

U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
REGION IV

REPORT OF INVESTIGATION

IE Investigation Report No. 78-05

Docket No. 50-313

Subject: Arkansas Nuclear One, Unit No. 1

Investigation based on a report that a reactor coolant line had broken resulting in spread of contamination throughout the reactor building and exposure of individuals requiring administration of chemicals internally to three individuals.

Period of Investigation: February 13 and 14, 1977

Investigator:

J. B. B  
J. B. B  
Radiation Specialist

3/6/78  
Date

Approved by:

*for* Blaine Murray  
Glen D. Brown, Chief, Fuel Facility and  
Material Safety Branch

3/6/78  
Date

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REASON FOR INVESTIGATION

A telephone call was received from the Associated Press, Little Rock, Arkansas, on February 9, 1978, inquiring about information they received from an informant that a coolant line had ruptured, resulting in contamination of the plant and exposure of three individuals requiring internal chemical treatment.

SCOPE OF INVESTIGATION

To determine the veracity of the informant's report, and if verified, to determine if personnel exposures exceeded regulatory requirements.

CONCLUSIONS

The licensee discovered a leak in a Reactor Coolant Pump Seal water sensing line on February 3, 1978, during a shutdown for a planned refueling outage. Contamination, including <sup>131</sup>I, was found to have been spread throughout containment by the circulating fans. Numerous persons were contaminated externally and internally during work in containment. Exposures and containment contamination did not exceed regulatory requirements and was not reportable to NRC.

SUMMARY OF FACTS

On February 9, 1978, the Associated Press, Little Rock, Arkansas, contacted Region IV inquiring about information they received from an informant that a coolant line had ruptured and the coolant had hit a fan resulting in exposure of three individuals requiring internal chemical treatment. The leak was further reported to have been in an instrument line and all five floors of the plant were contaminated.

This investigation verified that the licensee had discovered a leak in a Reactor Coolant Pump Seal water sensing line on February 3, 1978, during shutdown for a planned refueling outage. The primary coolant leak released radioactivity, including <sup>131</sup>I, which apparently was picked up by the containment air circulating fans, resulting in spread of relatively high levels of contamination throughout containment. The leakage was stopped by manual closure of an isolation valve.

As a result of the initial inspection in containment, closure of the isolation valve and subsequent activities in the containment, several individuals were externally and internally contaminated. Records of whole body counting show that 32 individuals had some intake of  $^{131}\text{I}$ . The maximum internal contamination for any individual was about 5.4 percent of the recommended Maximum Permissible Body Burden (MPBB) for  $^{131}\text{I}$ , and about 4.1 percent of the MPBB for  $^{60}\text{Co}$ .

The personnel exposures and contamination levels in the controlled area of the containment did not exceed regulatory requirements and were not reportable to the NRC.

DETAILS

1. General

The Region IV office received a telephone call from the Associated Press, Little Rock, Arkansas, on February 9, 1978, inquiring about information they received from an unidentified informant that a coolant line had ruptured at Arkansas Nuclear One, Unit No. 1 (ANO-1) sometime within the last 14 days and toxic fumes had been emitted. The coolant had hit a fan resulting in exposure of three people to radioactive material such that they had to be treated with chemicals internally. This leak was further reported to be in an instrument line and all five floors of the plant were contaminated.

On February 10, 1978, information was received from ANO-1 that the only known leak was in a line from Reactor Coolant Pump "C" low pressure seal to a pressure transmitter. The line had been found to be leaking during an inspection in containment just prior to shutdown for a planned refueling outage. The leak was described as "very small" and no cases of excessive radioactivity exposures or ingestions was known. In addition no chemicals or "antidotes" for ingestion of radioactive material had been administered.

On February 13 and 14, 1978, a RIV Radiation Specialist visited ANO-1 to investigate the status of plant operations during the two week period prior to February 9, 1978. The investigation consisted of an examination of selected records and interviews with ANO-1 personnel.

2. Persons Contacted

Arkansas Power and Light, Co. (AP&L)

J. W. Anderson, Plant Superintendent  
C. H. Halbert, Technical Support Engineer  
L. Alexander, QC Engineer  
B. T. Moon, Operations Shift Supervisor  
C. P. Zimmerman, Operator  
R. A. Capehart, Operator  
G. E. Redmon, Operator  
M. M. Nichols, Assistant Health Physics Supervisor  
R. E. Fishencord, Health Physicist

3. Description of Coolant Leakage

Licensee representatives stated that the only known coolant line leakage during the period in question occurred in the seal water pressure sensing line from Reactor Coolant Pump "C". This leakage into containment, estimated to be about 0.3 to 0.4 gallons per minute (GPM), was discovered on February 3, 1978, during an inspection in containment. The reactor at this time was in a hot shutdown condition in preparation for a planned refueling outage. The leakage was found to be between two isolation valves and was stopped by manually operating the isolation valves.

Licensee representatives also stated that contamination was found through most of the Reactor Building containment, necessitating a few days of decontamination. No overexposures were experienced and no medical care or administration of chemicals to workers was necessary.

4. Records

a. ANO Station Log-Operations

The ANO Station Log was reviewed for the period January 23, 1978 through February 9, 1978. The following entries were noted:

<u>Date</u>	<u>Shift/Time</u>	<u>Item</u>	<u>Plant Status</u>
1/31	D 1720 hours	Chemist checked reactor building (RB) atmosphere	40% power
2/2	D 1606 hours	Start RB purge	Reducing Power
2/3	A 0035 hours	2 men in RB for leak inspection	Hot Shutdown
2/3	A 0120 hours	2 men out of RB	Hot Shutdown
2/3	B 1040 hours	RCS cooldown	Cooldown
2/3	B 1623 hours	Reactor trip	Cold Shutdown

b. Health Physics Log

The ANO-1 Health Physics Log was reviewed for the period January 23, 1978, through February 9, 1978. The following significant entries were noted:

<u>Date</u>	<u>Item</u>
2/2	Reactor Building (RB) air sample taken.
2/3	Numerous people contaminated when exited RB. Hands and hair contaminated. Smears from levels 424, 401 and Polar Crane taken. All areas greater than 20,000 dpm/100cm <sup>2</sup> , 80% of areas greater than 100,000 dpm/100cm <sup>2</sup> (removable contamination). All phones on levels 424 and 401 contaminated.
2/4	Decontamination on RB started. Several people contaminated; all washed to background.
2/5	RB air samples taken.

c. Air Sample Results

Records of the results of various air samples taken before and after the initial entry into containment were reviewed as shown below. The air sample results show that airborne concentrations of <sup>131</sup>I were above the Maximum Permissible Concentration (MPC) of 9E-9 uCi/ml prior to the shutdown, and also the particulate airborne radioactivity was above the level of 1E-9 uCi/ml, at which respiratory protection equipment is required by Health Physics procedures.

<u>Record</u>	<u>Date/Time</u>	<u>Nuclide</u>	<u>Concentration(uCi/ml)</u>
Purge Release	1/31 1720 hrs.	<sup>131</sup> I	1.1 E-8
Air Sample Log	2/2 2025 hrs.	Particulate	6.5 E-8
		<sup>131</sup> I	9.7 E-8
Air Sample Log	2/2 2225 hrs.	Particulate	7.1 E-8
		<sup>131</sup> I	1.0 E-7
Air Sample Log	2/3 0530 hrs.	Particulate	2.5 E-8
		<sup>131</sup> I	5.3 E-11
Air Sample Log	2/3 0830 hrs.	Particulate	3.5 E-9
Air Sample Log	2/3 0917 hrs.	Particulate	3.7 E-9
Air Sample Log	2/3 2038 hrs.	Particulate	3.7 E-9
Health Physics Log	2/5	Particulate	1.0 E-9
Health Physics Log	2/6	Particulate	6.1 E-10
		<sup>131</sup> I	2.3 E-10

d. Whole Body Counting Results

The investigator reviewed the results of whole body counts for the period February 1 through February 8, 1978. The following tabulation shows the type and number of workers in which <sup>131</sup>I was detected. Results for <sup>60</sup>Co are also included.

<u>Job Title</u>	<u>No. Counted</u>	<u>Dates Counted</u>	<u>% MPBB</u>	
			<u><sup>131</sup>I</u>	<u><sup>60</sup>Co</u>
Laborer	7	2/6	0.4-1.1	0.7-1.4
Engineer	1	2/7	0.8	2.6
Electrician	2	2/3	2.6-4.0	0.5-3.4
Janitor	7	2/4	0.9-5.4	0.4-2.8
Mechanic	1	2/5	1.4	2.3
Operator	1	2/3	0.4	2.3
Health Physicist	9	2/4 - 2/8	0.5-3.2	0.6-4.1
Maintenance Repair	1	2/5	1.4	2.0
Assistant Professor	1	2/3	0.9	0.7
Technician	2	2/3	0.2-0.3	0.5

5. Interviews

The following information was obtained from interviews:

a. R. A. Capehart, Operator

Mr. Capehart stated that he entered containment with C. Zimmerman on February 3, 1978, to inspect for leaks. He stated that they noted water dripping like rain on the lower level of containment. He stated that he climbed a ladder to investigate the source of leakage and found the leakage spraying toward Reactor Coolant Pump "C" from a small line between two valves. He obtained a valve number so that the line could be identified and the leakage stopped. He stated that during the inspection he had protective clothing on and was wearing 3M backpack and hood respiratory protection equipment. He further stated that no contamination was found on his body when he exited containment and he was not treated with any chemicals.

b. C. P. Zimmerman, Operator

Mr. Zimmerman stated that he entered containment with Mr. Capehart to make a leak inspection on February 3, 1978. He stated that he saw the water falling but did not spend much time in this

area as he had to inspect the other side of containment. He stated no fans were operating except the containment cooling fans which operate during purge of the containment atmosphere. He stated that he was wearing the same type of protective clothing and respiratory protection as Mr. Capehart, and no contamination was found on his body. He also stated that he was not treated with any chemicals.

c. G. E. Redmon, Operator

Mr. Redmon stated that he entered containment on February 3, 1978, subsequent to the leak identification, to isolate the line that was leaking by manually operating the isolation valves. He stated that he was able to complete this task in about three minutes of stay time. He stated that his protective clothing was supplemented with a full plastic suit and double sets of gloves, and he was using a self-contained breathing apparatus (SCBA) type of respiratory protection device. Mr. Redmon stated that contamination was found on his hand upon egress from containment and he was required to shower and wash his hand several times. He stated that his hand was still contaminated after the washings and a chemical decontamination agent (potassium permanganate) was used. He further stated that a plastic bag was placed over his hand and he "sweated out" the remaining contamination in a short time. He also stated that no chemicals were administered internally and no further restrictions were placed on his operations.