

Omaha Public Power District

P.O. Box 399 Hwy. 75 - North of Ft. Calhoun Fort Calhoun, NE 68023-0399
402/636-2000

November 6, 1992
LIC-92-262L

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Reference: Docket No. 50-285

Gentlemen:

Subject: Licensee Event Report 92-029 for the Fort Calhoun Station

Please find attached Licensee Event Report 92-029 dated November 6, 1992. This report is being submitted voluntarily to provide the NRC with detailed information that may have generic implications at other nuclear power plants. If you should have any questions, please contact me.

Sincerely,

W. G. Gates

W. G. Gates
Vice President - Nuclear

*GG/lah

Attachment

c: J. L. Milhoan, NRC Regional Administrator, Region IV
S. D. Bloom, NRC Project Manager
R. P. Mullikin, NRC Senior Resident Inspector
INPO Records Center

120037

JE27

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Fort Calhoun Station Unit No. 1

DOCKET NUMBER (2)

05000285

PAGE (3)

1 OF 5

TITLE (4)

Intake of Radioactive Material

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	16	92	92	-- 009 --	00	11	06	92	FACILITY NAME	DOCKET NUMBER
										05000
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more) (11)							
POWER LEVEL (10)		000	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
			20.405(a)(1)(ii)		50.35(c)(2)		50.73(a)(2)(vii)		X OTHER	
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in narrative below and in Text, NRC Form 388A)	
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)			
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		Voluntary Report	

LICENSEE CONTACT FOR THIS LER (12)

NAME

Kenneth E. Steele, Acting Sup., Rad. Health & Engr.

TELEPHONE NUMBER (include Area Code)

(402) 533-7159

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE)

X NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 16, 1992 a Maintenance Work Order was performed to change out the Chemical and Volume Control System Letdown Purification Filters CH-17A and B. During the course of this work a Radiation Protection Technician, responding to a heat stress situation involving two workers, received an unanticipated intake of radioactive materials.

This intake is of significance in that transuranics (i.e., elements with an atomic number greater than that of uranium), along with activation and fission products were taken into the body. A calculated exposure of 366 Maximum Permissible Concentration-Hours (MPC-Hrs) has been determined, which is less than the 10 CFR 20 limit of 520 MPC-Hrs/Quarter. This LER is being submitted as a voluntary report.

The root causes of the event were found to relate to the filter design not facilitating changing of the filters, deficiencies in the method used to change the filters and delays which allowed the filter media to become relatively dry.

Corrective actions include revisions to Maintenance and Radiation Protection procedures, and evaluating a potential change in filter design.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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		92	-- 029 --	00	

TEXT (If more space is required, use additional copies of NRC Form 386A) (17)

BACKGROUND

The Chemical and Volume Control System (CVCS) Letdown Purification Filters (CH-17A and CH-17B) are designed to filter impurities from the Reactor Coolant System. These filters perform this function by trapping and retaining particulate contaminants on the filter media. The used filters are normally replaced, during refueling outages, in a wet condition to minimize the spread of contamination.

EVENT DESCRIPTION

The Fort Calhoun Station (FCS) was shut down for a normal refueling and maintenance outage on February 1, 1992. Maintenance Work Order (MWO) 914222 was written to change Letdown Purification Filters CH-17A and B. These filters had not been changed for two operating cycles. Per Engineering Change Notice (ECN) 91-228, the MWO was to replace the existing 5 micron filters with 2 micron filters to reduce the radiological source term. The filters were taken out of the system lineup on April 1, 1992 and the MWO was released from Operations to work. Pre-job surveys were performed by the Radiation Protection (RP) Department and an "As Low As is Reasonably Achievable" (ALARA) planning review was completed. A Radiation Work Permit was generated to support this task and an ALARA briefing was held on April 2, 1992, just prior to the work crew beginning the task.

The task was started and the work crew discovered that they could not remove the shielding above the filter housings due to an error in the procedure. The job was delayed until a proper procedure revision could be obtained. The second attempt to complete the task was delayed when extended core inserts, which were required to hold the new filter elements in place, were not available (an ALARA briefing was conducted prior to this second attempt to do the work). These extended core inserts had to be ordered and receipt inspected in the Warehouse prior to the job proceeding.

On April 16, 1992, a third ALARA briefing was conducted and the work resumed. The used filters (which had become relatively dry since the system had been drained) were removed by the work crew and placed into drums which were sealed and then taken to a storage area. An RP Technician was assigned the responsibility of escorting the sealed drums to the storage area. Since he was located outside the room where the filter change was in progress, he was not required to wear a respirator. Only the individuals working inside the filter room and above the room removing shielding were in respiratory equipment. This included three Pressure Equipment Craftspersons, a Quality Control Inspector, a Radioactive Waste Technician and another RP Technician who was in the room performing job coverage.

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Fort Calhoun Station Unit No. 1	05000285	92	-- 029 --	00	3 OF 5

TEXT (If more space is required, use additional copies of NRC Form 360A) (17)

The RP Technician outside the room had successfully escorted the used filters to the storage area and returned to the filter room expecting to see the workers exiting the area. He approached the step off pad to the Highly Contaminated Area (HCA) and noticed two workers in obvious physical stress due to heat exhaustion. The work had been performed in a highly contaminated area and the workers had been dressed in double layers of protective clothing which included plastic suits. He assisted in the removal of the outer layer of protective clothing and the respirators and escorted the two workers out of the immediate area. It is suspected that he inhaled/ingested the radioactive material during this evolution. He later returned to the step off pad and assisted the other RP Technician in removing bags of trash, clothing, tools, and respirators from the HCA.

Upon exiting the Radiation Controlled Area (RCA) the RP Technician caused a portal monitor to alarm. He was attended to in the RP Count Room where positive nasal smears were detected and an initial decontamination was performed. He was then taken to the Whole Body Counter for a series of Whole Body Counts. The results of air samples taken in the filter room were completed and indicated the presence of alpha emitting nuclides. As required by Fort Calhoun Station procedures, a series of bioassay samples were collected. A total of four urine samples and one fecal sample were collected over the following five days. These samples were sent to an independent laboratory for analysis. Initial exposure calculations were performed to determine exposure in Maximum Permissible Concentration-Hours (MPC-Hrs) per 10 CFR 20 Appendix B. The ratios of alpha to gamma emitting isotopes from previously measured waste streams were used as the basis for the calculations. An initial estimate of approximately 45 MPC-Hrs was determined pending the results of the bioassay samples. This is below the 10 CFR 20 limit of 520 MPC-Hrs/Quarter.

EVALUATION/SAFETY ASSESSMENT

The results of the bioassay samples were received on July 16, 1992. These results showed that the RP Technician had potentially been exposed to airborne contamination levels much higher than expected. The calculations, based on the results of the urine samples only, indicated that the exposure had potentially exceeded the 520 MPC-Hrs/Quarter regulatory limit. The samples indicated the presence of Americium 241, Curium 242, Curium 243/244, Plutonium 238, Plutonium 239/240, and Plutonium 242. The ratio of these transuranics was much different than had been measured in smear samples taken at FCS in December 1985.

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TEXT (If more space is required, use additional copies of NRC Form 385A) (17)

A significant effort was then initiated to determine the exact exposure. Two experts in the field of Internal Dosimetry were retained to assist the Omaha Public Power District (OPPD) in the evaluation. The NRC was briefed on the investigation and apprised of intended actions. Contacts were made with several nuclear utilities and several Department of Energy (DOE) facilities that routinely handle transuranics. Data was input into several commercially available internal dosimetry models to obtain upper and lower bounding values for the exposure.

The most appropriate calculation of the exposure was obtained using a combination of urine, fecal and whole body count data. Based on the guidance of NUREG/CR4884, an exposure of 366 MPC-Hrs was calculated. This has been determined to be the best estimate with respect to regulatory models and has been assigned to the individual.

This LER is being submitted as a voluntary report. The intake reported in this LER is of significance in that transuranics (i.e., elements with an atomic number greater than that of uranium), along with activation and fission products were taken into the body. The calculated exposure value of 366 MPC-Hrs is less than the regulatory limit of 520 MPC-Hrs/Quarter, but exceeded a FCS administrative limit of 40 MPC-Hrs/Week. Actual excretion data indicates that the true exposure could be postulated to be on the order of 100 MPC-Hrs, but this exposure could not be assigned within the assumptions used as the basis for the regulatory model and the recommendations of International Commission on Radiation Protection (ICRP) 30. It should be noted that both of the internal dosimetry experts were in agreement that the actual exposure was much less than the 366 MPC-Hrs conservatively assigned to the individual.

CONCLUSIONS

A Root Cause Analysis was performed. Three root causes were identified:

The filter design does not facilitate easily changing the filters,

The method used to change the filters promotes the spread of contamination and physical stress of the workers, and

The CVCS system was drained for maintenance and then the filter maintenance was delayed. This allowed the filter media to become relatively dry, allowing the contaminants to become re-suspended.

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The investigation also determined that a leaking fuel pin, identified during the 1992 Refueling Outage, may have contributed to the transuranic activity in the system. Failure to have all of the parts available to perform the job led to delays in completing the task. The accompanying procedures were not correct and required procedure changes, which added to delays. The ALARA planning work package was not evaluated for changing radiological conditions or the consequences of the filters drying as the work was delayed.

This event could have been prevented if the job had been completed without the delays experienced in performing the task or if procedures had been written to accommodate potential delays in performing the task.

CORRECTIVE ACTIONS

The following corrective actions have been or will be completed:

1. Procedure RP-301, "ALARA Job Reviews" was revised to include guidance for reviewing the work plan when work is delayed. Procedure RP-201, "Radiation Work Permits" was also revised to provide guidance for reviewing the Radiation Work Permit when work is delayed.
2. The Maintenance Procedure for changing the filters (PE-RR-CH-0200) will be revised by December 31, 1992 to include guidance on keeping the filter elements wet prior to change out.
3. An Engineering Assistance Request (EAR 92-209) will be evaluated by February 5, 1993, to consider changing CH-17A and B to a single filter assembly in each filter housing (in order to facilitate filter changes and reduce the potential for spread of contamination).

PREVIOUS SIMILAR EVENTS

No previous events involving intake of transuranics have been identified.