ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-313 50-368
License Nos.:	DPR-51; NPF-6
Report No.:	50-313/97-19; 50-368/97-19
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64W and Hwy.333 South Russellville, Arkansas
Dates:	November 3-6, 1997
Inspectors:	L. T. Ricketson, P.E., Senior Radiation Specialist Plant Support Branch G. L. Guerra, Radiation Specialist Plant Support Branch
Approved By:	Blaine Murray, Chief, Plant Support Branch Division of Reactor Safety
Attachment:	Supplemental Information

EXECUTIVE SUMMARY

Arkansas Nuclear One, Units 1 and 2
NRC Inspection Report 50-313/97-19; 50-368/97-19

The announced, routine inspection reviewed the radiation protection program. Areas reviewed included: exposure controls, controls of radioactive material and contamination, surveying and monitoring, the program to maintain occupational exposure as low as is reasonably achievable (ALARA), training and qualifications, and quality assurance in radiation protection activities.

Plant Support

- Exposure controls were implemented appropriately. High radiation areas were controlled properly. Radiological area posting was correct. Dosimetry was properly used. Dosimetry records were maintained as required. Good respiratory protection and whole-body counting programs were implemented (Section R1.1).

- There were vulnerabilities in the licensee's program for conditionally releasing items from the radiological controlled area that could result in the loss of control of radioactive material (Section R1.2).

- A violation was identified because the licensee failed to secure radioactive material from unauthorized removal or access and failed to store a radioactive source in accordance with procedural requirements (Section R1.2).

- The ALARA program produced good results. The 3-year average exposure per unit was below the national average for pressurized water reactors. For 1994-1997, the site 3-year average person-rem totals declined significantly. ALARA improvement ideas and lessons learned were captured and utilized well (Section R1.3).

- Good training programs were implemented for radiation protection technicians and professionals. The topics addressed in radiation protection training were appropriate. Professionals were provided sufficient opportunities to maintain a satisfactory level of expertise. The radiation protection organization was adequately qualified (Section R5).

- Licensee oversight of radiation protection activities was good. Corporate assessments and quality assurance surveillances were frequent and diverse enough to provide management with accurate information on the effectiveness of the radiation protection program. The licensee effectively implemented corrective actions in a timely manner for identified conditions (Section R7).

Report Details

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 External Exposure Controls

a. Inspection Scope (83750)

The inspectors interviewed radiation protection personnel and reviewed the following:

- Control of high radiation areas
- High radiation area key control
- Radiological posting
- Radiological controlled area access controls
- Dosimetry use by radiation workers
- Dosimetry record keeping
- Skin dose measurements
- Radiological air sampling techniques
- Respirator issue and use
- Respirator inspection and maintenance
- Breathing air certification
- Whole-body counting

b. Observations and Findings (83750)

During tours of the radiological controlled area, the inspectors noted high radiation areas were controlled and posted properly. Proper radiological controlled area access controls were implemented. Dosimetry was used appropriately by workers.

Personnel dosimeters were processed by the Waterford Unit 3 facility. The results of the dosimetry analyses were recorded in the licensee's computer data base, and the system assigned doses to the proper individuals. The inspectors determined that the licensee's computer system effectively maintained the required information for NRC Forms 4 and 5. The inspectors verified that exposures assigned to personnel who wore multiple badges or who received an internal exposures were correctly recorded in the computer data base. The inspectors noted that records were available and easily retrievable.

Whole-body counting was conducted on individuals if they were involved in a contamination event in which there was a potential for internal deposition of radioactive material. Five individuals were assigned doses as results of radioactive materials taken internally. These doses were accurately recorded in the dosimetry record system. Skin doses, resulting from personnel contamination events, were calculated correctly and recorded as required. The inspectors determined that the licensee properly implemented its whole-body counting and dose assignment program.

Radiological air sampling was performed routinely in certain areas of the plant. The inspectors verified through records review that airborne radioactivity concentration was calculated and recorded correctly. The inspectors reviewed Procedure 1601.301, "Radiological Surveys," Revision 5, and concluded that it provided good guidance.

Respirator issue was also tracked on the computer system. The system performed verifications to ensure individuals met qualification requirements and ensured that respirators matched the sizes worn during fit testing. Through records review and personnel interview, the inspectors determined that the respirator issue program was implemented correctly. Respirators were inspected every 30 days, as required by licensee procedure. Only minor maintenance was performed by the licensee. Used respirators were sent to a central facility at the Grand Gulf Nuclear facility for reconditioning, repair, and disinfecting. The licensee maintained two compressors for filling self-contained breathing apparatus bottles. An independent laboratory analyzed the licensee's quality of breathing air quarterly. The inspectors reviewed records of breathing air analyses and noted no problems.

A Total Effective Dose Equivalent/ALARA dose benefit curve was included in licensee procedures and used to determine if respirator use was appropriate for any specific radiological conditions. No respirators were issued for radiological safety, thus far, in 1997. The inspectors concluded that a proper respirator protection program was implemented.

c. Conclusions

Exposure controls were implemented appropriately. High radiation areas were controlled properly. Radiological area posting was correct. Dosimetry was properly used. Dosimetry records were maintained as required. Good respiratory protection and whole-body counting programs were implemented.

R1.2 Control of Radioactive Material and Contamination; Surveying and Monitoring

a. Inspection Scope (83750)

The inspectors interviewed radiation protection personnel and reviewed the following:

- Portable survey instrument calibration
- Release of radioactive material from the radiological controlled area
- Control of sealed radioactive sources
- Leak testing of sealed sources

b. Observations and Findings

During tours of the radiological controlled area, the inspectors verified that portable radiation detection instruments were calibrated and performance tested properly. Portable radiation detection instruments were calibrated at a central facility located that the Grand Gulf Nuclear Station.

During Inspection 50-313/97-15; 50-368/97-15, the inspector noted, during a review of condition reports, examples of radioactive material unintentionally released from the radiological controlled area. A violation was identified, because the requirements for unconditional release were not met. The inspectors identified no additional examples during this inspection. However, the inspectors identified vulnerabilities in the licensee's program to control radioactive materials and a potential means by which the licensee could loose accountability of some items contaminated with radioactive material.

According to Procedure 1012.020, "Radioactive Material Control," Revision 4, items not meeting the requirements for unconditional release from the radiological controlled area could be released if certain other conditions were met. These conditions included:

- Packaging and tagging or labeling the item(s)
- Documenting the release on Form 1012.020M
- Securing the signature of individual responsible for the item(s)

The inspectors attempted to verify the locations of selected items listed on conditional release records. One of the first things noted by the inspectors was the lack of a means to uniquely identify all items released. Without unique identification, there was no way to ensure the licensee maintained accountability on the correct item. Some items, such as tools, carried an engraved number that was unique to each tool. However, the inspectors noted examples in which the unique numbers were not used even though they were available. Specific examples were observed on release records dated January 28 and August 27, 1997.

The licensee's means of maintaining accountability depended on the memories of the individuals to whom the material was released. Conditional release records listed the individuals removing the items from the radiological controlled area; records did not list the location where the material was to be taken or stored. In many cases, there was only anecdotal evidence of the pathway followed by conditionally released items. If the person to whom the material was released was unavailable, locating the item(s) was even more difficult. Such was the case if the material was released to an employee or contractor who had terminated employment. Illegible signatures presented another potential difficulty in tracing released items. However, in most cases, the security badge number of the individual removing items was included with the individual's signature. The inspectors noted that the procedural guidance did not require the security badge number to be included.

The inspectors confirmed that the licensee maintained positive control of some conditionally released items. These included tools, when unique identification numbers were used, and items that were first conditionally released for isotopic analysis by the chemistry department. Items in the latter group were linked to the unique numbers of the isotopic analyses results.

For other items, the results of the inspectors' review were inconclusive, since many items were not uniquely identified. It was the licensee's position that all items selected for verification were located. The inspectors identified no examples in which the licensee

unquestionably failed to maintain accountability of an item released from the radiological controlled area.

Licensee representatives acknowledged the inspectors' comments regarding the vulnerabilities of the licensee's program for the conditional release of radioactive material and the associated procedural guidance. Licensee representatives stated that they would conduct discussions with other nuclear sites to determine how materials were controlled and review the guidance in their procedure to determine if changes were warranted.

In another area related to the licensee's control of radioactive material, the inspectors reviewed the list of sealed source storage areas, approved by the radiation protection manager, and attempted to confirm that selected sealed sources were stored appropriately. During a physical inventory, the inspectors determined that Source 1575, a 5 millicurie Ni-63 source assigned to the chemistry counting room, was not stored in the assigned storage area. Additionally, there was no indication of the source's location on the source signout log. After discussions with several chemistry technicians, the inspectors and licensee representatives found the source in an unlocked, metal cabinet outside Unit 2, but within the protected area. The inspectors were unable to determine when the source was first stored in the cabinet. However, during the most recent sealed source inventory, performed in July 1997, licensee representatives documented that the source was stored in the chemistry count room.

Procedure 1012.020, Section 6.2.4.C states, in part, "Store sources only in areas designated by the source custodian for the sources and approved by the Manager, Radiation Protection/Chemistry." Procedure 1012.020, Section 6.2.5.D, states, in part, "Each time a source utilizing an ANO source number is removed from its storage area, log the required information on the 1012.020H, 'Source Temporary Signout' located at the storage location."

The inspectors identified the failure to secure radioactive material from unauthorized removal or access and the failure to store the radioactive source in accordance with procedural requirements as a violation of Unit 1 Technical Specification 6.10 and Unit 2 Technical Specification 6.11 (50-313; -368/9719-01).

The licensee initiated Condition Report C-97-0325 to document the problem and track corrective actions.

c. Conclusions

There were vulnerabilities in the licensee's program for conditionally releasing items from the radiological controlled area that could result in the loss of control of radioactive material. A violation was identified, because the licensee failed to secure radioactive material from unauthorized removal or access and failed to store a radioactive source in accordance with procedural requirements.

R1.3 Maintaining Occupational Exposure ALARA

a. Inspection Scope (83750)

The inspectors interviewed radiation protection personnel and reviewed the following:

- ALARA goals/results
- Implementation of previous lessons-learned
- ALARA committee activities
- ALARA suggestions
- ALARA initiatives

b. Observations and Findings

ALARA committee meetings were attended well by representatives from all departments, indicating good support for the program. The number of meetings held throughout the year was appropriate.

Procedure 1012.027, "ALARA Program," Revision 2, implemented an ALARA improvement ideas program. No tracking system was used to monitor the evaluation and implementation of ALARA suggestions. When questioned, at first, radiation protection personnel did not know the number of ALARA suggestions submitted in 1997 nor the number implemented. Subsequently, the licensee determined that only one suggestion had been formally submitted for 1997. The licensee stated that all suggestion forms submitted were evaluated, and a response was given to the originator. Furthermore, the licensee stated that most improvement suggestions were verbally communicated to ALARA coordinators, and use of the improvement forms was minimal.

Despite the informal means of collecting improvement ideas, the inspectors noted that the licensee maintained a very good data base for ALARA planning purposes, historical radiological information, and lessons learned from previous work activities. The major input to this data base was information collected from supervisor memos and post-job briefings. Post-job briefings, to capture lessons learned and improvement ideas, were held for all major activities, not just those required by the licensee's procedure guidance. The inspectors concluded that this was a proactive initiative.

Action items were initiated for items identified to be of benefit in maintaining exposures ALARA. Licensee management's expectation was that the action items be addressed before the next outage. The inspectors noted that the licensee maintained an action item list generated from Unit 2 Refueling Outage 12 and that implementation status was tracked.

The 3-year average site exposure (per unit) for 1993-1997 is shown below. The results of the licensee's ALARA initiatives were reflected in the decline of the Arkansas Nuclear One 3-year exposure averages. Based on the licensee's prior performance, ALARA goals were challenging.

	1993	1994	1995	1996	1997*
Licensee's 3-year average per unit	248	217	136	127	119
National PWR average	194	133	170	131	

*1997 exposure projection

c. Conclusions

The ALARA program produced good results. The 3-year average exposure per unit was below the national average for pressurized water reactors. For 1994-1997, the site 3-year average person-rem totals declined significantly. ALARA improvement ideas and lessons learned were captured and utilized well.

R5 Staff Training and Qualification

a. Inspection Scope (83750)

The inspectors interviewed radiation protection personnel and reviewed the following:

- Radiation protection technician continuing training curriculum
- Radiation protection supervisor and professional training
- Membership in professional organizations

b. Findings and Observations

Continuing training was presented in 4 to 6 cycles per year with each cycle lasting 5 weeks. Continuing training was required for all radiation protection technicians, specialists, and supervisors. Baselining exams were used to assess fundamental knowledge and to determine needed training topics for the radiation protection staff. Radiation protection personnel worked with training department personnel in determining the scope of training provided during the continuing training cycles. Each cycle provided 18-24 hours of training to the radiation protection staff. The inspectors reviewed the topics presented in continuing training in 1996 and 1997 and concluded that they were appropriate. Licensee management was active in emphasizing plant systems training, lessons learned, and fundamental knowledge.

The supervisors and professionals within the radiation protection organization were given frequent opportunities to attend off-site training, professional meetings, or peer visits. The inspectors concluded this indicated good management support by allowing continuing training in the professionals' field of expertise.

During a review of qualifications and professional development, the inspectors noted that 14 of the 67 members of the radiation protection organization successfully completed the requirements for registration by the National Registry of Radiation Protection Technologists.

Of these, two were assigned to the radiation protection operations group. The inspectors concluded that this was a relatively low percentage of the staff. The inspectors also determined that there were no certified health physicists on the radiation protection staff. There were no regulatory requirements associated with these observations.

c. Conclusions

Good continuing training programs were implemented for radiation protection technicians and professionals. The topics addressed in radiation protection continuing training were appropriate. Professionals were provided sufficient opportunities to maintain a satisfactory level of expertise. The radiation protection organization was adequately qualified.

R7 Quality Assurance in RP&C Activities

a. Inspection Scope (83750)

The inspectors reviewed the following:

- Quality assurance surveillances
- Self-assessments
- Condition reports

b. Observations and Findings

The licensee utilized audits, surveillances, and assessments to evaluate the effectiveness of the radiation protection program. The inspectors noted that frequent surveillances of radiation protection activities were performed by quality assurance personnel. No audits of the radiation protection program had been performed since the last NRC inspection in this area. A corporate assessment of radioactive material control was performed. The assessment used technical specialists from other nuclear power generating facilities. The quality of the assessment was good. Implementation of suggested improvement items was tracked by the radiation protection department.

The inspectors noted that the licensee's identification threshold for generating condition reports was proper and that the licensee was effective in evaluating the conditions and taking proper corrective action as warranted. Corrective actions were initiated in a timely manner. No negative trends were identified by the inspectors during this review.

c. Conclusions

Licensee oversight of radiation protection activities was good. Corporate assessments and quality assurance surveillances were frequent and diverse enough to provide management with accurate information on the effectiveness of the radiation protection program. The licensee effectively implemented corrective actions in a timely manner for identified conditions.

R8 Miscellaneous RP&C Issues

8.1 (Open) Violation 50-313; 50-368/9715-01: Failure to control unauthorized access to a locked high radiation area and failure to determine the radiological conditions in a work area

The inspectors determined that the licensee had not implemented all corrective actions described in the licensee's response dated August 11, 1997. Corrective actions were not expected to be complete until January 15, 1998.

8.2 (Closed) Violation 50-313;50-368/9715-02: Failure to maintain control of radioactive material outside the radiological controlled area

The inspectors verified the corrective actions described in the licensee's response letter, dated August 11, 1997, were implemented. No additional problems were identified dealing specifically with the unconditional release of radioactive material.

VI. Management Meeting

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at an exit meeting on November 6, 1997. The licensee acknowledged the findings presented. No proprietary information was identified.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

G. Ashley, Licensing Supervisor
R. Bement, Radiation Protection/Chemistry Manager
R. Edington, General Manager
D. Fowler, Quality Assurance Supervisor
E. Frix, Radiation Protection Operations Shift Supervisor
D. Mims, Licensing Director
T. Rolniak, Dosimetry Supervisor
A. South, Licensing Specialist
J. Smith, Radiation Protection Superintendent
R. Schwartz, Health Physics Specialist

NRC

J. Melfi, Acting Senior Resident Inspector
S. Burton, Resident Inspector

INSPECTION PROCEDURES USED

83750	Occupational Radiation Exposure

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-313;368/9719-01	VIO	Failure to store a radioactive source in accordance with procedural requirements; failure to secure radioactive material from unauthorized removal or access

Closed

50-313;368/9715-02	VIO	Failure to maintain control of radioactive material outside the radiological controlled area

Discussed

50-313;368/9715-01	VIO	Failure to control unauthorized access to a locked high radiation area and failure to determine the radiological conditions in a work area

LIST OF ACRONYMS USED

ALARA	As low as is reasonably achievable
ERIMS	Entergy Radiological Information Management System
TLD	Thermoluminescent dosimeter

LIST OF DOCUMENTS REVIEWED

Procedures

1012.020, Radioactive Material Control, Revision 4

1012.026, Respiratory Protection, Revision 2

1012.027, ALARA Program, Revision 2

1601.201, Issue and Control of TLDs, Revision 3

1601.205, Personnel Dose Assignment, Revision 4

1601.603, Breathing Air, Revision 1

Assessments and Surveillances

Radioactive Material Control Assessment, July 21-24, 1997

Quality Assurance Surveillance Reports:

SR-025-97, "Radworker Practices/Contamination Control," June 16, 1997

SR-026-97, "Radiological Postings," June 16, 1997

SR-036-97, "HP Job Coverage During 2R12," August 8, 1997

SR-037-97, "Whole-Body Counting," August 11, 1997

SR-039-97, "Documentation Completeness of Routine RP/RW Tasks," August 22, 1997

SR-046-97, "Radiological Postings Outside Controlled Access," September 10, 1997

Other Documents

Radiation protection organization chart dated 10/20/97

List of condition reports and radiological information reports assigned to the Radiation Protection organization for disposition since the beginning of the assessment period (July 7, 1996).

List of topics covered in RP technician continuing training during 1996 and 1997

1997 ALARA Committee meeting minutes

Unit 2 Refuel 12 ALARA Success Report

Octobor 1997 Radiation Protection Monthly Report