

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

REGION III

Report No. 50-010/78-23  
50-237/78-21  
50-249/78-23

Docket No. 50-10; 50-237; 50-249 License No. DPR-2, DPR-19, DPR-25

Licensee: Commonwealth Edison Company  
P. O. Box 767  
Chicago, IL 60690

Facility name: Dresden Nuclear Power Station, Units 1, 2, and 3

Inspection at: Dresden Site, Morris, IL

Inspection conducted: August 7-10 and 16-18, 1978

Inspector: L. R. Greger

*LR Greger*

9/5/78

Approved by: W. L. Fisher, Chief, Fuel Facility Projects  
and Radiation Support Section

*W. L. Fisher*

9/6/78

Inspection Summary

Inspection on August 7-10 and 16-18, 1978 (Report No. 50-010/78-23;  
50-237/78-21; 50-249/78-23)

Areas Inspected: Routine, unannounced inspection of reactor coolant radiochemistry and liquid and solid radioactive waste systems, including: effluent releases; onsite storage; records and reports of effluents; effluent control instrumentation; procedures for controlling releases; licensee event reports; and licensee action on previously identified enforcement items and commitments. (Units 1, 2, and 3.) The inspection involved 60 inspector-hours on site by one NRC inspector.

Results: Of the ten areas inspected, no items of noncompliance were found; one deviation was found in one area (Deviation - failure to meet FSAR commitment for monitoring Unit 2/3 liquid radwaste effluents - Paragraph 7).

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## DETAILS

### 1. Persons Contacted

- \*D. Adam, Radiation Chemistry Supervisor
- \*G. Bergan, Chemist
- J. Chan, Engineer
- P. Duggan, Engineer
- \*D. Eggett, Chemist
- \*D. Farrar, Supervising Engineer
- W. Hildy, Instrument Engineer
- M. Paris, Health Physicist
- \*J. Parry, Health Physicist
- G. Reimers, Engineer
- T. Schneider, Chemist
- \*J. Skoryi, Radwaste Planner
- \*B. Stephenson, Station Superintendent
- J. Testa, Assistant Engineer

The inspector also contacted several other licensee employees, including members of the technical and engineering staffs.

\*Denotes those attending the exit interview.

### 2. General

This inspection, which began at 5:00 p.m. on August 7, 1978, was conducted to examine the licensee's radioactive waste activities for compliance with NRC requirements. The licensee's derivations and records of radioactive liquid effluents were reviewed and compared with the releases reported in the licensee's semiannual effluent reports. Liquid effluent monitor calibrations, solid radioactive waste operations, and reactor water radiochemistry conditions were also reviewed.

### 3. Licensee Action on Previous Inspection Findings

(Closed) Noncompliance (50-10/78-15, 50-237/78-13, 50-249/78-15): Failure to possess documents referred to in certificate of compliance and failure to notify NMSS prior to first use of a shipping container. The required documents had been acquired and NMSS had been notified.

(Closed) Noncompliance (50-10/78-15, 50-237/78-13, 50-249/78-15): Failure to maintain required records for radioactive material shipments. The required records have been maintained for radioactive material shipments made subsequent to the previous inspection.

(Closed) Unresolved Item (50-10/77-10, 50-237/77-11, 50-249/77-11): Use of a buildup factor greater than 1.0 in solid radioactive waste activity determination procedure. The licensee's procedure was revised to use a buildup factor of 1.0.

(Closed) Unresolved Item (50-10/77-30, 50-237/77-27, 50-249/77-26): Dilution provided by Unit 2/3 cooling lake. The inspector reviewed documentation of the dilution available to Unit 2/3 service water releases. The dilution is more than adequate to ensure compliance with release limits for cooling lake blowdown to the river.

#### 4. Radioactive Liquid Releases

The inspector selectively reviewed the licensee's liquid discharge permits (DCP 1400-2), calculation and discharge checklists (DOP 2000-25 and DOP 2000-28), and "Liquid Radioactive Waste Discharge Records" for 1977 and 1978, (through June). Except as noted during a previous inspection,<sup>1/</sup> no release exceeding the technical specification limit was identified. Liquid radioactive releases from Unit 1 were limited to laundry waste, as they have been since January 1976 when other liquid radwaste from Unit 1 was directed to the Unit 2/3 augmented liquid radwaste system for processing.

Approximately two laundry discharges per day occurred during the period reviewed. The discharges from Unit 1 averaged about 50 mCi/mo. and 2E5 l/mo. The licensee plans to replace the conventional laundry facilities with a dry cleaning system by late 1978. This modification should greatly reduce or eliminate liquid radwaste releases from Unit 1. Radioactive liquid wastes were released from Unit 2/3 from December 1977 through May 1978 at a rate of approximately two per week. The releases were necessitated by generation of liquid wastes at a greater rate than could be stored and processed for reuse. The total activity released during this period was about 800 mCi in 5E6 liters of effluent.

Liquid effluent quantification consists of prerelease gross beta analyses and quarterly isotopic analyses, including tritium, of representative batches. No discrepancies from the technical specification surveillance requirements were identified.

<sup>1/</sup> IE Inspection Report 50-10/77-30.

Liquid radwaste treatment is essentially unchanged from previous inspections. Laundry effluents are filtered before release to the Unit 1 circulating water system for discharge to the Illinois River. Unit 2/3 liquid radwaste treatment consists of a combination of filtration, demineralization, and evaporation designed to allow reuse of most liquids. When releases are necessary, the liquid effluent is diluted with blowdown from the Unit 2/3 cooling lake before release to the Illinois River. The demineralizers in the maximum recycle portion of the Unit 2/3 treatment system continue to be bypassed due to the efficiency of the evaporators for removing activity from the liquid wastes. Approximately 100 mCi of radioactive liquids have been released from Units 2/3 over the past year due to leakage and subsequent contamination of the containment cooling heat exchangers in the low pressure coolant injection (LPCI) system. These releases are made to the service water system which goes to the Unit 2/3 cooling lake before release to the Illinois River or reuse within the plant. (See Paragraph 12 for additional information concerning LPSI releases.)

No items of noncompliance or deviations were identified.

5. Radioactive Liquid Storage

The inspector selectively reviewed the licensee's records of above ground storage of radioactive liquids for 1977 and 1978 (through June). Except as previously reported by the licensee, no discrepancies from the technical specification activity or surveillance requirements were identified.<sup>2/</sup>

An operating surveillance procedure for Unit 1 radioactive liquid storage was being completed at the time of the inspection. Surveillance procedure DOS 2000-1 describes surveillance activities for the Unit 2/3 storage tanks. Chemistry and radiation protection procedures relating to storage activities do not specify internal notification levels or the storage tanks to be sampled for Unit 1. These items are specified for Unit 2/3 storage tanks. These matters will be reviewed further during a future inspection.

No items of noncompliance or deviations were identified.

6. Effluent Reports

The inspector reviewed the licensee's radioactive effluent reports for 1977 (liquid and solid radwaste) and corrections to the 1976 effluent reports.<sup>3/</sup> There are no further questions regarding the 1976 effluent reports. Selective comparison of the reported radioactive liquid effluents and solid shipments with the licensee's analysis records did not identify any discrepancies in the 1977 data.

No items of noncompliance or deviations were identified.

2/ LER 50-237/78-27.

3/ IE Inspection Report 50-10/77-10, 50-237/77-11, 50-249/77-11.

7. Effluent Control Instrumentation

The adequacy of the licensee's liquid radwaste effluent monitoring has been the subject of recurrent NRC concern since at least 1971 when the licensee committed to investigate methods for improving the sensitivity of the Unit 2/3 monitor.<sup>4/</sup> Internal and external radiation levels had rendered the monitor ineffectual for monitoring releases at or below the technical specification limits. A study of the methods to improve the sensitivity of liquid process monitors was completed in September 1974.<sup>5/</sup> The recommended action, installation of off line monitors, was completed during 1976 and testing of these monitors, Unit 2/3 service water and radwaste, extended into 1977. Although the NRC had acknowledged that the new radwaste monitoring system was superior to the original monitors in terms of sensitivity and correlation to actual discharges,<sup>6/</sup> the licensee removed the monitoring systems from operation in December 1977, thereby reverting to dependence on the ineffectual original monitors for detection of radioactive releases from the service water and radwaste systems. The reason stated for abandoning the new monitoring systems was that the sensitivity could not be made low enough to meet the FSAR commitment of  $3E-6$   $\mu\text{Ci/ml}$ . According to licensee personnel, a detection limit of  $1.1E-5$   $\mu\text{Ci/ml}$  was achieved. Using a nominal dilution of 1000 for radwaste system releases, the technical specification release limit of  $1E-7$   $\mu\text{Ci/ml}$  should be easily detectable.

Section 7.6.2.5 of the Unit 2/3 FSAR describes the liquid monitoring systems. The description of the radioactive waste disposal monitor notes that the monitor will "show changes in the discharge radiation levels" and will be equipped with an alarm which will be set "considerably lower than the discharge limit." The original monitoring system does not meet these requirements, due to excessive internal and external radiation levels. The licensee has not satisfied the FSAR commitments regarding the liquid radwaste monitor, particularly since abandonment of the offline monitoring system which apparently was capable of detecting liquid radwaste releases at and somewhat below the technical specification requirements for liquid discharges.

The inspector noted that the quarterly calibrations performed on the original liquid monitors for both Unit 1 and Units 2/3 did not include correlation of the monitor response to liquid activities as defined in Technical Specification 1.E. The calibration performed on the abandoned offline monitoring system was noted to have met these requirements during a previous inspection.<sup>7/</sup> The technical specification requirement for calibrating the radwaste monitors is unclear since Technical

<sup>4/</sup> Ltr. Grier to Lee dtd 8/2/71 (CO Rpt. No. 71-006)  
<sup>5/</sup> An Engineering Study of Ways to Improve the Sensitivity and Simplify the Calibration of Service Water and Other Monitors - September 1974

<sup>6/</sup> IE Inspection Report 50-10/77-07, 50-237/77-07, 50-249/77-07.  
<sup>7/</sup> Ibid.



Specification 3.8.C.1 states that either the radwaste monitors or the canal samplers can satisfy the requirement to provide continuous monitoring of radioactive liquid releases. The canal samplers collect 24-hour composite samples which are analyzed by the licensee to determine activity levels in the discharge canal. The canal samplers have not experienced extensive out-of-service time and are verified operable daily and prior to all planned discharges. If the canal samplers are used to meet the technical specification requirements for continuous monitoring, then the calibrations specified in Technical Specification 4.8.C.1 may not be necessary. This matter will be referred to NRR for resolution.

Liquid releases from Units 2/3 are routinely made from the radwaste system and infrequently via the service water system. These release paths are equipped with inline scintillation detectors (NaI) which, as previously noted, are of limited usefulness due to internal and external radiation buildup. The new offline monitors were also monitoring these discharges. Except for laundry discharges, Unit 1 liquid radwaste is transferred to the Unit 2/3 radwaste system for treatment and discharge, as necessary. The laundry waste is discharged via the Unit 1 circulating water system and is not monitored before release. The Unit 1 radwaste monitor has not been operable since 1976 when Unit 1 radwaste began to be treated via the Unit 2/3 radwaste system. The only operable liquid effluent monitor for Unit 1 is the service water monitor. Both Unit 1 and Unit 2/3 discharge canals are sampled by their respective composite samplers.

The canal samplers collect composite samples from the Unit 1 and Unit 2/3 discharge canals. Aliquots of the composites are analyzed (gross beta) daily by the licensee. A weekly composite is analyzed by the licensee's contractor for gross alpha, gross beta, and iodine-131 and a quarter composite is analyzed for strontium-89, strontium-90, and tritium. Gross beta results from the contractor's analyses are typically less than  $1\text{E}-8$   $\mu\text{Ci}/\text{ml}$  and indiscernible from intake canal samples. The licensee does not normally detect activity above the minimum detectable activity ( $0.5-1.0\text{E}-7$ ) of their gross beta analyses.

8. Procedures for Controlling Releases

The inspector reviewed new and revised procedures (through June 1978) related to radwaste management. Except as noted elsewhere in this report, no significant problems related to procedure format, content, or adherence were found.

No items of noncompliance or deviations were identified.

9. Reactor Coolant Water Quality

The inspector selectively reviewed the licensee's reactor coolant radiochemistry surveillance records for the period from January 1977 through June 1978 for compliance with the technical specification requirements.

Reactor coolant total iodine activities averaged less than 10% of the technical specification limit for all three units. No reactor coolant activities in excess of the technical specification limits were noted. Except for two occasions when the fuel was removed from the reactor and one occasion when a containment leak rate test was in progress, no discrepancies from the radiochemistry surveillance requirements were identified.

The inspector requested that the licensee correct inconsistencies contained in procedures DCP 1200-5, DCP 1710-4, and DCP 1400-5 regarding reactor coolant activity notification levels and recording internal notifications required by the above procedures.

No items of noncompliance or deviations were identified.

10. Solid Radioactive Waste

Unit 1 solid radwaste consists of spent resin, filter sludge, and dry active waste (DAW) which includes filters, paper, rags, etc. The spent resins and filter sludges are stored in underground tanks which were last processed and shipped offsite for disposal during 1975. Solidification and disposal of the spent resins and filter sludge tanks contents is not expected to be required until completion of the Unit 1 decontamination. At that time, modifications are scheduled which will allow the decontamination solidification equipment to be used for solidification of the spent resins and filter sludges. The burial tanks were originally intended to be capable of containing all the spent resin and filter sludge generated during the plants' lifetime. Installation of level instrumentation and pumps to prevent overflowing of the sludge and resin burial tanks was still in progress. The licensee now estimates completion of these modifications by the end of 1978. The licensee had originally estimated completion of the modification by mid-1976; this estimate was subsequently revised to April 1978. 8/9

8/ IE Inspection Report 50-10/75-4.

9/ IE Inspection Report 50-10/76-26.

Unit 2/3 solid radioactive waste consists of spent resin, filter sludge, evaporator bottoms, and DAW. The original concrete solidification system continues to be operated while work progresses on a replacement system, also concrete. The original system suffered from: (1) insufficient tank capacities to optimally utilize evaporator bottoms for dilution when solidifying spent resins and filter sludges and for utilizing mixtures of resins and sludges, (2) a lack of proper metering of solidification constituents, resulting in partially filled barrels, (3) ineffectual cleaning design for the mixer blades, thereby requiring hand cleaning with resultant excessive personal exposures, and (4) mechanical problems with the overhead monorail in the storage area which required hand movement of processed drums and additional personal exposures. In addition, the original capper did not function properly due to mechanical problems nor did its location in the system allow for time to ensure and check solidification and cessation of heat/gas generation which bulged barrels on occasion. A replacement capper was installed, and processed barrels are stored uncapped temporarily to preclude overpressurization and allow checking of solidification. The replacement system, scheduled for completion in late-1978 is expected to alleviate the problems encountered with the original system.

Personal exposures incurred due to Unit 2/3 solid radwaste operations are estimated to be about three mrem per month. Ten to fifteen barrels of radwaste are processed in a typical day.

No items of noncompliance or deviations were identified.

#### 11. Radioactive Materials Shipments

The inspector reviewed the licensee's shipment records for 1977 and 1978 (through June). The average monthly curie content of DAW and solidified waste shipments for 1977 and the first six months of 1978 were comparable to the previous year's shipments. Solidified wastes are shipped as transport Group III based on gamma spectral and strontium analyses of representative samples. A strontium analysis conducted during July 1977 indicated that strontium-90 contributed less than 0.2% of the total activity. Reactor coolant strontium activities are used to detect changes in the ratio of strontium-90 activity to total activity.

The mathematical model used by the licensee for quantification of solidified waste activities was revised to use a buildup factor of 1.0. This resolves an outstanding concern raised during a previous inspection. <sup>10/</sup>

<sup>10/</sup> IE Inspection Report 50-10/77-10, 50-237/77-11, 50-249/77-11.



As a result of findings during a previous inspection: (1) a checklist for recording the information required by 10 CFR 71.62 has been instituted, (2) the required notifications before first use of Type B containers had been made, and (3) copies of all documents referenced in the certificates of compliance had been procured.<sup>11/</sup>

No items of noncompliance or deviations were identified.

12. Review of Nonroutine Events

The inspector reviewed the licensee's actions with respect to the radiological aspects of the following licensee event reports.

LER 50-10/77-41:	Radwaste leakage from C-holdup tank (10/23/77) Revised - 8/18/78
LER 50-237/77-56:	Containment cooling heat exchanger leakage (11/4/77) Revised - 8/18/78, 1/20/78
LER 50-10/78-08:	Radwaste leakage from instrument line (2/3/78) Revised - 8/18/78
LER 50-10/78-17:	Radwaste spill from resin mixing tank (2/23/78)
LER 50-249/78-25:	Containment cooling heat exchanger leakage (6/7/78) Revised - 8/18/78
LER 50-237/78-27:	Excessive activity in above ground storage tank (4/18/78)
Ltr., Stephenson to Keppler (dtd 5/16/78):	Inadvertent pumping of contaminated water to construction area (6/5/78)

Errors were identified in several of the reports during the inspection. Revised reports were issued by the licensee to correct the identified discrepancies. There are no further questions regarding this matter.

<sup>11/</sup> IE Inspection Report 50-10/78-15, 50-237/78-13, 50-249/78-15.

Eleven 55-gallon drums of contaminated soil were removed and disposed of as solid radwaste as a result of the three Unit 1 spills. The licensee's corrective actions to prevent recurrence of the spills was examined. No significant discrepancies were identified.

Surveillance procedures were implemented to allow for quantification of future containment cooling heat exchanger releases. Releases, due to heat exchanger tube leakage, are diluted in the service water system, the circulating water system, and the Unit 2/3 cooling lake before release to the river in blowdown from the cooling lake. The inspector reviewed an analysis of the dilution provided for a typical release from the component cooling heat exchangers. Total dilution was calculated to be in excess of 1E6. This resolves an unresolved item from a previous inspection concerning a component cooling heat exchanger release.<sup>12/</sup>

A temporary procedure change was made to require sampling waste collector contents before processing to an above ground tank, in certain cases, in order to minimize the chances of exceeding the tank activity limits. The inspector reviewed a draft of the permanent revision.

The inspector reviewed the Unit 1 offgas isolation valve vault print to confirm the estimate of the water pumped to a construction pit; the water was subsequently recovered and processed in the Unit 2/3 radwaste system. The calculated volume agreed with the licensee's estimate of "approximately 600 gallons."

No items of noncompliance or deviations were identified.

13. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 7.

14. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on August 18, 1978, and further discussed the inspection findings with Mr. Stephenson by telephone on August 31, 1978. The inspector summarized the scope and findings of the inspection. In response to certain items discussed by the inspector the licensee:

- a. Stated that a surveillance procedure for Unit 1 storage tank activities was being written and would be implemented in the near future. (Paragraph 5)

<sup>12/</sup> IE Inspection Report 50-10/77-30, 50-237/77-27, 50-249/77-26.

- b. Agreed to revise the chemistry and radiation protection procedures for storage tank activities to include notification levels and specific tanks for Unit 1. (Paragraph 5)
- c. Acknowledged the inspector's comment that the 1977 semiannual effluent reports appeared to have received better review by the licensee than the 1976 reports. (Paragraph 6)
- d. Stated that liquid monitor problems would be addressed expeditiously. A preliminary decision was made to reactivate the offline monitors on the Unit 2/3 radwaste discharge and service water systems and perform a review in accordance with 10 CFR 50.59 for any deviations from the FSAR descriptions. The licensee's final decision will be submitted in response to the deviation notice. (Paragraph 7)
- e. Acknowledged the inspector's comments regarding the technical specification inconsistency for continuous monitoring and calibration requirements for radwaste discharges. (Paragraph 7)
- f. Stated that Unit 1 liquid releases were expected to be eliminated under normal operating conditions with a change to drycleaning laundry facilities by late-1978. (Paragraph 4)
- g. Agreed to resolve inconsistencies in procedures relating to reactor coolant activity notification levels and to examine methods for ensuring that the required internal notifications are made. (Paragraph 9)
- h. Stated that the solid radwaste system replacement for the present Unit 2/3 system was currently scheduled for completion by late-1978. (Paragraph 10)
- i. Stated that installation of level instrumentation and pumps in the Unit 1 sludge and resin burial tanks and vault was currently scheduled for completion in late-1978. (Paragraph 10)
- j. Agreed to revise four LER's which were noted to contain erroneous information. The revised LER's were reissued on August 18, 1978. (Paragraph 12)
- k. Stated that the licensee's action in response to NRC Circular 77-14 could not be ascertained and would be made available for review by the inspector during a future inspection.