

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report Nos: 50-237/98025(DRS); 50-249/98025(DRS)

Licensee: Commonwealth Edison Company

Facility: Dresden Nuclear Generating Station, Units 2 and 3

Location: 6500 N. Dresden Road
Morris, IL 60540

Dates: October 1-2 & October 5-8, 1998, with continued in-office
review through October 15, 1998

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EXECUTIVE SUMMARY

Dresden Nuclear Generating Station, Units 2 and 3
NRC Inspection Reports 50-237/98025; 50-249/98025

This routine, announced inspection evaluated the effectiveness of aspects of the radiation protection, chemistry and radioactive waste programs. Specifically, the inspection focused on the radiological effluent monitoring and control program, including the calibration and testing of effluent radiation monitors, effluent processing and quantification, and Offsite Dose Calculation Manual implementation. Within these areas, one non-cited violation (NCV) was identified and the following conclusions were made:

Plant Support

- Radiological effluents were generally well controlled, although several abnormal releases occurred that involved small quantities of radioactivity released through both liquid and gaseous effluent pathways. Effluents were properly quantified, and doses were determined consistent with the Offsite Dose Calculation Manual and remained well below regulatory limits (Section R1.1).
- A non-cited violation was identified for the failure to sample a slightly contaminated liquid, prior to discharge into a clean floor drain in the turbine building. Discrepancies in certain liquid effluent flow paths described in the Updated Final Safety Analysis Report (UFSAR) were also identified, along with a potential weakness in the effluent sampling program for the Waste Water Treatment Facility (Section R1.1).
- Overall, the liquid and gaseous effluent monitoring program was effectively implemented. Effluents were properly monitored, process effluent monitors were calibrated and functionally tested at required intervals, and the calibration and test program was implemented in accordance with approved station procedures (Section R2.1).
- Performance and reliability problems with the Unit 2 service water monitor and the Unit 2/3 main chimney monitor have continued for several years, which the licensee recognized and recently focused additional efforts to address (Section R2.1).
- Radiological housekeeping and material condition in the radioactive waste building was inconsistent with higher standards maintained in other plant areas, which the licensee planned to address. In addition, while the effluent monitor control terminal in the main control room functioned properly, a panel placard used as an aid to assist operators select monitor data from the terminal, listed information that was inconsistent with the liquid effluent monitors (Section R2.2).
- Positive steps were initiated to reclaim the main concentrator waste tank vault, and address long term problems with the radiological conditions in the room and with tank level instrumentation (Section R2.2).

Details

IV. Plant Support

R.1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Control of Gaseous and Liquid Effluents

a. Inspection Scope (IP 84750)

The inspectors evaluated the licensee's program for controlling and quantifying gaseous and liquid effluent releases. The Updated Final Safety Analysis Report (UFSAR), Offsite Dose Calculation Manual (ODCM), effluent summary data, and individual effluent release packages and associated procedures were reviewed; release pathways and liquid radioactive waste (radwaste) processing systems were walked-down; and chemistry, radiation protection (RP) and radwaste staffs were interviewed by the inspectors.

b. Observations and Findings

The inspectors verified that effluent treatment systems and normal release pathways for liquid and gaseous radwaste streams remained as described in the UFSAR and ODCM. However, the inspectors noted that about 13 turbine building open floor drains discharged to the station's waste water treatment facility (WWTF), unlike other drains in the radiologically protected area (RPA). Effluents discharged from these open, non-contaminated drains were not routed to the liquid radwaste system, or was the discharge pathway monitored with a radiation monitor. The WWTF effluent flowed to the Unit 2/3 discharge canal, where it was subsequently released to the Illinois River. Although WWTF effluent is sampled for radioactivity, the sampling is not continuous. This turbine building effluent pathway was previously identified by the licensee, as described below.

In December 1993, the licensee identified a small quantity of contamination in the oil separators of the WWTF, prompting an engineering review. The licensee's review identified several turbine building floor drains within the RPA that discharged to the WWTF, contrary to the Final Safety Analysis Report (FSAR). A Licensee Event Report (LER) was generated and a 10 CFR 50.59 safety evaluation concluded that an unreviewed safety issue did not exist, because the drains were configured as designed. The licensee concluded that administrative controls over the use of the drains would resolve the problem, and that narrative changes to the FSAR were necessary. The FSAR was subsequently revised to reflect that non-radioactive liquid wastes were either administratively controlled, or these sources of waste were located outside the RPA.

Although the FSAR was revised in 1994 to address this problem, the inspectors noted that the current UFSAR continued to contain discrepancies. For example, while leaks from the feedwater piping and other process systems in the turbine building can potentially drain to the non-contaminated turbine building drain system and be discharged to the WWTF, UFSAR section 11.1.5 indicates that "liquid from process

leaks are collected and routed to the liquid-solid radwaste system." Similarly, other sections in Chapter 11 of the UFSAR indicate that liquid radwaste from the turbine building drain system are collected for processing, and that all potential radioactive liquid waste discharged to the environment is monitored by a radiation monitor. The licensee acknowledged the continued UFSAR discrepancies and planned to revise the UFSAR, as appropriate.

In response to the 1993 LER, the licensee labeled the non-contaminated turbine building floor drains, to alert workers not to discharge liquids into these drains without RP approval. A procedure was also implemented, requiring that liquids intended for release into these drains be sampled prior to discharge. Also, when the problem was identified in December 1993, the licensee temporarily increased the frequency that WWTF effluent sampling was conducted, until the licensee was confident that radioactive effluent was not being released through this pathway. After several weeks, the licensee resumed its routine monthly sampling of the WWTF effluent. The routine sampling program requires that a 24-hour composite sample be collected and analyzed once each month. The licensee contends that since none of the WWTF effluent samples collected over the last several years showed any radioactivity and since inadvertent releases through these floor drains were rare, the administrative controls for the use of the drains were effective. However, since WWTF effluent is sampled only one day per month and the discharge pathway is not monitored with a radiation detector, the potential for undetected and unmonitored releases exists. This potential weakness in the licensee's sampling and effluent control program were discussed with the chemistry manager, who agreed to further evaluate the WWTF effluent sampling program and the administrative controls governing the use of the clean floor drains. These matters will be reviewed during a future inspection (IFI 50-237/98025-01; 50-249/98025-01).

Inspector review of the PIF data base and discussions with the licensee disclosed only one instance when contaminated liquids were known to have been released into one of the previously discussed floor drains. Specifically, on March 11, 1998, liquid from a non-contaminated system was discharged into one of the clean turbine building floor drains through a contaminated hose line, which caused a very small quantity of radioactivity (less than one microcurie of cobalt-60) to be unintentionally released to the environment through the WWTF. In that instance, a worker partially drained water from the Stator Cooling Heat Exchanger (a clean system) into the clean floor drain in preparation for system maintenance, and failed to contact RP to allow a sample to be collected and analyzed prior to the discharge. The worker realized the mistake and terminated the discharge after about 500 gallons had already been drained. The licensee attributed the problem to an isolated human error, and reprimanded the individual involved.

Technical Specification 6.8.A requires, in part, that written procedures be established and implemented covering the activities recommended in Appendix A of Regulatory Guide (RG) 1.33, Revision 2, February 1978. Appendix A of RG 1.33 specifies in Section 7 that procedures include the control of radioactivity for limiting materials released to the environment. Dresden Operations Procedure DOP-0040-06 (Rev 05), "Control of Equipment Draining," a procedure that implements RG 1.33 for limiting materials released to the environment, requires in step G.3 that a sample be obtained and isotopically analyzed prior to draining any type of liquid to a clean floor drain, unless

exempted. However, as described above, on March 11, 1998, a sample was not obtained and analyzed before draining about 500 gallons of (non-exempted) liquid into one of the clean turbine building floor drains. This non-repetitive, licensee identified and corrected violation is being treated as a non-cited violation (NCV), consistent with Section VII.B.1 of the NRC Enforcement Policy (NCV 50-237/98025-02; 50-249/98025-02).

Liquid releases to the Unit 2/3 discharge canal were made continuously from the service water systems, and on a batch basis from the liquid radwaste processing systems via the floor drain sample tanks or waste sample tanks. Liquid radwaste from Unit 1 was normally routed to Unit 2/3 for processing, prior to discharge to the Unit 2/3 canal. Gaseous releases were conducted primarily on a continuous basis through the Unit 2/3 main chimney, reactor building vent and chemical cleaning building, or occasionally batch released through drywell purge or isolation condenser venting.

In 1997, a total of about 1.43 E-2 curies and 243 curies (both excluding tritium) were released through liquid and gaseous pathways, respectively, compared to 2.89 curies and 140 curies through August 1998. In March and April 1998, about 2.87 curies of iron-55 (a beta emitter) was calculated to have been released in the Unit 3 service water effluent, a quantity greater than previous or subsequent months. The release calculation is based on the results of a monthly grab sample collected by the licensee and analyzed by a vendor for alpha and beta emitters. The licensee attributed the increase to the improved detection capabilities of a new vendor, who began analyzing the licensee's samples in early 1998. The new vendor reports iron-55 concentrations about two orders of magnitude below the minimum detection requirements of the ODCM and the previous vendor. Results of iron-55 analyses that were below the required limits of the ODCM, were previously reported as zero. The doses associated with liquid and gaseous effluents for both 1997 and 1998 through August remained well below (about .05%) regulatory limits.

The inspectors determined that doses from effluents were determined consistent with the ODCM and the methodology in NRC Regulatory Guide 1.109. Also, the inspectors' independent calculations showed that the doses associated with selected liquid batch and continuous gaseous stack releases in January 1998, were correctly calculated.

The licensee reported several abnormal releases in 1997 and two in 1998 through September. Small quantities of liquid and gaseous effluents were released, and attributed to a variety of reasons including: (1) continued storm sewer tritium contamination; (2) a Unit 3 main turbine gland seal leak; (3) long term east turbine building ventilation system contamination; and (4) the stator cooling heat exchanger water released to the WWTF, as previously described. An isolation condenser venting in April 1998, was also reported as an abnormal release. Abnormal releases were thoroughly evaluated, properly quantified, and documented in the annual effluent report, as required.

The inspector's review of the 1997 annual effluent report disclosed no significant problems. The report was timely submitted as required by 10 CFR 50.36, and followed the format of Regulatory Guide 1.21. The inspectors identified an error in the 1997

annual effluent report concerning the quantity of tritium released to the storm sewers during the second half of 1997, which the licensee planned to correct.

c. Conclusions

Radiological effluents were generally well controlled, although several abnormal releases occurred that involved small quantities of radioactivity released through both liquid and gaseous effluent pathways. Effluents were properly quantified, and doses were determined consistent with the ODCM. The total activity released and associated doses remained well below regulatory limits. A non-cited violation was identified for the failure to sample a slightly contaminated liquid, prior to its discharge into a clean turbine building floor drain. Discrepancies in certain liquid effluent flow paths described in the UFSAR were also identified, along with a potential weakness in the effluent sampling program for the WWTF, which the licensee is evaluating.

R2 Status of RP&C Facilities and Equipment

R2.1 Monitoring of Gaseous and Liquid Effluents

a. Inspection Scope (IP 84750)

The inspectors reviewed the performance history and evaluated the calibration and test program for the process effluent radiation monitors. Walk-downs of selected effluent monitors were performed by the inspectors; monitor reliability and availability information, and calibration and test records and associated procedures were reviewed; and RP, radwaste, chemistry and engineering staffs were interviewed. The inspectors also reviewed liquid radwaste discharge packages for several releases made in 1998. The inspectors' review focused on the following process effluent monitors:

- Unit 2/3 service water effluent monitors.
- Unit 2/3 liquid radwaste effluent monitor.
- Unit 2/3 main chimney system particulate, iodine and noble gas (SPING) monitor.
- Unit 2/3 reactor building vent SPING.
- Unit 2/3 General Electric (backup) main chimney monitor.

b. Observations and Findings

Inspector walk-downs revealed process effluent monitors to be operable, in generally good physical condition, and consistent with the descriptions in the UFSAR and ODCM. The inspectors reviewed calibration and/or functional test records and associated procedures for the above listed effluent monitors. Calibration and functional tests were performed by both instrument maintenance (IM) and RP groups, depending on the type of surveillance performed. Separate procedures were used by the two groups, and focused on different aspects of the test program. The RP group was responsible for those portions of the calibration and test program that involved the use of radioactive sources to determine instrument efficiency and linearity, while the IM department conducted electrical component related tests. Tests completed by the RP and IM

departments were reviewed and approved by supervisory personnel from the respective groups; however, no single department or individual was assigned responsibility for the overall calibration and test program. While the surveillance program was properly implemented, the inspectors questioned the apparent fragmented oversight of the program, and the potential impact on its effectiveness.

Calibrations of the Radiological Effluent Technical Standards (RETS) required effluent monitors were previously performed using National Institute of Standards and Technology primary gaseous and liquid sources. The initial calibrations established instrument efficiency and linearity. Subsequent calibrations used secondary sources to verify linearity and efficiency. The inspectors determined that calibrations were performed within the last 18 months and encompassed the entire instrument including actuation, alarm and trip functions, as required by the RETS. No problems were identified with the calibration and functional tests completed for those effluent monitors reviewed by the inspectors. Calibrations and tests were performed in accordance with approved procedures, acceptance criteria were met, and supervisory review was completed, as required. However, some deficiencies were identified by the inspectors with the calibration procedure for the RETS required liquid effluent discharge monitors. Specifically, the acceptance criteria for Dresden Radiation Surveillance Procedure DRS-5839-01 (Rev 01), "Liquid Discharge Monitor Calibration," failed to include instrument efficiency limits, a parameter used to derive the calibration constant and a key indicator of detector performance. Also, cesium-137 sources used to verify instrument linearity, were not of sufficient activity to demonstrate this desired response over a range that encompassed the monitor's alarm set point. These deficiencies were discussed with RP management, who acknowledged the observation and planned to evaluate the concern.

Operation and reliability problems with the Unit 2 service water monitor and Unit 2/3 main chimney SPING monitor have continued for several years. Although monitor availability had generally improved in 1998, neither monitor met the station's availability goal of 95% between June 1997 through September 1998. During out-of-service periods, compensatory samples were taken as required to monitor service water effluent, and the backup chimney monitor was used to monitor effluents from the main stack. The licensee closely tracked monitor out-of-service times, and took appropriate actions to ensure RETS action statements were met. The licensee recognized that reliability problems continued to exist with certain monitors, and recently focused additional efforts to assess the overall problems and develop corrective actions. In particular, in February 1998, the licensee designated the main chimney SPING monitor as a 10 CFR 50.65(a)(1) category system, warranting increased attention to address its performance problems. The licensee expects system engineer oversight for the process effluent monitors to improve, since a new dedicated system engineer was assigned within the last two months. The current system engineer is the fourth assigned to the effluent monitors since 1995. A modification package was recently approved to address recurrent sample collection problems with the Unit 2 service water monitor, which the licensee anticipates to complete later this year. The system engineer is in the process of evaluating the SPING's design, and developing a preventive maintenance program and other corrective measures to improve system reliability and performance.

The inspectors selectively reviewed records of three river discharge batch releases that took place in 1998. Through independent calculation, the inspectors verified that monitor alarm set points were appropriate for the source term and background radiation levels, and that the releases were prepared in accordance with procedural requirements, properly quantified and reviewed by radwaste supervision prior to the release.

c. Conclusions

Overall, the liquid and gaseous effluent monitoring program was effectively implemented. Effluents were properly monitored, process effluent monitors were calibrated and functionally tested at RETS required intervals, and the calibration and test program was implemented in accordance with approved station procedures. However, operation and reliability problems with the Unit 2 service water monitor and the Unit 2/3 main chimney monitor continued, which the licensee recognized and recently initiated additional actions to address.

R2.2 Plant Walk-downs and Other Observations

a. Inspection Scope (IP 84750)

The inspectors conducted walk-downs of the control room, radwaste building and liquid radwaste processing system, including areas in the radwaste building that were infrequently accessed such as tank rooms and the radwaste basement. Plant and equipment material condition and radiological housekeeping were evaluated, and posting and radiological controls were reviewed.

b. Observations and Findings

The inspectors' independent measurements verified that radiation areas and high radiation areas were appropriately posted. High and locked high radiation areas were controlled in accordance with station procedures and regulatory requirements, and radiological postings were properly maintained. However, the radiological housekeeping and material condition of the radwaste building was not equivalent to the higher standards maintained in other areas of the plant. Specifically, paint on floor and wall surfaces was generally chipped and worn, walls in some of the radwaste tank rooms were rusted and cracked from ground water in-leakage problems, and dry residue was observed on the floor in certain rooms. Other housekeeping and material condition problems observed by the inspectors in the radwaste building included:

- Plugged floor drains in the Max Recycle Concentrator Waste Transfer Tank Room since January 1996 (based on an action request tag date), and in other max recycle areas of radwaste.
- Scaffolding previously erected but no longer in use and a loose fire extinguisher both located on the stairwell landing leading to the radwaste basement.
- Debris located in a ventilation louver just inside the Waste Collector and Neutralizer Tank Room since mid-1996 (based on an action request tag date).

The licensee acknowledged the inspector's observations, and indicated that a floor drain hydrolazing project in the max recycle area was planned to commence soon, and that actions would be considered to improve the overall material condition of the radwaste area.

The inspectors verified that the effluent monitor control terminals in the main control room functioned adequately and that control room personnel were knowledgeable of its operations. However, a panel placard located between the redundant control terminals listed outdated and incorrect information, including codes corresponding to liquid effluent monitor channels that were inconsistent with the data generated by the terminal. The placard was used as an aid to assist the operations staff select the effluent monitor and monitor channel code that corresponded to the data generated by the control terminal. In response to the inspector's observation, the licensee initiated a PIF and planned to review operator surveillance procedures and records and determine if control terminal data was improperly used and recorded (NTS Item # 0102019803101). The results of the licensee's review will be evaluated during a future inspection (IFI 50-237/98025-03(DRS); 50-249/98025-03(DRS)).

In March 1998, the licensee initiated a project to cleanup and reclaim the Unit 2/3 main concentrator waste (CW) tank vault. The CW tank holds 5000 gallons and receives evaporator bottoms' sludge produced by the max recycle concentrator system. Sludge was then transferred from the tank and processed and prepared for burial as solid radwaste. The radwaste staff indicated that the floor of the vault contained about three feet of sludge that resulted from tank overflows which occurred more than 10 years ago. The licensee planned to remove the sludge using a robot, decontaminate the room, and install improved tank level instrumentation. The radwaste staff continues to use the CW system and administratively controls input to the tank to ensure additional problems are not created. As of October 1998, about 30% of the sludge had been removed from the vault floor. Videos taken during the cleanup efforts were viewed by the inspectors and the project was discussed with involved radwaste staff. According to the licensee and partially confirmed by the video, the tank and tank supports remain intact and do not appear significantly degraded. The licensee committed resources to continue this project, and anticipates using enhanced robotic methods to complete the project within approximately the next six months.

c. Conclusions

Radiological postings were properly maintained, and reflected area radiological conditions. However, radiological housekeeping and material condition in the radwaste building was inconsistent with higher standards maintained in other plant areas, which the licensee planned to address. While the effluent monitor control terminal in the main control room functioned properly, a panel placard used as an operator aid to select monitor data from the terminal, listed information that was inconsistent with the liquid effluent monitors. Positive steps were initiated to reclaim the main CW tank vault, and address long-standing problems with the radiological conditions in the room and with tank level instrumentation.

V. Management Meetings

XI Exit Meeting Summary

The inspectors presented the preliminary inspection results to members of licensee management at the conclusion of the site inspection on October 8, 1998. On October 15, 1998, a telephone conversation was conducted with the Chemistry Manager and a member of the Regulatory Assurance staff, to discuss the results of NRC's review of additional data provided by the licensee's staff between October 9 and 15, 1998. The licensee acknowledged the findings presented and did not identify any of the information reviewed as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

L. Aldrich, Radiation Protection Manager
M. Azar, Radwaste Staff
P. Boyle, Chemistry Manager
P. Chabot, Engineering Manager
L. Coyle, Shift Operations Superintendent
M. Friedmann, Radiation Protection Technical Support Supervisor
A. Karadi, System Engineer
R. Kelly, Regulatory Assurance
W. Lipscomb, Executive Assistant to Site Vice President
M. Mikota, Radwaste Specialist
P. Moore, Health Physicist
M. Pacilio, Work Control Manager
F. Spangenberg, Regulatory Assurance Manager
D. Spencer, Instrument and Control Supervisor

INSPECTION PROCEDURES USED

IP 84750 Radioactive Waste Treatment, and Effluent and Environmental Monitoring

ITEMS OPENED AND CLOSED

Opened

50-237/98025-01 50-249/98025-01	IFI	Review results of the licensee's evaluation of the liquid effluent sampling program for the WWTF.
50-237/98025-03 50-249/98025-03	IFI	Follow-up on the licensee's evaluation of main control room surveillance data obtained from the effluent monitor control terminals.

Opened and Closed

50-237/98025-02 50-249/98025-02	NCV	Failure to sample potentially contaminated liquids, prior to release to a clean turbine building floor drain.
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LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
IM	Instrument Maintenance
LER	Licensee Event Report
NCV	Non-Cited Violation
ODCM	Offsite Dose Calculation Manual
PIF	Problem Identification Form
Radwaste	Radioactive Waste
RETS	Radiological Effluent Technical Standards
RP	Radiation Protection
RPA	Radiologically Protected Area
SPING	System Particulate, Iodine and Noble Gas
UFSAR	Updated Final Safety Analysis Report
WWTF	Waste Water Treatment Facility

PARTIAL LIST OF DOCUMENTS REVIEWED

DRS 5830-01, Rev 01, "Liquid Discharge Monitor Calibration"

DIS 3900-01, Rev 13, "Service Water Effluent Sample Radiation Monitor calibration and Functional Test"

DIS 2000-03, Rev 11, "Unit 2/3 Radwaste river Discharge Effluent Radiation Monitor Calibration and Functional Test"

DIS 1700-14, Rev 13, "Radioactive Gaseous Effluent Monitor (SPING-4) Low, Mid, and High Range Noble Gas Channel Calibration"

DRS 5821-57, Rev 02, "SPING Effluent Monitor Quarterly Functional Test"

DRP 5821-27, Rev 01, "Unit 2/3 Plant Chimney Radiation Monitor Calibration"

DRS 5821-56, Rev 01, "SPING Effluent Monitor Calibration"

DAP 07-52, Rev 01, "Control of Equipment Draining"

DOP 0040-06, Rev 05, "Control of Equipment Draining"

DAP 10-02, Rev 08, Form 10-26, 10 CFR 50.59 Safety Evaluation, "Proposed Rev to UFSAR pg 9.1.C.3"

LER #93-022-00, 1/10/94, "Floor Drains in the RCA Have Potential Inputs into Non-Contaminated Processing Systems Contrary to FSAR"

UFSAR, Rev 2, Chapter 11, "Radioactive Waste Management"

UFSAR, Rev 2, Chapter 15.6.4, "Steam System Line Break Outside the Containment"

PIF #D1998-01624, "Equipment Draining Procedure Violation Self Identified by Operations Individual"

PIF #D1998-05420, "Incomplete Information on 923-7 Panel Placard"

1997 Radioactive Effluent Report, Dresden Station

Dresden Station ODCM, Rev 1.9, January 1997

Dresden Station Radiological Effluent Technical Standards, Rev 1.7, April 1998