

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-313/86-16  
50-368/86-16

Licenses: DPR-51  
NPF-6

Dockets: 50-313  
50-368

Licensee: Arkansas Power & Light Company (AP&L)  
P. O. Box 551  
Little Rock, Arkansas 72203

Facility Name: Arkansas Nuclear One (ANO)

Inspection At: ANO Site, Russellville, Pope County, Arkansas

Inspection Conducted: May 19-23, 1986

Inspector:

*Blaine Muncy*  
for H. Chaney, Radiation Specialist, Facilities  
Radiological Protection Section

*6/27/86*  
Date

Approved:

*Blaine Muncy*  
B. Murray, Chief, Facilities Radiological  
Protection Section

*6/27/86*  
Date

Inspection Summary

Inspection Conducted May 19-23, 1986 (Report 50-313/86-16; 50-368/86-16)

Areas Inspected: Routine, unannounced inspection of the licensee's radiation protection program (RP) including: external and internal radiation exposure controls, respiratory protection, contamination control, radiological surveys, radioactive material controls, radiation protection facilities, and preparations for the upcoming Unit 2 refueling outage.

Results: Within the areas inspected, one violation (see paragraph 3) and no deviations were identified.

DETAILS

1. Persons Contacted

AP&L

\*J. M. Levine, Director, Site Nuclear Operations  
\*E. C. Ewing, General Manager, Plant Support  
\*D. J. Wagner, Health Physics (HP) Superintendent (Acting)  
\*B. L. Bata, Quality Assurance (QA) Engineer  
\*S. Quennoz, General Manager, Plant Operations  
\*J. D. Vandergrift, Training Manager  
\*L. W. Humphrey, General Manager, Nuclear Quality  
\*L. W. Schempp, Quality Control (QC) Superintendent  
\*J. H. Montgomery, Human Resources Supervisor  
\*D. B. Lomax, Plant Licensing Supervisor  
\*P. E. Campbell, Plant Licensing Engineer  
M. J. Bolanis, HP Specialist  
F. H. Chilcoat, Instruments and Controls (I&C) Technician  
R. E. Green, HP Dosimetry Supervisor  
R. D. Deal, Dosimetry Technician  
L. E. Qualls, Dosimetry Technician  
J. S. Fancher, HP Technician  
T. R. Smith, HP Supervisor  
B. C. Burchard, HP Supervisor  
D. M. Dobbins, Data Processing Specialist  
N. R. Williams, HP Technician  
D. G. McCaslin, HP Technician  
D. W. Akins, Radwaste Supervisor  
H. N. Bishop, Assistant Radwaste Supervisor  
I. Mosquito, Respiratory Protection Trainer  
R. E. Stell, HP Technician  
W. L. Hada, HP Supervisor  
D. L. Helm, HP Specialist (ALARA Coordinator)  
J. Waid, Supervisor, Technical Specialist Training

Others

\*W. D. Johnson, Senior NRC Resident Inspector  
C. C. Harbuck, NRC Resident Inspector

\*Denotes those present at the exit interview on May 23, 1986.

The NRC inspector also interviewed other licensee employees including QA/QC, warehouse, toolroom, and contracted HP personnel.

## 2. Inspector Observations

The following are observations the NRC inspector discussed with the licensee during the exit meeting on May 23, 1986. These observations are neither violations nor unresolved items. These items were recommended for licensee consideration for program improvement, but they have no specific regulatory requirement.

- a. Legibility of Radiation Work Permits (RWP) - Special radiation protection instructions on RWPs and ALARA evaluations were found to be illegible. (see paragraph 3 for details)
- b. Airborne Radioactivity Uptake Calculations - The licensee had not implemented a procedure for assessing the radioactive material uptake of personnel in terms of Maximum Permissible Concentration - hours based on bioassay results. (see paragraph 4 for details)
- c. Shelf Life of Respiratory Protection Equipment - The licensee's respiratory protection equipment (RPE) QC inspections do not adequately address the periodic review of chemical canisters, lubricants, and thread sealers for shelf life expiration. (see paragraph 4.b for details)
- d. Marking of Breathing Air Gas Cylinders - Several cylinders containing breathing air needed to be remarked to indicate their contents. (see paragraph 4.b for details)
- e. Low-Level Radioactive Waste Storage Building - The radioactive liquid waste sump has potential unmonitored release pathways. (see paragraph 6 for details)

## 3. External Radiation Exposure Control and Dosimetry

The licensee's RP program was reviewed for compliance with the commitments contained in the Unit 1 Updated Safety Analysis Report (USAR) - Section 11.2.6.1, and Unit 2 USAR-Section 12.3.3; the requirements of Unit 1 Technical Specification (TS) 6.10, 6.11, 6.12, and Unit 2 TS 6.11 and 6.13; the requirements of 10 CFR Parts 19.12, 19.13, 20.101, 20.102, 20.104, 20.105, 20.202, 20.203, 20.205, 20.206, 20.405, 20.407, 20.408, and 20.409; the recommendations of NRC Inspection and Enforcement (I&E) Information Notices 86-24, 85-87, 85-60, 85-42, 84-61, 84-60, 84-59; the recommendations of NRC Regulatory Guides (RGs) 8.2, 8.4, 8.7, 8.8, 8.13, 8.14, and 8.28; and the recommendations of industry standards ANSI N13.11-1983, N13.5-1972, and N13.27-1981.

The NRC inspector reviewed and inspected: dosimetry equipment; exposure control procedures (whole body, extremity, skin and eyes); equipment operating procedures; representative records of exposures for permanent ANO and AP&L employees, visitors, and contractors; high radiation area posting and controls; and compared dosimetry requirements referenced on

radiation work permits (RWP) to those observed at worksites. The NRC inspector reviewed the implementation of a computerized exposure control and exposure records system, and a new state-of-the-art personnel dosimetry system. The NRC inspector determined that the licensee had included the information contained in I&E Information Notice 85-42 to their proposed dosimetry system. The NRC inspector also noted that the licensee was participating in a routine QA program with an offsite laboratory to compare their current personnel dosimetry system with the criteria of industry standard ANSI 13.11-1983. The licensee's inventory and capabilities of personnel dosimetry equipment maintained in emergency kits (E-kits) were inspected. Procedures reviewed during this inspection are listed in the attachment to this inspection report.

The NRC inspector reviewed the licensee's processing of personnel dosimetry for compliance with ANO procedures and TS requirements. During a review of one of the two dosimetry processing stations at ANO on May 21, 1986, the NRC inspector noted that the dosimetry technicians were using an out-of-date procedure for establishment of the QC parameters for the thermoluminescent dosimeter (TLD) reader. TS 6.10 (Unit-1) and 6.11 (Unit-2) require that procedures be maintained and adhered to for all operations involving personnel radiation exposure. The dosimetry technician was found to be using a unofficial copy of Revision 4 to ANO Operations Procedure 1632.020, "Harshaw 2271 TLD System Setup," for setting the QC parameters of the TLD processing equipment (at the ANO Nuclear Training Center) when Revision 5 had been in effect since March 18, 1986. When this was brought to the attention of the dosimetry technician, the technician immediately obtained an unofficial copy of Revision 5 to the procedure and verified that all processing parameters were still valid. The NRC inspector also noted, that even though the completed QC setup data sheets had a place for signifying a review by the dosimetry supervisor, data sheets had not been reviewed since before March 1, 1986. The use of obsolete procedures for establishing TLD operating parameters is an apparent violation of TS 6.10 and 6.11 for Units 1 and 2. (50-313/8616-01 and 50-368/8616-01)

During a review of several RWPs and ALARA job reviews, it was noted that the special handwritten instructions appearing on both types of documents were illegible. The NRC inspector emphasized to licensee representatives that worker comprehension of written instructions was paramount to implementation of effective radiological controls over work operations. The licensee's representatives stated that this problem would be resolved by the new computerized exposure control system, in that, special RWP instructions would be typed. The licensee indicated that, in the meantime, instructions would be given to RWP writers to ensure that RWPs were more legible.

The NRC inspector observed prework briefings and reviewed proposed radiological controls for the transfer of a two curie Cesium-137 source from a storage container into an automated TLD irradiator.

No deviations were identified.

4. Internal Radiation Dosimetry and Exposure Control

The licensee's internal radiation exposure control program, including airborne radioactivity monitoring/sampling and respiratory protection program, was reviewed for compliance with the commitments in Unit 1 USAR-Sections 11.2.6 and 11.3.2.3, and Unit 2 USAR-Sections 12.2.4 and 12.3.3.2; the requirements of Unit 1 TS 6.10 and Unit 2 TS 6.11; the requirements in 10 CFR Parts 19.12, 19.13, and 20.103, 201, 203, 405, 407, 20.408, and 20.409, and 29 CFR Part 19.10; the recommendations of industry standards ANSI 13.1-1969, N343-1978, Z88.2-1980, NUREG-0041, and RG 8.2, 8.7, 8.8, 8.9, 8.15, 8.20, and 8.26.

The NRC inspector reviewed the licensee's corporate policies, programs, and activities involving routine and emergency aspects of the internal dosimetry and exposure controls.

a. Internal Dosimetry

The NRC inspector reviewed internal radioactive assessment procedures, in-vitro bioassay equipment (two whole body counters), and a computerized assessment program. The licensee documentation logs for equipment calibration and daily response checks were inspected. During a review of the records used by the HP department to track personnel exposures to radioactive materials and determine whether or not whole body counting is required, it was noted that an error was made in one calculation involving the degree of exposure (in units of maximum permissible concentration-hours (MPC-hr)) incurred by a worker during April 26-27, 1986. The licensee's procedures 1622.015, "Bioassay Sampling Program," and 1609.010, "MPC-hour and Staytime Calculations," require that personnel be given a whole body count when they exceed 2 MPC-hr of exposure during any day/24-hour period. MPC-hr tracking records revealed that following an internal exposure of approximately 1.1 MPC-hr, on April 26, 1986, at 9:30 p.m. an employee received another exposure of approximately 1.8 MPC-hr, on April 27, 1986, at 9:30 a.m. The HP supervisor making the entries did not sum the two entries. This error led to the worker being excluded from being monitored for internal radioactivity even though the worker's total estimated exposure for the previous 24-hour period was 2.9 MPC-hr. Discussions with the supervisor and other licensee representatives disclosed that the supervisor mistakenly assumed that the use of calendar days was meant in the procedures and not a continuous 24-hour period. The NRC inspector reviewed approximately 60 other entries and did not observe any other errors. The licensee immediately corrected the error, arranged for the subject worker to be given a whole body count, reinstructed the supervisor in the proper method for tracking MPC-hr exposures, revised the MPC-hr tracking form so that each entry included the time of the incurred exposures, provided definitions on daily and weekly exposure criteria, and provided for better supervisory review of the entered data. This problem appears to be an isolated case and not an indication of a general breakdown of the program.



The licensee's termination report involving uptake of radionuclides and WBC results is being modified to address NRC Form 439 changes that were recently recommend by the NRC. The licensee stated that there had been no significant or unique radionuclide uptakes that have necessitated the use of indirect (in-vitro) bioassay methods.

b. Respiratory Protection

The NRC inspector reviewed the licensee's occupational radiological respiratory protection program involving:

- ° management policies on respiratory protection equipment (RPE) use,
- ° implementing procedures,
- ° qualifications of personnel responsible for program implementation,
- ° training,
- ° maintenance,
- ° determination of user physical fitness,
- ° fit testing,
- ° certification,
- ° QC and testing,
- ° program review and oversight,
- ° inventory control,
- ° breathing air standards and certification,
- ° compressor qualifications,
- ° RPE dedicated to emergency response,
- ° radiological surveys of permanently installed plant breathing air systems,
- ° selection, issuance and return of RPE,
- ° radiological surveying of RPE,
- ° decontamination and sanitizing of RPE,
- ° inspection of stored RPE,

- ° retesting breathing air cylinders and filter cartridges, and
- ° use of chemical canisters.

The licensee's actions taken regarding I&E Information Notices 84-24, 84-60, 85-60, and 85-87 were reviewed. The licensee has an established program to evaluate each notice. The NRC inspector noted that the licensee's internal correspondence regarding I&E Information Notices did not address Notice 84-24, "Physical Qualifications of Respiratory Protection Users." However, the NRC inspector determined that the licensee's medical qualification program for RPE users adequately addressed the requirements of 10 CFR Part 20.103.

The NRC inspector also reviewed the licensee's respiratory program concerning identification of airborne radioactive concentrations via grab sampling (including breathing zone sampling) and continuous air monitoring. The licensee's gaseous and particulate sampling programs for routine and emergency conditions involving alpha and beta-gamma concentrations (including tritium and Iodine-131) were reviewed. Records of air sampling activities were reviewed and found complete, and able to identify individual radioisotopes at/or below the limits stated in 10 CFR Part 20, Appendix B.

The NRC inspector discussed with the licensee several areas that could be improved. It was noted that the quarterly HP department QC sampling (procedure 1609.012, "Respiratory Protection Program Evaluation") of RPE did not provide for the inspection of RPE (chemical canisters and cartridges) and RPE maintenance materials (thread sealer and lubricants) for shelf-life. Also, it was noted that several breathing air cylinders were in need of relabeling as to their contents. The NRC inspector also noted that the non-radiological respiratory protection program, which is used on occasion within radiologically controlled areas, does not appear to satisfy the requirements of the safety and health standards promulgated by the Occupational Safety and Health Administration (OSHA) in 29 CFR Part 19.10, and other pertinent industry standards. Areas of concern include training of personnel in equipment selection, control over equipment issue and use, and fit testing of equipment. The RPE involved half-face filtered masks and chemical cartridges. The aforementioned concerns were referred to the Regional OSHA office in Dallas, Texas, for further action. These actions are in accordance with guidance contained in NRC Enforcement and Inspection Manual Chapter 1007.

5. Control Radioactive Materials (RAM) and Contamination, and Radiological Monitoring

The licensee's programs for the control of RAM and contamination, radiological surveys and monitoring were reviewed for compliance with the commitments contained in the Unit 1 USAR-Sections 11.2.6 and 11.3.1, and Unit 2 USAR-Sections 12.1.3.4, 12.2.4, 12.3.3, and 12.4.1; the requirements in Unit 1 TS 4.14, 6.10, and 6.11, and Unit 2 TS 3/4.7.9,

6.11, and 6.13; the requirements in 10 CFR Parts 19.12, and 20.4, 20.5, 20.201, 20.203, 20.207, 20.209, 20.301, 20.401, 20.402, and NUREG-0737-Item III.D.3.3; and the recommendations of I&E Information Notices 84-25, 85-92, and 86-23.

The NRC inspector inspected the licensee's radiological survey program including: areas surveyed (lunch rooms, tool rooms, locker rooms, and normally non-radioactive plant systems), frequency of surveys, detail of surveys, documentation and supervisory review of completed surveys, and storage of completed survey records. The licensee's radiological survey program was found to be well maintained. The NRC inspector reviewed the licensee's surface contamination and airborne contamination survey program for the ability of the licensee to qualitatively and quantitatively identify failed-fuel related radioactivity in plant areas, including Iodine-131 during emergency situations. The NRC inspector also conducted confirmatory measurements of licensee posted radiation and high radiation areas. Radiological worker conduct and contamination control practices were also reviewed during plant area inspections.

The licensee's radiological work area review program and high radiation area posting (including a functional door check) programs were reviewed. The NRC inspector discussed with licensee representatives the depth of control exercised over the Unit 1 secondary steam system when certain portions were opened. This system had become contaminated during a failure of steam generator tubes. The licensee's posting of the Unit-1 secondary systems appeared to be complete and in accordance with the requirements of 10 CFR Part 20.203. Procedures and records of the licensee's activities involving procurement, receipt, storage, and accountability of radioactive materials/sources was inspected. Several portable radiological survey instruments and their operating procedures were inspected for current calibration. The NRC inspector also reviewed the facts involved in the licensee's telephonic report, on December 3, 1985, to the NRC Regional Office of a possible lost source. The licensee's subsequent investigation determined that an instrument technician had inappropriately stored the low-activity source onsite (over the weekend) when he found the normal source storage facility locked. The selected interim storage location did not create any exposures to personnel or improperly posted areas. The sealed radioactive source consisted of approximately 80 microcuries of Cesium-137. The licensee had reevaluated their control over sources and reduced the number of auxiliary source storage and issue locations.

No violations or deviations were identified.

#### 6. Radiological Control Facilities and Equipment/Instruments

The licensee's facilities for radiological protection activities during routine and emergency situations were reviewed for compliance with commitments contained in the Unit 1 USAR-Sections 11.3.2, and 12.3.1, and the Unit 2 USAR-Sections 12.3.2, 12.4.2, and 13.3; the requirements in Arkansas Nuclear One Emergency Plan (ANO-EP)-Tables 4A, 4B, 4E, 4F, 4G, and 4H; Units 1 and 2 operating license condition regarding monitoring



ability for Iodine-131 during reactor accidents; Unit 1 TS 6.5 and Unit 2 TS 6.5.2.8.e; and the recommendations of RG 1.97, 8.8, 8.25, NUREG-0041, and NUREG-0654/FEMA-REP-1.

The NRC inspector inspected the facilities for ingress and egress from radiological controlled areas, temporary work facilities, and assembly areas used during activation of the ANO-EP. Facilities for HP technicians, protective clothing donning and removal, protective clothing sorting and storage, radiological instrument storage and calibration (including segregation of ready-for-use instruments from uncalibrated instruments), and the computer controlled instrument inventory and calibration/maintenance surveillance system. Respirator protection equipment issue, repair, training, and mask fit test facilities were also reviewed. The licensee's dedicated stock of emergency equipment in emergency-kits in the: control rooms, operational support center, offsite emergency operations facility, onsite first aid room, and the Russellville, Arkansas St. Mary's Hospital, were inspected for proper inventory and compliance with plant inventory procedures. All emergency-kits contained the required radiological monitoring equipment, expendable radiological surveying supplies, respiratory protection equipment (including iodine canisters for full face respirators), decontamination supplies, first aid kits, and procedures to perform required emergency monitoring functions, including onsite surveys and radiological habitability verifications of selected emergency facilities. The licensee's warehouse inventory of radiological and respiratory protection equipment and expendable supplies were inspected.

The NRC inspector discussed with licensee representatives their preparations for the upcoming refueling outage for Unit-2. The licensee was evaluating dose reduction methods to be employed during steam generator and pressurizer work operations. The NRC inspector noted that the licensee maintained full scale mockups of their steam generators onsite for training of personnel involved in steam generator tube inspection and repair.

During an inspection of the newly built onsite low-level radioactive waste storage building, it was noted that the drainage system for collection of liquid leakage from stored wastes in the building involve a potential unmonitored pathway to the environment. The NRC inspector noted that a potential path of potentially radioactive liquids existed from the collection systems pumpdown and diverting valve manifold (located in the truck bay) to an unmonitored storm/sewer drain system opening, which is also within the truck bay. This valve manifold was noted to consist of approximately nine bolted bonnet and flanged manually operated valves for the flow control, blowdown, and pumpdown of the system. This valve complex was not provided a leakage collection system or impoundment for leakage from the uncapped valve openings or their flanged joints. Also, the main pumpdown valve for the 5000 gallon sump associated with the system extends out into the truck bay and is not provided any protection from contact with vehicular movement within the area. At the time of the inspection, the facility was not operational and no radioactive waste

had been moved into the facility. The licensee stated that the NRC inspector's observations would be reviewed prior to use of the building.

No violations or deviations were identified.

7. Exit Interview

The NRC inspector met with the licensee's representatives and the NRC resident inspector identified in paragraph 1 of this report at the conclusion of the inspection on May 13, 1986. The NRC inspector summarized the scope and the results of the inspection.