps as not applicable; however, before performing Section I of the procedure, the technician realized that Channel C was not in steam generator bypass. The technician then correctly performed Steps 1 and 2. No impact to the plant occurred.

The technician held the Steam Generator B pressure bypass permissive bistable test button and adjusted the test level potentiometer until the bistable just tripped. Because the test level potentiometer was not turned sufficiently below the bistable setpoint, the steam generator low pressure indicator light flickered rather than illuminated solid as expected. The technician alertly stopped the test and consulted with his supervisor. The supervisor stated that an identical situation occurred in previous surveillance tests and suggested that the step be reperformed starting with Section F, with care being taken to go past the bistable setpoint. The technicians reperformed the tests, in accordance with the applicable steps, and the surveillance was successfully completed. No operability or safety concerns were identified.

6.3 Conclusions

For the most part, test activities were observed to be carefully performed in accordance with instructions. In one case, a technician incorrectly noted steps as not applicable. However, the error was corrected prior to proceeding with the testing. While the licensee recognized and corrected the error, the lack of care in making initial-signoffs was considered to be a weakness.

7 THREE MILE ISLAND ACTION PLAN REQUIREMENT FOLLOWUP (TEMPORARY INSTRUCTION 2515/65-01)

7.1 (Closed) Units 1 and 2 Three Mile Island Action Item III.D.3.4, "Control Room Habitability"

Action Item III.D.3.4 required that "licensees shall assure that control room operators will be adequately protected against the effects of accidental release of toxic and radioactive gases and that the nuclear power plant can be safely operated or shutdown under design basis accident conditions."

A previous review of this item was documented in NRC Inspection Report 50-313/92-13; 50-368/92-13. Based on the Safety Evaluation performed by the Office of Nuclear Reactor Regulation on February 12, 1982, it was determined that Unit 2 satisfied the requirements of Action Item III.D.3.4 and that Unit 1 would satisfy the requirements of Action Item III.D.3.4 when the Unit 1 Technical Specifications had been modified so that the existing chlorine detection system was equally effective whenever either Unit 1 or 2 was at power.

The Unit 1 Technical Specifications have been modified to address these requirements in response to the safety evaluation performed by the Office of Nuclear Reactor Regulation; therefore, this item is closed for both Units 1 and 2. Further, all Three Mile Island action plan requirement followups are complete as described in Temporary Instruction 2515/65-01.

8 FOLLOWUP ON CORRECTIVE ACTIONS FOR VIOLATIONS AND DEVIATIONS (92702)

8.1 (Closed) Violation 368/8319-01: Failure to Meet Record Retention Requirements

A review of all NRC inspection reports was conducted by the licensee to ensure that all commitments were implemented and to ensure clear documentation existed for the closure of open items. Clear documentation did not exist for closure of this violation, which involved the failure of the licensee to retrieve for review by the NRC inspector the meteorological instrumentation surveillance records. The inspectors, during an inspection of the licensee's radiological environmental monitoring program this inspection period, asked for and received copies of the meteorological instrumentation surveillance records. There was no problem in retrieving these records. Therefore, this violation is administratively closed.

8.2 (Closed) Violation 313/8918-01: Use of Wrong Grease on High Pressure Injection Pump Coupling

The licensee, after reviewing their records, could not identify whether this violation had been closed. This violation was reviewed and left open in NRC Inspection Report 50-313/89-46; 50-368/89-46 with a reference to a planned inspection of the licensee's program for lubrication of pump couplings to be performed by the resident inspector.

A similar problem was identified by the licensee on Unit 2 and reviewed in NRC Inspection Report 50-313/90-05; 50-368/90-05, Section 4.6. A nonlicensed operator identified that the wrong oil was added to the gear box of Sodium Hydroxide Addition Pump 2P-136B. In conjunction with the review of that event, the inspector comprehensively reviewed the lubrication program and identified weaknesses in the program for storage of lubricants and control of database information related to lubricants for subassemblies. The licensee committed to additional corrective actions to address these weaknesses.

Inspection Followup Item 313/9005-02; 368/9005-02 was written to broaden the scope of the issue to two units and ensure inspection was performed pertaining to the implementation of the additional commitments. The control of lubrication products and processes was again inspected and documented in NRC Inspection Report 50-313/91-12; 50-368/91-12 where the Inspection Followup Item 313/9005-02; 368/9005-02 was closed. Based on the combination of the referenced inspections, this violation is administratively closed.

9 FOLLOWUP (92701)

9.1 Followup of Previous Inspection Findings

9.1.1 (Closed) Inspection Followup Item 313/8404-01;368/8404-C1: Measures to Prevent Compromise of Safeguards Information

The licensee, after reviewing their records, could not identify whether this inspection followup item had been closed. This inspection followup item involved commitments made by the licensee to prevent compromise of safeguards information. Inspection in the appropriate program area was conducted and documented in NRC Inspection Report 50-313/88-12; 50-368/88-12, paragraph 10, with no problems identified. The historical NRC tracking systems were reviewed, but clear closure documentation was not easily identified. This item was discussed with the Region IV security specialist, and it was determined to be acceptable to document closure of this item based on the inspection conducted in 1988. This item is closed.

9.1.2 (Closed) Unresolved Item 313/8928-02: Seismic Gap with Missing Caulk

The licensee, after reviewing their records, could not identify whether this unresolved item had been closed. This unresolved item was closed in NRC Inspection Report 50-313/90-05; 50-368/90-05, paragraph 3.3. However, due to a typographical error, the issue was not documented as closed. This item is closed.

9.1.3 (Closed) Inspection Followup Item 313/9009-01;368/9009-01: Followup on Root Cause and Corrective Action on Failed Valve 2CV-5091

This item involved followup of the licensee's disposition and corrective actions for Low Pressure Safety Injection Flow Control Valve 2CV-5091 as documented on Condition Report 2-90-0134. The licensee's disposition and corrective actions were reviewed and documented in NRC Inspection Report 50-313/91-17; 50-368/91-17. The item remained open pending further review of two outstanding items: the performance of an engineering evaluation to consider adding thrust collars to Valves 2CV-5091 and 2CV-5093 and the performance of an overhaul of these valves with a matched parts set consisting of disk, shaft, and taper pins. Valve 2CV-5093 was included because it was identical in design to Valve 2CV-5091. JO 00845259 was initiated to overhaul the valves. An engineering evaluation was performed and Plant Change 91-8011 was initiated to add thrust collars to the valves. However, based on the small probability of failure of the valves and the associated expected high

radiation dose rate, JO 00845259 and Plant Change 91-8011 were postponed until such time that failure of the valves occur or corrective maintenance is required for the valves.

A review of USAR, Section 6, and Low Pressure Safety Injection System Piping and Instrument Drawings revealed that, in the event of accidental closure or failure of flow control Valve 2CV-5091, a manual bypass Valve 2SI-5091-3 was provided in parallel with Valve 2CV-5091 to ensure full flow in the event of a loss of coolant accident. A similar configuration existed for Valve 2CV-5093. Therefore, postponing JO 00845259 and Plant Change 91-8011 was acceptable.

Based on review of Condition Report 2-90-134, NRC Inspection Report 50-313/91-17; 50-368/91-17, Unit 2 USAR, Section 6, Plant Change 91-8011, and JO 00845259 this item is closed.

9.1.4 (Closed) Inspection Followup Item 313/9010-02; 368/9010-02: Service Water Bay Level Instrumentation

During an inspection of the service water (SW) system in May 1990, the inspectors observed that the Unit 1 SW bay level monitoring instrument was upgraded. The inspectors noted that the licensee had not developed test or calibration procedures for the new instruments. In addition, the inspectors noted that an Engineering Action Request (EAR-89-391) was initiated to determine if the Unit 2 SW bay level instruments should also be upgraded. Based on this, a followup action was established to review the licensee's actions related to testing and calibrating the Unit 1 instruments and the evaluation of upgrading the Unit 2 instruments.

In July 1991, a followup inspection of the SW bay level instruments was conducted. During this inspection, the inspectors found that the Unit 1 procedures still had not been developed. A probablistic risk analysis had been performed, which indicated that upgrading the Unit 2 instruments would provide only limited safety enhancements. The inspectors noted that upgrading the instruments was assigned a lower priority than other planned modifications. This item was kept open pending completion of the licensee's actions to implement appropriate procedures and determine the long-term status of the Unit 2 instruments.

During this inspection, the inspectors found that a procedure was developed for the calibration, inspection, and testing of the Unit 1 SW bay level instrumentation. Procedure 1413.275, Revision 1, "Service Water Bay Level Switch Calibration Check and Inspection," was reviewed and found to contain steps for the performance of preventive maintenance activities for the bay level detectors and the bay level monitor and alarm. The inspectors concluded that the procedure was sufficient for calibration and testing of the level instrumentation.

Licensing Information Request L92-0085 requested the results of the probablistic risk analysis study concerning the adequacy of the Unit 2 SW bay level instrumentation. The response to the licensing information request

dated February 18, 1993, stated that the Unit 2 instrumentation did not need to be replaced since no modifications were required to further reduce the core melt frequency involving loss of SW bay level.

Based on the review of the issue and applicable plant procedures, the licensee decided to make changes to Units 1 and 2 procedures that addressed the specific issue of the loss of SW bay level instrumentation. Unit 1 operating procedures were in the process of being revised to add statements that Unit 1 operators shall notify Unit 2 of SW bay low level and of traveling water screen trouble. Unit 2 procedures were currently being revised to notify the Unit 1 operators of Unit 2 SW bay water level problems and to check with Unit 1 if Unit 2 instrumentation was lost. The inspectors found the actions taken by the licensee were acceptable; therefore, this item is closed.

9.1.5 (Open) Inspection Followup Item 368/9010-03: Service Water System (SWS) Water Hammer Study

In December 1989, the NRC Diagnostic Evaluation Team questioned the adequacy of a licensee study of Unit 2 SWS water hammer events. The licensee committed to reassess the water hammer phenomenon and take any required corrective actions. In May 1990, a scoping report concluded that the potential for significant water hammer existed in the SWS of both units. However, the licensee determined that detailed hydraulic modeling was necessary to compare the potential water hammer forces to forces generated by a design basis seismic event to identify any cases where the potential water hammer forces exceed the design seismic forces. This item was reviewed in NRC Inspection Report 50-313/92-11; 50-368/92-11 and left open pending the completion of the hydraulic model.

During this inspection, the inspectors reviewed Entergy Memorandum ANO-93-00578, dated March 9, 1993, titled "Scope of SWS Water Hammer Analysis." This memorandum discussed the original scope of the water hammer modeling and analysis that was completed by Bechtel and which was currently in the process of being checked. The original scope included water hammer modeling and analysis of the SWS in the engineered safeguards lineup. In addition, the licensee stated that the scope of the modelling was being expanded to include three water hammer cases that were in the design and licensing basis. These three additional cases included loss of offsite power without a loss of coolant accident, surveillance testing induced water hammers, and a coincident loss of offsite power with a loss of coolant accident scenario.

During a discussion with the inspectors, the licensee stated that the complete analysis and scoping report and a long-term corrective action plan would be completed by December 1993. This item remains open pending completion of the water hammer study.

9.1.6 (Closed) Inspection Followup Item 368/9010-04: Verification of Continued Proper Implementation of SW System Flushing Activities

During an inspection of the SW system in May 1990, the inspectors reviewed the licensee's response to NRC Information Notice 88-37, concerning flow blockage of cooling systems due to biofouling. The licensee responded by stating that biofouling could occur and not be detected due to stagnant water in portions of the system piping which were not routinely flushed or flow tested. The report determined that a number of Unit 2 radiation monitors were not included in the routine flow testing and flushing program. The report recommended that flow testing of these monitors be added to the flow test procedure.

In April 1990, a flow test was performed on Radiation Monitor 2RE-1525. It was found that there was virtually zero flow occurring. This was due to blockage from a live Asiatic clam. The licensee determined that the clam larvae entered the system and became isolated in the monitor during a period when the chlorination system was not operating. The inspectors reviewed the service water integrity program dated April 1990 to determine if the radiation monitors were included in the 6-month flushing program and found that they were not included. The inspectors did find that SW flow test Procedure 2311.002, Revision 6, required that flow was to be measured through the radiation monitors. This inspection followup item was opened to insure continued proper implementation of SW system flushing activities.

During this inspection, the inspectors found that mandatory preventive maintenance Task 018178 for Loop 1 SW and 017184 for Loop 2 SW were developed to monitor and maintain small coolers and radiation monitors on the Unit 2 SWS. The preventive maintenance tasks were performed at least once every 24 weeks. This was documented in the SW repetitive tasks Table 3 in the Service Water Integrity Program dated March 30, 1993. The purpose of the mandatory preventive maintenance tasks was to determine the flow rate through the components and compare it with the most recent SW flow test. The SW flow test was performed in accordance with Procedure 2311.002 during each refueling outage. The test results from the flow test were used as the baseline for determining whether the flow rate determined from the preventive maintenance test was acceptable. In addition, Chemistry Procedure 1618.029 monitored the SWS for the effectiveness of the bromination system used in treating the system. The procedure required sampling of various points within the system and specified minimum residual concentration requirements. The inspectors considered that the licensee had a program in place to adequately implement SW flushing activities, therefore, this item is closed.

9.1.7 (Open) Inspection Followup Item 313/9011-01: Upgrade of Technical Specification Battery Test Requirements to Current Standards

This item remained open pending resolution of a technical issue. Discussions to resolve the issue as a part of the development of revised Standard Technical Specifications are scheduled for May 7, 1993. This item remains open.

9.1.8 (Closed) Unresolved Item 368/9213-02: Core Operating Limit Supervisory System (COLSS) Monthly Operability Surveillance Requirements

A review was performed of the licensee's procedures implementing certain COLSS azimuthal power tilt Technical Specification surveillance requirements to determine if a problem existed similar to that identified on Waterford 3 LER 50-382/92-001-01.

Procedure 2312.001, Revision 4, "COLSS Monthly Operability Test," was reviewed to verify that the requirements of Technical Specification 4.2.3.c were met. Review of the procedure and interviews with computer support personnel confirmed that COLSS software as well as the annunciator hardware were functionally tested. However, a requirement for direct comparison between the COLSS azimuthal power tilt alarm setpoint and the core protection calculator azimuthal power tilt allowance was not incorporated into procedures.

The licensee stated that other Combustion Engineering plants viewed the intent of their surveillance requirements similar to Surveillance Requirement 4.2.3.c to be restricted to a functional test. This position was reviewed by the NRC technical staff and was determined to be appropriate. This item is closed.

9.1.9 (Closed) Inspection Followup Item 313/9303-01: Emergency Feedwater Pump Turbine Inoperability as a Result of Limit Switch Compartment Flooding

On February 15, dual indication for Emergency Feedwater Pump Turbine Steam Admission Valve CV-2663 was observed by the operators. During troubleshooting, 1/2 gallon of condensate was found in the limit switch compartment of the Limitorque valve operator for this valve. The licensee determined that the source of condensate was a small steam leak which had existed for 4 months. The valve was located in the main steam isolation valve penthouse. Temperatures in this room dropped as low as 40°F during the winter months. The licensee theorized that the leak was large enough to envelope the actuator in 100 percent humidity without warming the actuator sufficiently to prevent condensation. Following the dual indication observation, the steam leak was promptly repaired.

Based upon additional analysis, the licensee now believes that, due to this condition, the emergency feedwater pump turbine governor valve control circuit interlock could have malfunctioned, making the pump vulnerable to an overspeed trip if it had been called upon to function. As a result, the licensee considered the pump inoperable for an estimated 5 to 21 hours. While the licensee was unaware that the emergency feedwater pump turbine was inoperable, the licensee's prompt repair following the identification of the dual indication returned the emergency feedwater pump to operable status within the allowed outage time of Technical Specification 3.4.4. The licensee considered that all reasonable expectations were met in the initial evaluation and subsequent monitoring of the steam leak for Valve CV-2663 given the

information known at that time. The licensee planned to review this issue with all personnel so that they will be sensitive to the potential impact of plant steam leaks.

The environmental qualification (EQ) report for the actuators addressed the limit switches in terms of their effect on valve actuation during harsh environment conditions that would be caused by a steam line break in the area. The leakage current caused by water buildup in the casing as the result of the EQ testing was insufficient to cause inadvertent interlock actuation or the needed interlock actuation would occur immediately after the accident and, therefore, would not have been affected by a condensate buildup condition that could have occurred after several hours into the accident. Therefore, the actuators were determined to meet the requirements of 10 CFR Section 50.49. The licensee reviewed other applications of Limitorque actuator limit switches that were used in interlock circuitry and confirmed that the remaining interlock applications were acceptable.

Further review by the licensee determined that limit switch compartments on Limitorque DC actuators were not designed to drain. The limit switch compartments on the Limitorque AC valve actuators were designed to drain through the wireway to the actuator compartment which has the ability to drain if oriented vertically. ANO does not have controls on orientation of installed actuators. A Limitorque evaluation determined that other orientations would be acceptable, but small puddles of water may form and, as a result, recommended the installation of drains. The licensee identified the lack of installed drains as a contributing cause to this issue and plans to install limit switch compartment drains on both steam admission valves. The licensee also planned to evaluate other Limitorque actuators in the valve testing program to determine if low point drains should be installed in the limit switch compartments.

Because minor steam leaks are expected during plant operation, the failure to design for an environment which had the potential for introducing condensate into the limit switch compartment was considered to be a deviation from the licensee's commitment for the general design of the facility (313/9304-01).

9.2 Items of Regional Interest

9.2.1 Condensate Pump Suction Strainers

During a review of Drawing M204, Sheet 1, the inspector observed a note which indicated that the suction strainers on the condensate pumps were intended to be temporary and be removed following construction. The licensee stated that the system engineers had made a conscious decision to leave the strainers in place and that they were cleaned during the last refueling outage. The licensee planned to correct the drawing error using Drawing Revision Notice 93-01998.

9.2.2 Review of Condition Report C-93-0024

Condition Report C-93-0024 involved the investigation of the transportation event detailed in NRC Inspection Report 50-313/93-03; 50-368/93-03. The event was the buckling of a trailer while transporting the reactor coolant pump rotating element and cover. The investigation was to determine the cause of the failure of the trailer prior to reshipping the parts.

The investigation was thorough and determined that the root cause of the trailer buckling was that the concentrated weight limit of the trailer was exceeded. The investigation noted that it was the driver's responsibility to ensure that the load was properly placed to distribute the load evenly. A lack of training on weight distribution requirements for transport vehicles for the individuals responsible for loading radwaste shipments at ANO was considered to be a contributing factor. The report identified the following additional concerns: the weight provided for the pump cover container was the empty container instead of the loaded container weight, the additional weight of the lead blankets was not accounted for on the bill of lading, and the radioactive shipment was not video-taped.

The investigation also recommended corrective actions to prevent recurrence. The recommended corrective actions included conducting training for all radwaste personnel on proper weight distribution and loading of radioactive shipments. Discussions with the licensee's staff indicated that a vendor presented the training and that it was well received.

The first shipment contained two containers. The licensee now plans to ship containers separately.

10 ONSITE FOLLOWUP OF LERS (92700)

10.1 (Closed) LER 313/90-008: "Control Room Wall Not Seismically Qualified Due to Personnel Error Involving Installation Acceptance of a Blockout Construction"

This LER concerned the south wall of the Unit 2 control room, which was determined to be not seismically qualified due to the absence of structural reinforcement. The licensee determined the root cause of the problem to be an error on the part of the lead installation field engineer in accepting the installation of a nonreinforced wall during the construction.

The inspectors reviewed Condition Report (CR) 1-90-0311, dated August 9, 1990, which contained an operability assessment. The CR listed the equipment considered inoperable due to the wall not being seismically qualified. The condition report also contained the corrective actions required to seismically qualify the wall and called for a review of generic implications. The immediate corrective action consisted of repairing the wall. The modification was performed in accordance with Limited Change Package 90-5040, dated August 9, 1990, "Control Room Block Wall Modification."
Calculation 90-E-0059-01, dated August 8, 1990, was prepared to seismically

qualify the block wall modification. The inspectors considered the modification to be acceptable.

The inspectors considered that the licensee's corrective actions adequately addressed the event; therefore, this licensee event report is closed.

10.2 (Closed) LER 313/90-020: "Design Deficiency Results in Potential for Structural Damage or Failure of Containment Polar Crane During Design Basis Accident Conditions"

This LER involved the failure to perform an analysis of the Unit 1 containment building polar crane to determine if it could withstand the effects of a rapid increase in containment pressure during a loss of coolant accident. Condition Report 1-90-553 was initiated, and an engineering evaluation was performed by the vendor.

Based on the evaluation, it was determined that, due to inadequate venting, a large differential pressure across the crane's bridge girders might cause the girders to yield or collapse, allowing the crane structure to fall from its stored position.

Limited Change Package 90-5055 and JO 00829495 were initiated to add vent holes to the crane bridge girders, trolley sides, and end trucks. The work was completed prior to plant heat up following Refueling Outage 1R9. A 5-ton load limit was imposed on the crane due to the addition of the vent holes. Subsequently, during Midcycle Outage 1M9, 6-inch diameter sleeves were fitted and welded into the crane's vent holes. All modifications to the crane were inspected and reviewed by the vendor. The original design load rating of 150 tons was re-established.

Based on review of CR 1-90-553, Limited Change Package 90-5055, JO 00829495, and JO 00830982, this LER is closed.

10.3 (Closed) LER 368/90-020: "Failure of Motor Operated Valve on Main Condenser Circulating Water Pump to Close Results in Loss of Vacuum and Subsequent Manually Initiated Reactor Trip"

This LER involved a failure of Circulating Water Pump 2P-3B Discharge Valve 2CV-1215 to automatically close when securing the pump. This allowed a flowpath for circulating water flow to bypass the main condenser which resulted in high condenser pressure and a subsequent reactor trip.

CR 2-90-0438 was initiated, and the cause for the failure of the valve to close was determined to be a mechanical key which disengaged from the motor shaft, allowing the motor pinion gear to turn freely on the shaft. Vibration had loosened the setscrew used to secure the key. Due to inadequate work instructions, the setscrew that was previously installed was too small to allow proper lockwiring. A contributing factor to the event was that the operator failed to follow the procedural instructions as written for securing Circulating Water Pump 2P-3B, which resulted in a premature trip of the pump.

Operations personnel manually closed the discharge valve and cooling water was restored to the main condenser. The plant was stabilized in a hot standby condition. The motor pinion gear key for Valve 2CV-1215 was replaced and an adequate setscrew was installed. Procedure 1403.040, Revision 4, "Unit 1 & Unit 2 MOVATS Testing & Maintenance of Limitorque SMB-0 Thru 4 Actuators," was revised to insure a proper selection of an adequate setscrew. The event was discussed with the operations staff, and additional training was provided on proper operation of the circulating water pumps.

Based on review of CR 2-90-0438 and Procedure 1403.040, this LER is closed.

10.4 (Closed) LER 368/91-008: "Control Room Ventilation Isolation caused by Emergency Diesel Generator Exhaust Fumes in the Intake Air Duct"

This LER involved a control room ventilation isolation due to actuation of a smoke detector in the supply air duct. The source of the smoke was from the exhaust of an emergency diesel generator undergoing a test run. The normal lineup for the control room ventilation was in the recirculation mode, but, due to the chilled water system being out of service combined with the failure of one of the emergency air conditioning compressor condensing units, the ventilation system was aligned to allow outside air circulation.

CR 2-91-0166 was initiated and the root cause of the control room ventilation isolation was attributed to the design and location of the diesel generator exhaust.

Based on review of Condition Report 2-91-0166 and applicable documentation, this LER is closed.

10.5 (Closed) LER 368/91-013: "Fire Watches Released From Inoperable Fire Barriers Due to Inadequate Documentation Concerning Posting Requirements"

This LER involved the premature release of firewatches, who were posted at inoperable fire barriers due to inadequate documentation concerning posting requirements. The fire barriers were located in the lube oil tank room, lube oil reservoir room, both battery rooms, and the control room. After the error was discovered, CR 2-91-0362 was initiated and 1-hour roving fire watch posting was re-established. The fire watch request forms for the affected barriers were revised to prevent recurrence of the event.

Based on review of CR 2-91-0362, this LER is closed.

11 INOFFICE REVIEW OF LERs (90712)

The following LERs were reviewed and it was determined that additional reactive inspection effort or other NRC response was not warranted. The corrective action plans appeared appropriate.

11.1 (Closed) LER 368/90-006: "Procedural Deficiencies Cause Nuclear Instrumentation Channels to be Declared Inoperable Resulting in a Manual Actuation of the Reactor Protection System and Cause the Performance of Inadequate Channel Functional Tests"

(Closed) LER 368/90-015: "Personnel Errors Result in an Incorrect Procedure Revision Which Caused the Performance of an Inadequate Channel Functional Test on the Logarithmic Power Level Nuclear Instrumentation Channels Prior to a Reactor Startup"

These LERs both dealt with inadequacies in nuclear instrumentation channel functional test procedures. The problem was initially corrected using a temporary change. However, because of a personnel error, the permanent revision did not fully implement the corrections. As a result, the problem recurred. The appropriate procedures were corrected. These items are closed.

11.2 (Closed) LER 368/90-014: "Automatic Reactor Trip Due to an Erroneous Control Element Assembly Position Indication and Subsequent Penalty Factor Generated by the Control Element Assembly Calculator"

The licensee continued to have problems with noisy CEA position indication circuitry. Personnel training, installation of a high range dead band to block spurious rod position high signals, and installation of appropriate temporary modifications as reed switch position transmitters fail have successfully prevented additional reactor trips. The licensee plans to instrument the control rod drive mechanism nozzles during Unit 2 Planned Outage 2P-93-01 with thermal elements. The temperature data will be used to evaluate the cooling to the nozzles to determine whether modifications to the cooling system could increase the longevity of the reed switch position transmitters. The licensee planned to change out the transmitters after the cooling system concerns have been resolved. This item is closed.

11.3 (Closed) LER 313/90-021: "Reactor Shutdown Required by Technical Specification Due to Unisolable Leak In a Pressurizer Nozzle Which Was Caused by Pure Water Stress Corrosion Cracking"

The installation of the initial repair was evaluated in NRC Inspection Report 50-313/90-50; 50-368/90-50. The planned repair was also evaluated by the Office of Nuclear Reactor Regulation prior to installation and found to be acceptable for one cycle. The repair was later approved as a permanent repair, provided a monitoring program with a nondestructive examination technique demonstrated to be effective in evaluating pressurizer base metal corrosion was implemented. The safety evaluation was issued on May 13, 1992. No additional reviews are planned at this time. This item is closed.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

D. Boyd, Licensing Specialist
B. Eaton, Design Engineering Director
R. Edington, Unit 2 Plant Manager
M. Harris, Unit 2 Maintenance Manager
L. Humphrey, Quality Director
M. Sellman, General Manager
C. Turk, Nuclear Engineer Design Manager
C. Zimmerman, Operations Manager

1.2 NRC Personnel

L. Smith, Senior Resident Inspector
K. Weaver, Engineering Aide

The personnel listed above attended the exit meeting. In addition to the personnel listed above, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on April 20, 1993. During this meeting, the inspectors reviewed the scope and findings of the inspection as detailed in this report. The inspector reviewed proprietary environmental qualification test results associated with Limitorque valve actuators; however, this information is not included in this report.