U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-237/90008(DRSS); 50-249/90007(DRSS)

Docket Nos. 50-237; 50-249 License Nos. DPR-19; DPR-25

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Dresden Nuclear Power Station, Units 2 and 3

Inspection At: Dresden Site, Morris, Illinois

Inspection Conducted: February 13-15, 1990 (On-site)

Inspector: R. B. Holtzman 3/12/90
Date

Approved By: M. C. Schumacher, Chief 3/13/90
Radiological Controls and Date
Chemistry Section

Inspection Summary

Inspection on February 13-15, 1990 (Report Nos. 50-237/90008(DRSS); 50-249/90007(DRSS))

Areas Inspected: Routine, unannounced inspection of: (1) the chemistry program, including procedures, organization, and training (IP 84750); (2) the hydrogen water chemistry (HWC) program (IP 79701); (3) quality assurance/quality control program in the laboratory (IP 79701); (4) nonradiolgical confirmatory measurements (IP 79701); and (5) the Radiological Environmental Monitoring Program (IP 84750).

Results: The nonradiological chemistry confirmatory measurement results were very good. The laboratory has a good QA/QC program for analytical measurements, which is being developed further. The staff was generally knowledgeable and competent. The REMP appears to be operating satisfactorily. No violations or deviations were identified.

DETAILS

1. Persons Contacted

[1] L. F. Gerner, Technical Superintendent, DNPS
[1] D. Morey, Chemistry Services Supervisor, DNPS
[1] D. Saccomundo, Health Physics Supervisor, DNPS
[1] F. D. Bevington, Quality Programs, CECo
K. Peterman, Regulatory Assurance Supervisor, DNPS
[1] R. Falbo, Regulatory Assurance Assistant, DNPS
[1,2] K. Whittum, Chemistry Group Leader-Technical, DNPS
D. Malauskas, Chemistry Group Leader-Operations, DNPS
J. Rund, Auxiliary System Chemist, DNPS
R. Holman, GSEP Coordinator, DNPS

The inspector also interviewed other licensee personnel in various departments in the course of the inspection.

[1]Present at the plant exit interview on February 15, 1990.
[2]Telephone conversation held on March 1, 1990.

2. Licensee Action on Previous Inspection Findings

a. (Closed) Open Item Nos. (50-237/88028-01; 50-249/88029-01): Licensee to return the gas diluters on the HRSS containment air samplers to the manufacturer for rebuilding and recalibration of valve volumes. The inspector's review of the documentation showed that the diluters had been overhauled and the valve volumes recalibrated and certified by the manufacturer (Radiological and Chemical Technology, Inc.) to be 0.14 ml each. the licensee representative stated that these values were within the Technical Specification requirements of a factor of two of the conservative 0.1-ml value used previously.

b. (Closed) Open Item Nos. (50-237/88028-02; 50-249/88029-02): Licensee to install a new electrochemical potential and crack-growth monitor on the Unit-2 recirculation pipes to monitor the effects of hydrogen water chemistry (HWC) and to review the environmental radiation levels due to the HWC. The station obtained and installed an ECP and crack-growth monitor. The system is presently being conditioned for operation (Section 4). The inspector reviewed the data on the environmental radiation levels in some of the offices.

The radiation levels indicated by TLD measurements in the Health Physics Office (formerly the Tour Center) and the Gatehouse since operation of the HWC system in 1983 appeared to have risen at most only 1-2 mrem/quarter relative to those in the year prior; this increase is probably within the limits of measurement uncertainty.

c. (Closed) Open Item Nos. (50-237/88028-03; 50-249/88029-03): The licensee split with Brookhaven National Laboratory (BNL) an RCS sample spiked with chloride, fluoride and sulfate, analyzed it,

and sent the results to Region III for comparison with the BNL results. The results of the comparison are shown in Table 1 and the acceptance criteria in Attachment 1. The results showed two of the three results to be in agreement; the chloride result, although in agreement, had a large positive bias. We were unable to resolve the differences because of the uncertainties in the BNL results. However, because of the similarities in the licensee's three results, which indicates a possible dilution problem, and the good agreements obtained during the present inspection, this item is considered to be satisfactorily closed.

d. (Closed) Open Item Nos. (50-237/88028-04; 50-249/88029-04): The licensee improved the procedure for the anion analyses on the ion chromatograph (IC), and the metal analyses on the atomic absorption spectrophotometer (AAS). The quality of the IC standards was improved by revising laboratory practice to use a more accurate commercially-available aqueous standard (allowable under the IC procedure). The procedure has been updated and is in the final approval stage. The problems with the metal analyses were not fully-resolved, but the AAS was replaced by a more sophisticated model with a Zeeman effect background corrector.

3. Management Controls, Organization and Training (IP 84750)

The Chemistry Department organization has been little changed since the previous inspection in this area.[1] The Chemistry Services Supervisor now reports to the Technical Superintendent. Reporting to the Supervisor are the Operational Group and Technical Group Leaders, supported by three and four staff members, respectively, and an additional Laboratory Foreman has been added for a total of three.

There are still 14 permanently-assigned chemistry technicians (CT), all qualified as CTs under the standard ANSI N18.1-1971.

The staffing appears to be adequate to perform the required chemistry for plant operations. The permanent assignment of technicians to Chemistry appears to be a substantial improvement in laboratory capabilities and technician proficiencies.

No violations or deviations were identified.

4. Hydrogen Water Chemistry, Unit 2 (IP 79701)

The inspector reviewed aspects of the hydrogen water chemistry (HWC) in which hydrogen is added to the feedwater to reduce oxygen levels in the RCS to limit corrosion. Licensee representatives noted that despite the use of this process over about five years, cracks were found in the recirculation and cleanup inlet pipes in a recent ultrasound test (UT) program. While the recirc pipe damage was considered to be intergranular

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[1]Region III Inspection Report Nos.(50-237/88028; 50-249/88029).

stress corrosion cracking (IGSCC), it was not apparent that the cracks occurred since the implementation of HWC; it is believed that they were observed due to improved UT techniques and a chemical decontamination that may have removed debris from the cracks. Because the cracks in the inlet pipe had a different pattern, the cause was attributed to thermal stress, rather than to IGSCC. To optimize the HWC, the licensee obtained and installed a new electrochemical potential (ECP) and crack arrest verification (CAV) monitor much sooner than previously scheduled (Section 2c). Sampling lines are presently being conditioned with oxygenated water to provide accurate values of ECP and CAV. Licensee representatives expect the monitor to be operational about July 1990.

No violations or deviations were identified.

5. Implementation of the Chemistry Program (IP 84750)

The inspector reviewed the chemistry programs, including physical facilities and laboratory operations. The laboratories are greatly improved over previous years; the laboratory has been completed, traffic of nonlaboratory personnel through the area has been stopped and the entire laboratory was made into a radiological controlled area. Housekeeping and bench space were adequate for the analyses performed. Laboratory instrumentation has been improved; a new computer-operated Autoion 455 Model III two-unit Dionex Ion Chromatographic system has been added and the IC equipment upgraded; and the atomic absorption spectrophotometer (AAS) was upgraded to a computerized Perkin-Elmer Model 5100 AAS with a Zeeman background corrector furnace.

Overall, the laboratory appeared to be adequate for the proper operation of the plant and to be operating satisfactorily. Licensee management is aware of the value of a good water quality control program, and has improved both the laboratory facilities and its organization (Section 3).

No violations or deviations were identified.

6. Nonradiological Confirmatory Measurements (IP 79701)

The inspector submitted chemistry samples to the licensee for analyses as part of a program to evaluate the laboratory's capabilities to monitor nonradiological chemistry parameters in various plant systems with respect to various Technical Specification and other regulatory and administrative requirements. These samples had been prepared, standardized, and periodically reanalyzed (to check for stability) for the NRC by the Safety and Environmental Protection Division of Brookhaven National Laboratory (BNL). The samples were analyzed by the licensee using routine methods and equipment.

The samples were diluted by licensee personnel as necessary to bring the concentrations within the ranges normally analyzed by the laboratory, and

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[2]Ibid.

run in triplicate in a manner similar to that of routine samples. The results are presented in Table 2 with the the criteria for agreement presented at the end of the table. These criteria are derived from the BNL results of the present samples and the relative standard deviations (RSD) derived from the results of the 1986 interlaboratory comparisons from the various plant laboratories in the study (Table 2.1, NUREG/CR-5422). The acceptance criteria were that the licensee's value should be within ± 2 SD of the BNL value for agreement and between 2 and 3 SD for qualified agreement.

The licensee analyzed nine analytes at three concentrations each, except that six samples of boron were analyzed. Of the initial 30 analyses, 26 were in agreement and two were qualified agreement (Table 2) for a total agreement of 93% with the BNL values. The disagreements included the results from a nickel and a silica sample.

A rerun of the high-level silica brought it into agreement. However, the bias was still low; the licensee is examining the possible effects of low temperatures on color development. The change in bias of the results from the low to the high concentration samples indicates the possibility of silica contamination in the deionized water used for dilution. The disagreement in the nickel analysis appears to be due to a defective sample or dilution error. Some of the problems appear to be due to the use of a new AAS with procedures still under development, and the sample matrix, which contains all four metal ions in approximately equal concentrations, is not that normally analyzed by the laboratory.

The licensee's results were very good and greatly improved over those in the previous inspection.[3] Resolution of the discrepancies above will be followed in subsequent routine inspections in this area.

No violations or deviations were identified.

7. Implementation of the QA/QC Program in the Chemistry Laboratory (IP 79701)

The inspector reviewed the nonradiological QA/QC program in the laboratory. This program is governed by procedure DCP 1900-3, "Chemistry Quality Control," Revision 3, March 31, 1988, ispresently being updated. They have control charts for all analyses as noted previously.[4] The charts were good and well maintained in the logbooks of the respective intruments. The inspector noted that the charts would be more useful if the previous completed one were kept along with the ongoing chart. The licensee representative agreed to follow this suggestion.

The technician performance test program was reviewed. In the light of the permanent assignment of the CTs to Chemistry, the licensee modified the program to have the CTs spend time at the Corporate Production Training Center at Braidwood annually for requalification training and testing on the instrumentation, which was identical to that in the plant. In the

[3]Ibid.
[4]Ibid.

initial session the CTs setup and calibrated each of the instruments and ran a performance check standard. The acceptance limits were the two-sigma control limits for the instrument used in the plant laboratory. Only one of the results was out of the acceptable range. This program had the advantages that an independent chemist observed the CTs and each CT ran each of the analyses, some of which they did not necessarily do in their own work over the year, due to scheduling problems. In the future sessions the program will be enhanced to require the running of blind samples.

The licensee results in the corporate interlaboratory comparison was good over 1988, running 89-100% agreement, but they dropped in the first two quarters of 1989 to the 70-76% range. These improved to 96-100% in the subsequent two quarters.

The inspector noted to licensee representatives that the QA/QC program has progressed well and appears to be a good program as planned. Further progress of this program will be followed in subsequent routine chemistry inspections.

No violations or deviations were identified.

8. Radiological Environmental Monitoring Program (REMP) (IP 84750)

The inspector reviewed the licensee's REMP, including the two latest (1987 and 1988) Annual Environmental Reports, inspected several environmental air sampling stations, and discussed aspects of the program with the Health Physics Supervisor. The program is operated by CECo corporate personnel and collect the environmental samples. The samples are collected and analyzed, by a vendor laboratory (Teledyne, Inc.) who also makes the reports.

The Annual REMP Reports conformed to the Technical Specification requirements, including lists of missing samples and the availability onsite of the individual measurement data (the cumulative monthly reports January to December of the respective years). The inspector noted that the text summary stated that there was no effect of the plant on the environment; however, some of the 1988 samples showed measurable levels of up to 1100 pCi/liter of H-3 (LLD 200 pCi/liter). This is below the Technical Specification reporting level of 20,000 pCi/liter. The licensee representative stated that samples listed were part of the shared values from the areas around the GE Fuel Reprocessing Facility in Morris. The licensee will note reasons for such anomalies in future reports.

The inspector observed the operation of five air sampling stations. They appeared to be operating satisfactorily, except J-03 in which the weak vacuum was observed while blocking the filter face, indicating air inleakage after the sample head. Moreover, a single individual could not simultaneously observe the flow meter and check the vacuum while blocking the filter by hand. After the inspector noted his concerns, the licensee agreed to correct this problem.

Otherwise, the REMP appeared to be operating satisfactorily.

No violations or deviations were identified.

9. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee, or both. No open items were disclosed during the inspection.

10. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on February 15, 1990, and in a telephone discussion on March 1, 1990, with a Chemist. The inspector discussed the Open Items in Section 2 and observations on the quality control program and the confirmatory measurements. He noted the progress in the QA/QC program since the previous inspection. The inspector noted that the data indicates that the HWC apparently did not significantly increase radiation levels in the Health Physics office and Gatehouse. He discussed the REMP and the problem with the air sampler in Section 8.

During the exit interview, the inspector discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. Licensee representatives did not identify any such documents or processes as proprietary.

Attachments:
1. Table 1, Nonradiological Split Sample Intercomparison, June 1989
2. Table 2, Nonradiological Interlaboratory Test Results, February 13-15, 1990
3. Attachment 1, Criteria for Comparing Analytical Measurements (Nonradiological)

TABLE 1
Nonradiological Interlaboratory Split Sample
Results
Dresden Nuclear Power Station
June 1989

Analyte	Matrix[a]	Analysis Method[b]	NRC Y ± SD	Licensee X ± SD	Ratio Z ± SD	Comparison[c] ±2 SD
			Concentration, ppb			
Fluoride	RCS	IC	24.8 ± 2	25.5 ± 0.2	1.028 ± 0.083	A
Chloride	RCS	IC	16.3 ± 2	24.4 ± 0.3	1.497 ± 0.260	A*
Sulfate	RCS	IC	50.2 ± 1.5	25.1 ± 0.2	0.500 ± 0.426	D*

a. Matrix:
RCS Reactor Coolant System.

b. Analytical method:
IC Ion Chromatatography

c. Comparison:
A Agree
D Disagree
(See Attachment 1 for agreement criteria.).

TABLE 2
Nonradiological Confirmatory Measurements Results
Dresden Nuclear Power Station
February 13-15, 1990

Analyte		Method[1]	Conc[2]	Ratio[3]	Acceptance Ranges[4] ± 2RSD	± 3 RSD	Result[5]
			ppb				
Fluoride	A	IC	10	1.050	0.875-1.125	0.813-1.187	A
	B		20	0.967	0.875-1.125	0.813-1.187	A
	C		40	0.922	0.875-1.125	0.813-1.187	A
Chloride	A	IC	10	1.000	0.933-1.067	0.900-1.100	A
	B		30	0.932	0.917-1.081	0.879-1.121	A
	C		45	0.977	0.926-1.074	0.895-1.105	A
Sulfate	A	IC	10	1.011	0.895-1.105	0.842-1.158	A
	B		20	0.958	0.895-1.105	0.868-1.132	A
	C		35	0.947	0.900-1.100	0.867-1.133	A
Iron	G	AA/FL	500	0.976	0.904-1.096	0.854-1.146	A
	H		900	1.002	0.903-1.097	0.857-1.143	A
	I		1500	1.015	0.903-1.097	0.855-1.145	A
Copper	G	AA/FL	500	1.055	0.904-1.095	0.859-1.141	A
	H		900	1.040	0.904-1.096	0.857-1.143	A
	I		1500	1.047	0.904-1.096	0.857-1.143	A
Nickel	G	AA/FL	500	0.920	0.936-1.064	0.906-1.094	A+
	H		900	0.648	0.936-1.064	0.906-1.094	D
	I		1500	0.942	0.936-1.064	0.906-1.094	A
Chromium	G	AA/FL	500	1.112	0.905-1.096	0.855-1.145	A+
	H		900	1.063	0.905-1.096	0.855-1.145	A
	I		1400	1.068	0.905-1.096	0.855-1.145	A
Silica	S	Spec	20	1.061	0.906-1.094	0.859-1.141	A
	T		50	0.987	0.906-1.094	0.859-1.141	A
	U		90	0.776	0.906-1.094	0.859-1.141	D
(rerun)	U		90	0.928	0.906-1.094	0.859-1.141	A
Boron (New set)	D	Titr	1000	0.981	0.979-1.021	0.968-1.032	A
	E		3000	1.006	0.979-1.021	0.968-1.032	A
	F		5000	0.987	0.979-1.021	0.968-1.032	A
Boron (Old set)	D	Titr	1000	1.001	0.979-1.021	0.968-1.032	A
	E		3000	1.005	0.979-1.021	0.968-1.032	A
	F		5000	1.009	0.979-1.021	0.968-1.032	A

[1]Methods: Titr - Titration
IC - Ion Chromatography
Spec - Spectrophotometry
AA/FL - Atomic absorption spectrophotometry (flame)

[2]Conc: Approximate concentration analyzed.

[3]Ratio of Licensee mean value to NRC mean value.

[4]The RSD in the fifth and sixth columns represents the coefficient of variation obtained from averaging licensee data from the preceding cycle (Table 2.1 of NUREG/CR-5244). The licensee value is considered to be in agreement if it falls within the ± 2 RSD range; a qualified agreement if it lies outside ± 2 RSD but within ± 3 RSD; and in disagreement if it is outside the ± 3 RSD range.

[5]Result:
A = Agreement: Licensee value is within ± 2 RSDs of the NRC mean value.
A+ = Qualified agreement, licensee is between ± 2 and ± 3 RSDs of the NRC value.
D = Disagreement: licensee value is outside ± 3 RSDs.

ATTACHMENT 1

Criteria for Comparing Analytical Measurements

This attachment provides criteria for comparing results of the capability tests. The acceptance limits are based on the uncertainty (standard deviation) of the ratio of the licensee's mean value (X) to the NRC mean value (Y), where

(1) $Z = X/Y$ is the ratio, and

(2) S_z is the uncertainty of the ratio determined from the propagation of the uncertainties of licensee's mean value, S_x, and of the NRC's mean value, S_y.[1] Thus,

$$\frac{S_z^2}{Z^2} = \frac{S_x^2}{X^2} + \frac{S_y^2}{Y^2}, \text{ so that}$$

$$S_z = Z \bullet \left(\frac{S_x^2}{X^2} + \frac{S_y^2}{Y^2} \right)^{\frac{1}{2}}$$

The results are considered to be in agreement when the bias in the ratio (absolute value of difference between unity and the ratio) is less than or equal to twice the uncertainty in the ratio, i.e.

$$| 1-Z | \leq 2 \bullet S_z .$$

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1. National Council on Radiation Protection and Measurements, A Handbook of Radioactivity Measurements Procedures, NCRP Report No. 58, Second Edition, 1985, Pages 322-326 (see Page 324).

4/6/87