U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-237; 50-249
License Nos:	DPR-19; DPR-25
Report Nos:	50-237/98028(DRS); 50-249/98028(DRS)
Licensee:	Commonwealth Edison Company
Facility:	Dresden Nuclear Generating Station, Units 2 and 3
Location:	6500 N. Dresden Road Morris, IL 60540
Dates:	November 2-6, 1998
Inspectors:	W. Slawinski, Senior Radiation Specialist R. Glinski, Radiation Specialist
Approved by:	Gary L. Shear, Chief, Plant Support Branch 2 Division of Reactor Safety

EXECUTIVE SUMMARY

Dresden Nuclear Generating Station, Units 2 and 3
NRC Inspection Reports 50-237/98028; 50-249/98028

This routine, announced inspection evaluated aspects of the operational chemistry and radiological environmental monitoring programs. Specifically, the inspection focused on the overall implementation of the radiological environmental monitoring program (REMP) including sample collection, analysis and instrument maintenance and servicing; and plant water chemistry management, chemistry sample collection and analysis, and quality control of laboratory and in-line instrumentation. Within these areas, the following conclusions were made:

Plant Support

- The REMP was well implemented and station oversight of contractor activities was effective. Data showed that plant operations did not have a discernible radiological impact on the environment. Sample collection, sample change-out and pump calibration field practices simulated by the contractor technician were technically sound, and the individual exhibited a thorough knowledge of the sample stations and sampling processes (Section R1.1).

- Reactor water quality was maintained within appropriate levels during the current fuel cycles, with occasional sulfate excursions that were timely resolved. Hydrogen and depleted zinc oxide injection systems for Unit 2 were effective in decreasing corrosion and radioactive source term, respectively. Plant personnel monitored fuel integrity appropriately, and no active fuel integrity problems were identified (Section R1.2).

- Quality control data indicated that operability and accuracy of the in-line instruments was excellent. The chemistry staff effectively maintained and calibrated the instruments, and there were no materiel condition issues (Section R2.1).

- Engineered safety feature atmosphere air cleaning systems were maintained in good materiel condition, and in-place and laboratory surveillance tests were completed as required and satisfied test acceptance criteria (Section R2.2)

- Chemistry personnel were generally knowledgeable of departmental and individual responsibilities, and displayed improved ownership of chemistry department instrumentation. Chemistry technicians demonstrated appropriate ALARA practices during sample collection and conducted sampling activities in accordance with station procedures (Section R4.1).

- The chemistry department continued to self-assess its program and recently concluded a thorough, collaborative assessment which disclosed deficiencies with procedures and practices not indicative of operational excellence. Actions to address the deficiencies were underway and included mechanisms to track resolution and corrective action progress (Section R7.1).

- Overall, the quality assurance/quality control and performance of the laboratory instrumentation was excellent, as evidenced by QC checks and QA intercomparison data. In addition, the control of standards and reagents was effective, and chemistry staff was testing new technologies to improve laboratory analysis capabilities (Section R7.2).

Details

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Implementation of the Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope (IP 84750)

The inspectors evaluated the implementation of the REMP, as described in Chapter 11 of the Dresden Station Offsite Dose Calculation Manual (ODCM). Several environmental sampling stations were examined by the inspectors, sample collection and change-out processes were discussed and simulated by the contractor sample technician, sample analysis results were reviewed, and the quality control and maintenance program for sampling station equipment was assessed.

b. Observations and Findings

Beginning in 1998, Dresden Station implemented the Commonwealth Edison (ComEd) Uniform Radiological Environmental Monitoring Program (UREMP). The program was implemented as described in Chapter 9 of the ComEd ODCM, except that the frequency of radio-iodine cartridge exchange and food product sampling was reduced, and the acceptance criteria for outer ring thermoluminescent (TLD) locations was expanded. The inspector determined that the modifications were adequately evaluated and justified by the licensee, and were consistent with Regulatory Guide 4.1 and the Updated Final Safety Analysis Report (UFSAR).

An inspector accompanied the contractor sample technician to several sample stations, examined the station and its equipment, and observed the contractor simulate sample collection and change-out. Sampling stations were properly equipped, well maintained and in good working order. Data posted at the stations showed that sample pump calibration checks were completed monthly as required by the contractor's sampling procedure manual. Sample pump flow and leak check, and the calibration of a pump flow meter simulated by the technician were conducted appropriately and in accordance with procedure. Sampling techniques were technically sound and repeatable, and samples were packaged and uniquely labeled to allow proper identification and prevent cross contamination. The contractor technician demonstrated good sampling practices and a thorough knowledge of sampling requirements and of the equipment maintenance program.

In late 1997, the licensee's meteorological contractor evaluated all Dresden air sample stations, and identified potential deficiencies with several of the stations relative to their proximity to trees during the growing season. As a result, in June 1998, the licensee relocated one of its near field sample stations because the air inlet was less than 20 meters from tree drip lines. The inspector verified that the new sample station was properly evaluated by the licensee, and satisfied the ODCM placement criteria for near field air samplers. Other potentially deficient air sample station locations continue to be

monitored by the licensee to ensure tree growth does not affect the representativeness of the air sample.

The REMP program included the collection and analysis of air, water, vegetation, fish, and river sediment, and TLDs were used to measure direct radiation. Inspector review of the licensee's annual radiological environmental operating report for 1997 and the contractor's monthly progress report for 1998 through August, revealed that sample collection and analyses were completed in accordance with the ODCM and Technical Specifications. Infrequently missed or anomalous sample results were described in the reports. REMP data for 1997 and 1998 through August, indicated that plant operations did not have a discernable radiological impact on the environment.

Additionally, inspector review of sample pump calibration and service records for 1998, and field and master rotameter calibration documents showed that these instruments were calibrated and maintained at required intervals.

c. Conclusions

The REMP was well implemented and station oversight of REMP contractor activities was effective. Data for 1997 and 1998 through August showed that plant operations did not have a discernible radiological impact on the environment. Sample collection, change-out and pump calibration field practices simulated by the contractor technician were technically sound and the individual exhibited a thorough knowledge of the sample stations and sampling processes.

R1.2 Control of Plant Water Quality

a. Inspection Scope (IP 84750)

The inspectors evaluated the licensee's management of reactor water chemistry, including the program to reduce impurities in plant systems. Plant water quality and fuel integrity data for the current fuel cycles was reviewed, and chemistry personnel were interviewed regarding completed and planned actions to improve water quality.

b. Observations and Findings

Reactor water quality data for both units showed that conductivity and chloride concentrations were maintained well within the technical specification (TS) limits, and generally satisfied the licensee's goals which were consistent with Electric Power Research Institute (EPRI) Action Level 1 guidelines. Although the sulfate levels in both units were occasionally above the industry guideline level of 5 parts per billion (ppb) during power operations, reduced levels were quickly reestablished through optimized demineralizer system and resin cleaner operations or the restored operation of the reactor water cleanup system (RWCU). The inspectors verified that plant staff collected confirmatory samples and documented the sulfate excursions, as required by the licensee's chemistry program.

For Unit 2, the operability of the hydrogen injection system (at 1.5 parts per million [ppm]) exceeded the station's goal of 90% during power operations, and the injection of depleted zinc oxide (DZO) at 5-15 parts per billion (ppb) achieved a 90% reduction in drywell dose rates, as indicated by recent BRAC (BWR Radiation Assessment and Control) point surveys. The station planned to initiate noble metal injection for Unit 2 in December 1999, to further inhibit corrosive materials. The inspectors discussed water quality plans for Unit 3 with chemistry personnel, who indicated that the planned hydrogen water chemistry (HWC) program would maintain the hydrogen concentration at 2 ppm, to achieve the desired electrochemical potential to mitigate intergranular stress corrosion cracking. Zinc injection for Unit 3 was initiated in late July 1998, and HWC was planned to commence soon.

Feedwater (FW) total iron levels were generally maintained below the EPRI and chemistry program guidelines, with occasional spikes slightly above the EPRI Action Level 1 value of 5 ppb. Oxygen was injected into the hotwell to minimize FW iron, and required Technical Discrepancy Forms were completed to document instances of increased FW iron levels.

Fuel integrity monitoring was accomplished by radiochemical analyses of reactor coolant for the "Sum of Six" krypton and xenon isotopes. The Sum of Six and the Iodine Dose Equivalent data, indicated that there were no current fuel integrity problems, although elevated levels of the noble gas and iodine isotopes in Unit 3 were due to tramp uranium from a known fuel leak in the previous cycle. The inspectors concluded that the staff used appropriate methodology for this determination.

c. Conclusions

Reactor water quality was maintained within appropriate levels during the current fuel cycles, with occasional sulfate excursions that were quickly resolved. The hydrogen and DZO injection systems for Unit 2 were effective in decreasing corrosion and radioactive source terms, as evidenced by radiation survey and chemistry water quality data. Plant personnel monitored fuel integrity appropriately, and no active fuel integrity problems were identified.

R2 Status Of RP&C Facilities and Equipment

R2.1 Quality Control (QC) and Materiel Condition of the Laboratory and In-Line Instrumentation

a. Inspection Scope (IP 84750)

The inspectors reviewed chemistry QC data for the in-line instrumentation, interviewed chemistry staff regarding instrument use and performance, and conducted a walkdown of the instrumentation.

b. Observations and Findings

The inspectors noted that the operability and materiel condition of the in-line instrumentation was excellent, as evidenced by the lack of current work requests and its reliable performance as indicated by chemistry staff. The 1998 performance checks also demonstrated excellent accuracy and operability for these instruments. The in-line instruments were used to measure conductivity, pH, and dissolved oxygen for a wide variety of plant water systems. In conjunction with the implementation of the HWC, the chemistry staff installed dissolved oxygen meters on the sampling panels. Installation of dissolved hydrogen in-line instruments was also planned to monitor the effectiveness of the HWC system. The inspectors noted that the chemistry staff demonstrated strong ownership of the instrumentation, and effectively managed instrument calibration, performance checks and maintenance.

c. Conclusions

The QC data indicated that operability and accuracy of the in-line instruments was excellent. The chemistry staff effectively maintained and calibrated the instruments, and there were no materiel condition issues.

R2.2 Engineered Safety Feature Filtration Systems

a. Inspection Scope (IP 84750)

An inspector reviewed surveillance tests for the TS required engineered safety feature (ESF) atmosphere air filtration and absorption units, and discussed system performance and maintenance with station staff.

b. Observations and Findings

Standby Gas Treatment System (SGTS) and Control Room Emergency Ventilation System (CREVS) surveillance tests were performed by a licensee contractor, and included required in-place penetration and bypass leakage tests for both high efficiency particulate air (HEPA) filters and charcoal absorption systems, and laboratory analysis of a representative carbon sample for methyl iodide removal efficiency.

An inspector reviewed surveillance test procedures and test results for the SGTS and the CREVS for 1997 and 1998, and determined that the tests were completed in accordance with station procedures and that technical specification test frequencies and acceptance criteria were met.

Interviews of the system engineers for the SGTS and CREVS, and a walkdown of both trains of the SGTS revealed no material condition or system maintenance problems.

c. Conclusions

ESF atmosphere air cleaning systems were maintained in good materiel condition, and in-place and laboratory surveillance tests were completed as required and satisfied test acceptance criteria.

R4 Staff Knowledge and Performance in RP&C

R4.1 Performance of Chemistry Sample Collection and Analysis

a. Inspection Scope (IP 84750)

The inspectors interviewed chemistry technicians and management, and observed in-plant chemistry sampling and analysis activities.

b. Observations and Findings

The inspectors observed that in-plant samples (reactor coolant, feedwater filters, and reactor building gaseous effluent) were collected by chemistry technicians (CTs) in accordance with station procedures. The CTs were experienced and knowledgeable regarding proper sample collection, analysis, and sample panel operations. The CTs appropriately rinsed sample containers with the sample matrix and surveyed the sampling panels prior to sample collection. However, the inspectors witnessed one instance when a CT mislabeled a reactor coolant sample. The inspectors observed that the materiel condition of the sampling panels was excellent, and noted that the chemistry staff periodically disassembled and cleaned the sample panels. The CTs exhibited a proper understanding of the sampling systems, in-line instrumentation performance, and ALARA practices. In particular, the inspectors noted that the chemistry staff had assumed responsibility for the calibration and maintenance of the in-line instruments, resulting in improved operability, and continued to improve ownership of other chemistry systems.

c. Conclusions

Chemistry personnel were generally knowledgeable of departmental and individual responsibilities, and displayed improved ownership of chemistry department instrumentation. Chemistry staff demonstrated appropriate ALARA practices during sample collection and conducted sampling activities in accordance with station procedures.

7. Quality Assurance in RP&C Activities

R7.1 Chemistry Program Self-Assessments

a. Inspection Scope (IP 84750)

The inspectors reviewed the results of a chemistry program self-assessment completed just prior to the inspection, and discussed the assessment program with chemistry management.

b. Observations and Findings

The chemistry department continued to self-assess its program, in an effort to improve deficiencies identified during previous audits. As documented in Inspection Reports 50-237/97020(DRS); 50-249/97020(DRS), a chemistry self-assessment program was initiated in 1995, and included several assessments in 1996 and 1997 which covered a variety of selective program areas.

Just prior to this inspection, a collaborative two-week assessment of the chemistry program was completed. Five individuals participated in the assessment including representatives from the station's nuclear oversight staff, the chemistry department staff and a chemistry representative from another nuclear utility. The self-assessment focused on the laboratory quality assurance /quality control (QA/QC) program; the high radiation sampling system (HRSS); chemistry technician knowledge; and overall data review, trend analysis and procedure maintenance.

The assessment identified several deficiencies related to procedure development and adherence and departmental practices not indicative of operational excellence. For example, certain instrumentation for the HRSS was not maintained consistent with the UFSAR, or tested in accordance with industry good practices. The assessment also found that count room QC procedures were not consistently implemented, and that other procedural and documentation deficiencies existed.

The inspectors reviewed the draft assessment report, discussed the assessment with the Chemistry Manager and concluded that the assessment was very thorough, focused and self-critical. The licensee was evaluating the assessment results, was developing corrective actions and had implemented mechanisms to track resolution.

c. Conclusions

The chemistry department continued to self-assess its program, and recently concluded a thorough, collaborative assessment which disclosed deficiencies with procedures and practices not indicative of operational excellence. Actions to address the deficiencies were underway, and included mechanisms to track resolution and corrective action progress.

R7.2 Quality Assurance/Quality Control for Laboratory Instrumentation and Analyses

a. Inspection Scope (IP 84750)

The inspectors reviewed QA/QC data for both chemistry and radiochemistry laboratory instrumentation, and interviewed chemistry supervisory and management staff regarding laboratory quality controls.

b. Observations and Findings

The inspectors reviewed QA/QC data for the following chemistry instruments/methods and associated analyses:

- Ion Chromatography - sulfate, chloride, chromate, nickel, iron, sodium, zinc
- Wet chemistry/titration - boron
- Atomic Absorption - iron, copper
- Ultraviolet/visible (UV/vis) spectrometry - silica
- Gamma Spectrometry - gamma emitting isotopes in air and water
- Liquid Scintillation Counter - tritium in air

The QC data for chemical and radiochemical laboratory instrumentation indicated that instrument operability had remained within acceptable statistical parameters. The staff effectively utilized QC charts to trend instrument performance, and the supervisory staff reviewed the data regularly to check for biases, trends, and outliers.

The counting room staff tracked peak area, peak width, and peak location to gauge gamma spectrometry system performance. The liquid scintillation counter was also reviewed regularly for any adverse trends. Laboratory instrumentation performance was very good, as demonstrated by QC charts completed by the chemistry staff. The calibrations and annual verifications of the radiochemical instruments utilized appropriate commercial radionuclide standards, which were traceable to the National Institute for Standards and Testing (NIST).

The laboratory participated in QA interlaboratory comparison programs for both chemical and radiochemical analyses. For 1997 and 1998, the cold chemistry intercomparison results met acceptance criteria, with the exception of silica analysis by UV/vis spectrometry. The staff had passed less than 50% of the silica comparisons for 1997 and 1998. Chemistry supervision was reviewing potential effects of reagent temperature on the silica analysis, and was also considering a new spectrometer as a means to address this issue. The radiochemistry staff participated in two separate intercomparison programs over the last year and the results were excellent, as only one disagreement was identified, which was under review by chemistry supervision.

The materiel condition of the laboratory instrumentation was very good, and the inspectors noted that laboratory reagents were properly labeled and within the prescribed shelf life. The chemistry staff was currently testing X-ray fluorescence and alpha spectrometry as methods to improve the laboratory capabilities.

c. Conclusions

Overall, the QA/QC, materiel condition and performance of the laboratory instrumentation were excellent, as evidenced by QC checks and QA intercomparison data. In addition, the control of standards and reagents was effective, and chemistry staff was testing new technologies to improve laboratory analysis capabilities.

R8 Miscellaneous RP&C Issues

R8.1 (Closed) Violation 50-237/97020-01; 50-249/97020-01: Failure to follow chemistry procedures during sampling activities. The inspectors selectively verified that the licensee padlocked sample panel cabinets in the reactor and turbine buildings, to limit access to sampling equipment drain valves to only authorized chemistry staff. The inspectors also verified that chemistry procedure DCP 2218-01, "Reactor Building Vent," was revised, to clarify and streamline the sample change-out process and ensure procedural steps were performed in the proper sequence. Additionally, CTs attended Human Error Reduction training and cyclic Stop, Think, Act, Review (STAR) training to improve procedure adherence. During this inspection, the inspectors observed CTs collect reactor coolant and gaseous effluent samples, and identified no repetitive problems. These corrective actions were adequate and this item is closed.

R8.2 (Closed) Violation 50-237/97020-02; 50-249/97020-02: Failure to complete yearly surveillance tests on the HRSS. The licensee evaluated the surveillance program and identified a process weakness in implementing the station's pre-define program in the chemistry department. To address this problem, chemistry surveillance scheduling processes were improved, and the pre-define program documentation requirements were revised to ensure that actual surveillance documentation is retained as a package and sent to Central File after management review. The licensee also reassigned HRSS oversight to another station chemist. The inspectors reviewed quarterly and yearly HRSS surveillance records, and verified that surveillance tests were completed as required. These corrective actions were adequate and this item is closed.

V. Management Meetings

XI Exit Meeting Summary

One of the inspectors presented the inspection results to members of licensee management and other station staff at the conclusion of the inspection on November 6, 1998. The licensee acknowledged the findings presented and did not identify any of the information reviewed as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

ComEd

P. Boyle, Chemistry Manager
L. Coyle, Shift Operations Superintendent
T. Fisk, Shift Chemistry Supervisor
M. Friedmann, Technical Support Supervisor
M. Heffley, Site Vice President
R. Kelly, NRC Coordinator
B. McGallian, System Engineer
P. Planing, Engineering Programs Supervisor
B. Rysner, Nuclear Oversight Auditor
G. Sipe, System Engineer
F. Spangenberg, Regulatory Assurance Manager
P. Swafford, Station Manager

Other

A. Lewis, REMP Technician, Teledyne Brown Engineering Environmental Services

INSPECTION PROCEDURES USED

IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring

ITEMS OPENED AND CLOSED

Opened

None

Closed

50-237/97020-01 50-249/97020-01	VIO	Failure to follow chemistry procedures during sampling activities
50-237/97020-02 50-249/97020-02	VIO	Failure to complete yearly HRSS surveillance tests

LIST OF ACRONYMS USED

ALARA	As-Low-As-Is-Reasonably-Achievable
BRAC	Boiling Water Reactor Radiation Assessment and Control
ComEd	Commonwealth Edison
CREVS	Control Room Emergency Ventilation System
CT	Chemistry Technician
DZO	Depleted Zinc Oxide
EPRI	Electric Power Research Institute
ESF	Engineered Safety Feature
FW	Feed Water
HRSS	High Radiation Sampling System
HWC	Hydrogen Water Chemistry
NIST	National Institute For Standards and Testing
ODCM	Offsite Dose Calculation Manual
ppb & ppm	Parts Per Billion & Parts Per Million
QA/QC	Quality Assurance/Quality Control
REMP	Radiological Environmental Monitoring Program
RP& C	Radiological Protection and Chemistry
RWCU	Reactor Water Cleanup
SGTS	Standby Gas Treatment System
STAR	Stop, Think, Act and Review
TLD	Thermoluminescent Dosimetry
UFSAR	Updated Final Safety Analysis Report
UREMP	Uniform Radiological Environmental Monitoring Program

PARTIAL LIST OF DOCUMENTS REVIEWED

Technical Specifications, Section 3/4.6.I and 3/4.6.J - Primary System Boundary

NOD-CY.02, Revision 5, "BWR Water Chemistry Control Program", dated 12/2/97.

Memorandum, Dresden Plant Engineering, "Fuel Monitoring Data for Dresden Units 2 and 3 October 1998, dated 11/2/98.

Technical Specifications, Section 3/4.7.P, "Containment Systems - SGTS" & 3/4.8.D, "Plant Systems - CREVS

DCP 1009-02, Revision 7, "In-Line Chemistry Instrument Quality Control".

DCP 22118-01, Revision 5, "U-2 and U-3 Reactor Building Vent Particulate & Iodine Sampling"

DCP 1019-01, Revision 17, "Sampling"

DCP 2213-01, Revision 10, "Main Chimney"

DTS 5750-04, Revision 09, "Control Room Air filter Unit Performance"

DTS 7500-07, Revision 10, "Standby Gas Treatment System Charcoal Leak Test"

DTS 7500-11, Revision 06, " DOP Testing of 2/3 SBGT HEPA Filter"

DTS 7500-13, Revision 0, "SBGT System Visual Inspection"

Dresden Station Annual Radiological Environmental Operating Report, dated 4/30/98

Dresden Station, REMP Monthly Progress Report from Teledyne Brown Engineering, dated 10/7/98

ODCM, Chapter 11, Revisions 1.3 & 1.4, "Dresden Annex - REMP"

ODCM, Chapter 12, Revision 1.6, "Dresden Annex - Radiological Effluent Technical Standards"