

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-313/90-39  
50-368/90-39

Operating Licenses: DRP-51  
NPF-6

Dockets: 50-313  
50-368

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

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

Inspection At: ANO Site, Russellville, Arkansas

Inspection Conducted: October 29 through November 2, 1990

Inspector:

*R. E. Baer*  
R. E. Baer, Senior Reactor Health Physicist  
Radiological Protection and Emergency  
Preparedness Section

*11/29/90*  
Date

Approved:

*Blaine Murray*  
B. Murray, Chief, Radiological Protection and  
Emergency Preparedness Section

*11/29/90*  
Date

Inspection Summary

Inspection Conducted October 29 through November 2, 1990 (Report 50-313/90-39;  
50-368/90-39)

Areas Inspected: Routine, unannounced inspection of the licensee's occupational radiation protection program activities during the Unit 1 refueling outage (1R9).

Results: Within the areas inspected, two violations and no deviations were identified (failure to perform adequate surveys and to keep individuals informed of radiation in the restricted area, paragraph 7).

The organization structure, management controls, staffing levels, and upper management support of the radiation protection program appeared adequate.

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Facilities for controlling personnel exiting the radiologically controlled areas (RCAs) were marginal as were the controls in the turbine building around the Unit 1 turbine generator which are contaminated with radioactive material.

Contract health physics (HP) technicians need to increase their hot particle awareness.

The respiratory protection program appears adequate.

## DETAILS

### 1. Persons Contacted

#### ANO

- \*J. W. Yelverton, Director, Operations
- \*D. W. Akins, Superintendent, HP
- H. N. Bishop, Radwaste Supervisor
- \*D. W. Boyd, Licensing Specialist
- O. Cypert, Senior HP Specialist
- \*R. A. Fenech, Plant Manager, Unit 2
- \*J. J. Fisicaro, Manager, Licensing
- \*R. E. Green, Dosimetry Supervisor
- \*L. W. Humphrey, General Manager, Quality
- \*G. T. Jones, General Manager, Engineering
- \*R. J. King, Supervisor, Licensing
- \*D. B. Lomax, Superintendent, Engineering Programs
- \*D. J. Moss, Radiation Protection/Radwaste Manager
- \*T. W. Nickels, Superintendent, Radwaste
- S. P. Robinson, Supervisor, ALARA
- T. M. Rolniak, Lead Trainer, HP
- \*R. A. Sessoms, Plant Manager, Central
- \*D. D. Snellings, Technical Assistant, HP
- \*J. D. Vandergrift, Plant Manager, Unit 1
- \*D. J. Wagner, Supervisor, Quality Assurance
- J. R. Waid, Supervisor, Technical Support Training

#### Others

- \*L. Smith, Resident Inspector, NRC
- \*C. Warren, Senior Resident Inspector, NRC

\*Denotes those individuals present at the exit meeting conducted on November 2, 1990.

The inspector also interviewed several other licensee and contractor employees, including HP, chemistry, maintenance, and training personnel.

### 2. Advanced Planning, Preparation, and Staffing (83750)

The inspector reviewed the outage planning and preparations performed by the licensee, including: increased clothing, respiratory protective equipment, temporary shielding, instrumentation, and other job related HP considerations.

The inspector reviewed radiation work permits (RWPs), discussed outage planning with licensee representatives and observed work activities to verify that job specific planning and preparations were taking place. The

licensee had provided two ALARA planners and two ALARA schedulers to improve work activities between HP and other departments.

The licensee had augmented the permanent radiation protection staff with approximately 120 contract HP technicians. The inspector reviewed the resumes of the contract technicians and discussed work experience with others. About 75 percent of the technicians were ANSI/ANS 3.1-1978 qualified senior technicians and the remainder junior technicians.

No violations or deviations were identified.

### 3. Training and Qualifications (83750)

The inspector reviewed the licensee's training and qualification program to determine compliance with the requirements of Unit 1 Technical Specifications (TS) 6.3 and 6.4 and the recommendations of Industry Standard ANSI/ANS 3.1-1978.

The licensee's procedure for the selection of contract HP technicians includes a comprehensive written screening examination. The examination is given to both junior and senior level technicians. The individual's resume is also evaluated to determine that the 3 years of experience requirement is fulfilled.

The contractor technician attends formal training, as necessary, for site specific radiation protection, respiratory protection, emergency plan, and station procedures. The individual is required to complete a competency evaluation and verification which covers: control point functions, instrument and respiratory protection equipment issue, radiological surveys, general job coverage, and special job coverage prior to independent plant assignment.

The inspector discussed with licensee representatives the respiratory protection equipment training provided to contractor technicians. This training consists of a review of respiratory protection requirements and a qualification examination. The licensee's procedures allow for other methods besides formal classroom training, but procedures do not specifically address a combination of lectures and a proficiency examination. The inspector noted the proficiency examination is the same as that administered for General Employee Training 3/3A respiratory protection training. The licensee acknowledged the inspector's observation and stated that they would review their procedures to clarify training provided to contractor HP technicians.

The inspector also noted during observation of work practices that contractor HP technicians did not always demonstrate hot particle awareness during routine surveys. The licensee does not provide any additional training to heighten the technicians' awareness concerning hot



particles or precautions necessary while performing or accessing radiological surveys. This matter was discussed with licensee representatives.

No violations or deviations were identified.

4. External Exposure Control (83750)

The inspector reviewed the licensee's external exposure control program to determine compliance with 10 CFR Parts 20.101, 20.102, 20.202, 20.401, and 20.403, and commitments in Section 12.3 of the Updated Safety Analysis Report (USAR).

The inspector verified that each person entering the RCA was issued a thermoluminescent dosimeter (TLD) and self-reading dosimeter (SRD). Additional dosimeter devices, such as high range SRDs or multiple pack TLDs, which included extremity monitors, were issued when required for select work evolutions, such as steam generator work or as specified on a RWP. The inspector reviewed a selected sampling of the RWPs issued during the refueling outage. The RWPs appeared to incorporate sufficient radiological controls.

The licensee maintained Form NRC-4 information as required by 10 CFR Part 20.101. The licensee had established a program to provide a daily listing for current worker exposures based on SRD results. The listings were sent to each department and posted for review by the workers.

During tours of the ANO Unit 1 containment, auxiliary building, and turbine buildings, the inspector made independent measurements and determined that the designated areas in the RCA were posted properly and afforded an adequate level of protection to workers.

No violations or deviations were identified.

5. Internal Exposure Control (83790)

The inspector reviewed the licensee's internal exposure control program to determine compliance with the requirements of 10 CFR Part 20.103 and commitments in Sections 12.3 and 12.4 of the USAR.

The inspector did not identify any problems regarding the respiratory protection program. The inspector noted that the licensee requires a whole body count on individuals prior to the assignment of a TLD which is needed to enter the RCA and an exit whole body count upon completion of the work assignment at the site. The licensee routinely performs a whole body count on an individual when facial contamination is detected in the areas around the nose or mouth.

The inspector reviewed the licensee's continuous air monitoring program for gaseous, particulate, and iodine airborne concentrations. The inspector noted that the licensee had only four continuous air

monitors (CAMs) in operation in the auxiliary building and two CAMs in the reactor building. The licensee acknowledged the need for the additional CAMs and stated they had borrowed three additional CAMs from a sister plant and were in the process of putting these instruments into operation. The inspector noted from the airborne radioactivity sample log that only a limited number of grab air samples were being taken in the plant. The licensee stated that the airborne radioactivity sampling frequency would be increased in the reactor building.

No violations or deviations were identified.

6. Posting, Labeling, and Worker Controls (83750)

The inspector reviewed selected portions of the licensee's posting, labeling, and worker controls. The inspector noted the licensee had experienced over 185 personnel contamination events during the period from October 1-31, 1990. Approximately 130 of these involved skin contamination and 10 involved hot particles. The licensee had calculated the highest skin of the whole body exposure to be approximately 2.9 rem.

The inspector observed the use of personnel contamination monitors (PCMs) at the exits from the RCAs. The inspector noted on the turbine deck that personnel were not consistent in the manner they monitored themselves exiting the area. Some individuals would remove their hard hat while others would wear their hard hat when monitoring with the PCMs. The PCM is a beta radiation sensitive instrument and would not detect hair contamination if the hard hat was worn.

The inspector also noted that the traffic pattern at CA-1 was poor. Personnel would remove their hard hat and place it into one of the two tool monitors used, then step over to one of the three PCMs and monitor themselves. Hard hats would complete their monitoring cycle before the individual would complete his monitoring cycle in the PCMs. Other individuals would remove the hard hat from the tool monitors and place their own hard hat inside to be monitored. These later individuals would not know if their hands were contaminated. Additionally, after personnel completed their monitoring cycle they would have to cross paths with unmonitored, potentially contaminated personnel to retrieve their hard hat prior to logging off the RWP they had been working on. The licensee stated that the personnel traffic pattern at CA-1 would be reviewed.

No violations or deviations were identified.

7. Control of Radioactive Materials and Contamination, Surveys, and Monitoring (83750)

The inspector reviewed the licensee's program for control of radioactive materials and contamination, surveys, and monitoring to determine compliance with the requirements of Unit 1 TS 6.8.1, 6.10, and 6.13, 10 CFR Parts 19.12, 20.4, 20.5, 20.201, 20.203, 20.205, 20.207, 20.301, 20.401, and 20.402.

The inspector reviewed the licensee's radiological survey program involving work areas, storage areas, change rooms, lunch and meeting rooms, contractor service facilities, and radiological control points for the surveying and release of materials and personnel. The inspector noted the licensee performed surveys of the new lunch room facility in the maintenance building on a weekly schedule. The inspector discussed with licensee representatives the desirability to perform surveys at least on a daily schedule. The licensee acknowledged the inspector's observation and stated that they would review the current survey frequency.

On October 31, 1990, at approximately 11 p.m., a contract worker entered the reactor building with a contract HP technician and a quality control (QC) inspector to perform maintenance work on Check Valve CF-1B which is part of the core flood tank system. A second crew also entered at this time to work on another valve in close proximity to CF-1B. The HP technician was to provide continuous coverage for both work crews. RWP 900594 was written to support work activities relating to the repair of valve actuators, indicators, and supports, and listed Valve CF-1B dose rates as 60 millirem per hour (mR/hr) and contamination levels of 48,000 disintegrations per minute (dpm). Additionally, the RWP required HP to survey for hot particles during work involving a breach of the system.

The HP technician stayed with the second work crew while the QC inspector and a worker went to Valve CF-1B. The QC inspector explained to the worker what needed to be done before his inspection. The QC inspector noted a blackish deposit inside the valve and said that would also have to be removed before he would inspect the valve. This valve had been worked on at approximately 7 p.m. and the system breached at that time. The contract worker took a piece of lint-free cloth and folded it up, four layers thick, to remove the blackish deposit. He carefully wiped the deposit and placed the cloth aside. After contacting the HP technician to survey the material removed from the valve on the cloth, he held the cloth in his hand, the black area at his finger tips, while the HP technician surveyed. The initial measurement was approximately 25,000 mR/hr. The cloth was set down and the HP technician directed all personnel to leave the area.

Later surveys performed on November 1, 1990, measured 20,000 mR/hr and indicated four distinct hot particles on the cloth. A gamma spectrometer analysis of an additional hot particle found by Valve CF-1B indicated that the particles contained both activation and fission products.

A radiation survey was also located that was performed on October 31, 1990, at 7:20 p.m. on Valve CF-1B. This survey indicated that a radiation level of 900 mR/hr existed on contact with the flapper. There was no record of any contamination, alpha or beta radiation survey taken inside the valve, or the required hot particle survey directed by the RWP. 10 CFR Part 20.201(b) states, in part, that a licensee shall make radiation surveys that are reasonable under the circumstances to evaluate

the extent of radiation hazards that may be present. The failure to perform a proper survey when the system was breached is considered an apparent violation of 10 CFR Part 20.201(b) (313/9039-01; 368/9039-01).

10 CFR Part 19.12, "Instruction to Workers," states, in part, that all individuals working in or frequenting any portion of a restricted area shall be kept informed of the radiation in such portions of the restricted area and precautions or procedures to minimize exposure. The individual worker who wiped the inside of the valve with a cloth had not been informed of the radiation levels inside the valve along with proper procedures for handling contaminated material. The failure to provide proper instructions is considered an apparent violation of 10 CFR Part 19.12 (313/9039-02; 368/9039-02).

The licensee stopped the valve work until after an assessment of the radiological conditions were determined. Personnel involved with valve CF-18 were later debriefed and time and motion studies were made of the cleaning process. The licensee performed an initial assessment on what they believed to be several hot particles on the cleaning cloth. The licensee projects a dose to the persons extremities of approximately 3.0 rem. The cloth containing these particles was sent to a vendor for further analysis from which a final dose assignment will be made.

No deviations were identified.

8. Maintaining Occupational Exposures ALARA (83750)

The inspector reviewed the licensee's ALARA program to determine agreement with the recommendations of Regulatory Guide 8.8 and 8.10 and adherence to ANO procedures.

The licensee had established radiation exposure (490 person-rem), personnel contamination incidents, and radioactive waste generation goals for the IR9 outage. The licensee had established a 1990 annual goal of 614 person-rem for both units. The inspector noted that the goals for both the outage and 1990 total would likely be exceeded by the end of the outage. Changes in the scope of work to be performed had added to the cumulative personnel exposure. The licensee expects the personnel exposure for the outage to be approximately 560 person-rem.

The licensee's radiation exposures for 1988-1990 are depicted below:

	<u>EXPOSURE HISTORY (PERSON-REM)</u>		
	<u>1988</u>	<u>1989</u>	(Projected) <u>1990</u>
ANO Units 1 & 2 (Total)	1388	717	700
Average Per Unit	694	358	350
PWR Average	336	292	~300



The inspector discussed with the licensee that their person-rem exposures were double the national average in 1988 and about 20 percent above the national average in 1989. It also appears that the licensee's 1990 person-rem exposures will be above the national average at about the same level as noted in 1989. The licensee had installed extensive temporary shielding in the containment building to reduce general area radiation levels and also removed some specific hot spots such as the let-down line. However, continued attention is needed in such areas as reduction of the in-core source term and the removal or shielding of local hot spots to assist in lowering the person-rem totals. The licensee acknowledged that their person-rem exposures were high, but stated that several ALARA initiatives are planned to address this area. The inspector will review the effectiveness of these initiatives in future inspections.

No violations or deviations were identified.

9. Exit Meeting (30703)

The inspector met with the senior resident inspector and licensee representatives identified in paragraph 1 of this report at the conclusion of the inspection on November 2, 1990. The inspector summarized the scope of the inspection and discussed the inspection findings as presented in this report. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspector during the inspection.