U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/88015(DRSS)

Docket No. 50-255 License No. DPR-20

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Plant

Inspection At: Palisades Site, Covert, Michigan

Inspection Conducted: May 31 and June 1-2, 1988 (Onsite)
June 3, 6, 13 and 16, 1988 (Telephone discussions)

Inspectors: R. B. Holtzman 6/23/88
Date

J. E. House 6-23-88
Date

Approved By: M. C. Schumacher, Chief 6/23/88
Radiological Effluents and Date
Chemistry Section

Inspection Summary

Inspection on May 31 and June 1-2, 1988 and telephone discussions on June 3, 6, 13 and 16, 1988 (Report No. 50-255/88015(DRSS))
Areas Inspected: Routine, announced inspection of the chemistry program, including (1) procedures, organization, and training (IP 83722, 83723); (2) reactor systems water quality control programs (IP 79701); (3) quality assurance/quality control program in the laboratory (IP 79701); and (4) nonradiological confirmatory measurements (IP 79701). Also reviewed past open items.
Results: The Chemistry Department was recently reorganized and new managers appointed who appear to be qualified for their positions. The licensee has an extensive water quality control program, including the use of boron addition to the secondary system. The nonradiological confirmatory measurements results demonstrated some weaknesses in with the chemical measurements QA/QC program. Licensee representatives agreed to correct these problems. No violations or deviations were identified.

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DETAILS

1. Persons Contacted

[1,3]R. M. Rice, Operations Manager, CPCo
[1]D. J. Malone, Nuclear Licensing Analyst, CPCo
[1,2,5]C. T. Hillman, Plant Chemical Engineer, CPCo
[1,4]T. A. Chartrand, Chemistry Supervisor, CPCo
[1]R. E. McCaleb, Quality Assurance Director, CPCo
[1]J. E. Paver, Chemistry Support Supervisor, CPCo
M. D. Sullivan, Lead Technician, CPCo
[5]P. Rigozzi, Supervisory Instructor, Nuclear Training Department, CPCo
[1]E. R. Swanson, Senior Resident Inspector, NRC

The inspectors also interviewed other licensee personnel in the course of the inspection.

[1]Present at the plant exit interview on June 2, 1988.
[2]Telephone discussion held on June 3, 1988.
[3]Telephone discussion held on June 6, 1988.
[4]Telephone discussion held on June 13, 1988.
[5]Telephone discussion held on June 16, 1988.

2. Licensee Action on Previous Inspection Findings

a. (Closed) Open Item No. 50-255/87017-01: Licensee to modify the nonradiological interlaboratory comparison program to test all technicians on a quarterly basis. The licensee has developed a tracking program to insure that technicians will be tested twice per year. (Section 7)

b. (Open) Open Item No. (50-255/87017-02): Licensee will modify the QA/QC program for the counting room, and especially that for the gamma spectrometers. The inspectors reviewed progress in the development of the QC program for the gamma spectrometer. The licensee had implemented the program to use only two check source lines, but had errors in some datasets that caused difficulties in producing control charts. The chemist operating the system was new at the position and had contacted the software vendor for help. The control charts for the other instrumentation and QA/QC program for the gamma spectrometer will be reviewed in a subsequent inspection.

c. (Closed) Open Item No. (50-255/87017-03): Licensee to spike, split with BNL and analyze a PWR primary coolant sample with anions, feedwater and condensate water samples with metals. The licensee spiked and analyzed a Spent Fuel Pool sample (a stand-in for PWR reactor coolant matrix) with chloride, and feedwater and condensate pump discharge water samples with copper, iron and chromium ions. The results are shown in Table 1 and the acceptance criteria in

Attachment 1 (see Section 6 for discussion of criteria). Because the licensee did not report uncertainties for the results, the inspectors arbitrarily assumed those for the metals to be 50 ppb, which represents a relative standard deviation of about 5%, and is a reasonable value for this type of analysis. The licensee achieved five agreements in seven analyses. Because the chromium analysis is no longer used and the licensee's QA/QC program is still under development this item is considered closed. These problems will be reviewed in a subsequent inspection under Open Item No. 255/88015-02 in Section 7.

d. (Closed) Open Item 50-255/87017-04: Licensee to send a letter to Region III by August 28, 1987, addressing the proposed modifications of the QA/QC program. The licensee letter dated August 28, 1987, proposed some limited changes in the chemistry program and some more substantial ones in the counting room. Additional and more substantive changes were presented by the Operations Manager in a meeting at the Region III office on April 5, 1988. Progress in implementation was noted during this inspection.

3. Management Controls and Organization (IP84722)

The Chemistry Department underwent extensive personnel and reorganization changes since the previous inspection.[1] The title of the Chemistry Department Head was changed from Plant Chemist to Plant Chemical Engineer and this position reports to the Operations Manager. An individual whose former position was manager of the Chemical Engineering Group was appointed to fill this position. The former Plant Chemist has transferred to the Reactor Engineering Department. Supervisory positions for the Hot and Cold laboratories have been condensed into a single Laboratory Supervisor position. A former member of the Chemical Engineering Group has been appointed to this position. These individuals meet ANSI qualifications. This position along with the Environmental Coordinator, Chemical Engineering Section Supervisor and Support Supervisor report to the Plant Chemical Engineer. Daily operations are managed by the Laboratory Supervisor and two Lead Technicians, one for the hot laboratory and the other for the cold laboratory. This appears to be an efficient management structure.

The licensee's Chemical Technician Training Program was accredited by INPO September 23, 1987. The Nuclear Training and Chemistry Departments are revising this program for reaccreditation in 1989 to better conform to improved laboratory practices.

No violations or deviations were identified.

[1]Region III Inspection Report No. 50-255/87017

4. Water Chemistry Control Program (IP 79701)

The inspectors reviewed the Water Chemistry Control Program based on Procedure No. COP 11, "Secondary System Chemistry," Revision 11, March 15, 1988. The specifications of the administrative limits on the parameters of the various systems are derived from and consistent with the relevant EPRI Steam Generator Owners Group (SGOG), "PWR Secondary Water Chemistry Guidelines," NP-5056-SR, Revision 1, 1987. It allows the Plant General Manager to waive holds due to out-of-specification chemistry parameters when chemistry excursions from hideout return following power changes cannot be corrected within the time frames of the Action Levels. Several circumstances contribute to this problem: large hideout return causing very high levels of chloride and sulfate (peaking at greater than 600 ppb sulfate), a low capacity on the steam generator blowdown rate, the absence of an inline condensate demineralizer, and a condensate storage tank vented to the atmosphere. These parameters are normally maintained well below the Action Level 1 Guidelines during normal steady state operations at power. The procedure is currently being revised to incorporate a statement of "management philosophy" to regulate the use of the waiver.

The licensee is working on various aspects of the problems in the secondary system to improve water chemistry. During the last outage, they removed a large amount of sludge from the steam generators. A boric acid addition program is used in the secondary system to reduce corrosion and denting in the steam generators. The licensee concluded after some research that a concentration of 2 ppm boron was more appropriate to this system than the lower EPRI Guideline level of 5 ppm boron.

In general, the various parameters representing contamination are maintained in an apparently satisfactory manner. The plant has not been out of Technical Specifications limits for chemistry. Rather than using the Hours Out of Specification Parameter, chemistry now maintains a new INPO index, the Chemistry Performance Indicator (CPI) for recirculating steam generators, based on the quarterly averages of the sum the ratios of the chemistry parameters to their Action Level 1 values and normalized to 1.0, i.e..

$$QV = 1/5*(K_a/0.8 + Cl/20 + Na/20 + SO_4/20 + O_2/10),$$

where:

QV is the quarterly value,
K_a is the blowdown conductivity (uS/cm),
Cl is the blowdown chloride concentration (ppb),
Na is the blowdown sodium concentration (ppb),
SO_4 is the blowdown sulfate concentration (ppb), and
O_2 is the condensate pump discharge dissolved oxygen concentration (ppb).

The chemistry parameter data are stored in computer files which may be viewed online, printed, or plotted on a graphics printer for better assessment of the results. The Plant Chemical Engineer reviews key radiochemistry parameters. Some chemistry data goes to the Vice President of Nuclear Operations and other managers via the Daily Report. The Operations Manager does not normally use the trend charts, but requests them for special problems, such as high levels of dissolved oxygen found in feedwater and elevated xenon levels found in secondary water.

The licensee has not committed to the EPRI primary coolant system guidelines, but will review them for compatibility with his system when the latest version is published shortly (probably in June 1988). The licensee is putting considerable effort into improving and maintaining water quality.

No violations or deviations were identified.

5. Implementation of the Chemistry Program (IP 79701)

The inspectors reviewed the chemistry programs including physical facilities and laboratory operations. Changes from the last inspection[2] include a gradient elution system for the Dionex Ion Chromatograph. Construction of a new cold laboratory is underway which will provide needed additional laboratory space.

The inspectors observed several technicians analyze the confirmatory measurements samples for boron by titration, metals by atomic absorption spectrophotometry, and fluoride, chloride and sulfate by ion chromatography (IC). They appeared to be generally knowledgeable about the work and followed the procedures.

Overall, the laboratory appeared to be adequate for the proper operation of the plant and to be operating satisfactorily.

No violations or deviations were identified.

6. Nonradiological Confirmatory Measurements (IP 79701)

The inspectors submitted chemistry samples to the licensee for analysis 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.

[2]Ibid

The samples were diluted by licensee personnel as necessary to bring the concentrations within the ranges normally analyzed by the laboratory, and run in triplicate in a manner similar to that of routine samples. The results are presented in Table 2 and the criteria for agreement in Attachment 1. These criteria are based on comparisons of the mean values and estimates of the standard deviations (s.d.) of the measurements. Consideration was given to the fact that the uncertainties (s.d.) of the licensee's results were not necessarily representative of the laboratory's because they were obtained by one analyst over a short period of time. Consequently when the licensee s.d. was less than that of BNL, and a disagreement resulted, the BNL value was substituted for that of the licensee in calculating the s.d. of the ratio Z (S_Z in Attachment 1).

The licensee analyzed a limited number of samples, six analytes at three concentrations each. Of the initial 18 analyses, 12 of the results (67%) were in agreement with those of BNL. The disagreements included the three chloride, the two higher fluoride, and the low-level boron results. The most persistent problem appeared to be in the analyses on the IC, which accounted for five of the six initial disagreements. The licensee has replaced isocratic elution (constant eluant strength) with gradient elution in which the eluant concentration increases with time during the run. This technique is relatively new and is the first of its type observed in Region III. The use of gradient elution is purported to improve the elution of fluoride, chloride and sulfate in a single run. Lack of experience with the gradient system may account for some of the disagreements observed. For these three analytes the biases were high at the low concentrations and decreased at the higher concentrations which suggests either low-level contamination, or peak broadening with increasing concentration. There also appeared to be some problems in preparation of the calibration standards, which were made from solids and may have not been dried sufficiently.

While the iron results were in agreement, the biases of 8-10% low indicate that the calibration standard is high. The licensee will check this with an independent standard.

Some problems appeared in the boron analysis. While the lower-level results had very good precision in both the BNL and licensee results, the 4% low bias resulted in a disagreement. The middle-level result had a similar bias, but because of the higher uncertainty in the BNL value, it resulted in agreement. Part of the discrepancy appears to be due to the difference in end-points used in the titration. When the analyst used the BNL end-point of pH 8.6, rather than the 7.0 called for in the licensee's procedure, the results were then in agreement. An additional likely source of error is the lack of an independent functional check standard.

Progress in the improvements in ion chromatography, iron and boron analyses, will be followed in subsequent inspections under the Open Item No. 50-255/88015-01.

No violations or deviations were identified.

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

The inspectors reviewed the nonradiological QA/QC program required by the Chemistry Program Manual. The licensee has developed control charts for all assays. While these charts reflect values of controls, the parameter plotted is usually recovery instead of the measured value. A fixed acceptance criterion (±20%, for example) is used instead of a statistical criterion based on the mean value ±2 standard deviations. The licensee has agreed to implement statistically based acceptance criteria.

Three point calibration curves have been implemented on the IC, an improvement over the one-point curve formerly used. Single point curves with function checks are still used on the atomic absorption unit. These function checks are used to test instrument calibrations on all instruments. However, they are not independent controls because the check material comes from the same source as the calibrators. A similar weakness exists in the licensee's Boron analysis which has no independent verification of the titrant strength. This deficiency could be eliminated by incorporation of a second independent Boron control or by standardizing the titrant against Phthalic acid followed by the analysis of a Boron control. The licensee has agreed to implement independent controls and statistically based acceptance criteria for control charts by September 1. 1988. Control chart statistics and independent controls will be followed in subsequent inspections under Open Item No. 50-255/88015-02.

The licensee participated in an interlaboratory cross-check program with a vendor (NWT, Inc.). Samples of varying composition are provided to the participants quarterly, and the results of the comparison, along with the vendor's standard value, are provided afterwards to the participants. No statistical uncertainty is quoted for the vendor's value which is a weakness in the program. Comparison methods were discussed with the licensee.

The inspectors also reviewed the Technician Testing Program which is based on the interlaboratory cross-check program. During the previous inspection it was determined that not all technicians were participating in the testing program. The licensee is modifying the program to insure that all technicians will undergo testing twice yearly. The absence of acceptance criteria is a weakness in this program also. The licensee is addressing this problem by developing these criteria along with action statements to be implemented when a technician's results are out of limits. Responsibility for this program rests with the Laboratory Supervisor. Changes in the Interlaboratory Cross Check Program and the technician testing program will be followed in subsequent inspections under Open Item No. 50-255/88015-03.

The licensee reported[3] an error (approximately 6%) in the listed value (1000 ppm) of a purchased boron standard. The apparent discrepancy was identified by the licensee's QC checks plus followup analysis using

[3]Letter dated May 2, 1988, K. W. Berry (CPCo.) to Director, NRR.

independent standards. In addition to the Part 21 report, the licensee has notified the vendor and returned the standards as requested. The inspectors discussed this matter by telephone on June 21, 1988, with a vendor representative who stated that an NBS Boron standard had been obtained for use in reanalysis of the lot in question. This matter will be followed under Open Item No. 50-255/88015-04.

The licensee's QA/QC system has the basic elements of a satisfactory program, and has progressed from from the last inspection. An increased responsiveness to NRC concerns was noted. Some changes are still needed and were discussed with licensee representatives who will consider the inspectors concerns.

No violations or deviations were identified.

8. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspectors, and which involve some action on the part of the NRC or licensee, or both. Open items disclosed during the inspection are discussed in Sections 6 and 7.

9. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on June 2, 1988. The inspectors discussed the Open Items in Section 2 and observations on the quality control program and the confirmatory measurements. Licensee representatives agreed to modify the QC charts and to consider other modifications of the program, as discussed in Section 7. These modifications will be completed by September 1, 1988. Additional discussions were held by telephone with Messrs. R. M. Rice on June 6; C. T. Hillman on June 3 and 16; T. A. Chartrand on June 6, and P. Rigozzi on June 16, 1988.

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

Attachments:
1. Table 1, Nonradiological Interlaboratory Split Sample Results, December 3, 1987
2. Table 1, Nonradiological Interlaboratory Test Results, May 31 through June 2, 1988
3. Attachment 1, Criteria for Comparing Analytical Measurements (Nonradiological)

TABLE 1

Nonradiological Interlaboratory Split Sample Results

Palisades Nuclear Generating Plant

December 3, 1987

Analyte	Matrix[a]	Analysis Method[b]	NRC[c] Y ± SD	Licensee[c] X ± SD	Ratio Z ± SD	Comparison[d] ±2 SD
			Concentration, ppb			
Cl^-	SFP	IC	65 ± 9	57 ± 0	0.877 ± 0.121	A
Cu	FW	AAS/FL	1020 ± 20(50)	952 ± 50	0.933 ± 0.040	A
	CPD		1020 ± 30(50)	952 ± 50	0.931 ± 0.040	A
Fe	FW	AAS/FL	921 ± 3(50)	1021 ± 50	1.109 ± 0.081	A
	CPD		906 ± 2(30)	1022 ± 50	1.128 ± 0.083	A
Cr	FW	AAS/FU	1050 ± 30(50)	784 ± 50	0.747 ± 0.036	D
	CPD		1090 ± 30(50)	779 ± 50	0.715 ± 0.034	D

a. Matrix:
   SFP Spent fuel pool coolant
   FW Feedwater
   CPD Condensate pump discharge water
b. Analysis method:
   IC Ion chromatography
   AAS/FL Atomic absorption/Flame
   AAS/FU Atomic absorption/Furnace
c. The SD for the metals is assumed to be 50 ppb (about 5% relative SD) for both the NRC (50) and licensee.
d. Comparison:
   A Agree
   D Disagree

TABLE 2

Nonradiological Interlaboratory Test Results

Palisades Nuclear Generating Plant

June 1-2, 1988

Analyte	Analysis Method[b]	NRC Y ± s.d.(n)	Licensee[a] X ± s.d.(n)	Ratio Z ± s.d.	Comparison[c] ±2 s.d.
		Concentration, ppb			
F^-	IC	11.25 ± 1.0(7)	12.55 ± 0.15	1.116 ± 0.100	A
		21.15 ± 0.2(7)	23.8 ± 0.17	1.126 ± 0.014	D*
		41.4 ± 0.85(7)	32.4 ± 0.65	0.782 ± 0.026	D*
Cl^-	IC	9.25 ± 0.05(7)	11.0 ± 0.78	1.189 ± 0.084	D
		18.65 ± 0.15(7)	20.9 ± 0.21	1.121 ± 0.014	D
		38.25 ± 0.6(8)	41.63 ± 0.71	1.088 ± 0.025	D
Sulfate	IC	9.75 ± 0.7(7)	11.8 ± 0.2	1.209 ± 0.113	A*
		19.2 ± 1.35(7)	21.6 ± 1.6	1.128 ± 0.116	A
		39.0 ± 1.15(9)	37.9 ± 0.6	0.971 ± 0.032	A
Cu	AAS	400. ± 6 (7)	390. ± 1.	0.975 ± 0.015	A
		810. ± 30(7)	770. ± 1.	0.951 ± 0.035	A
		1200. ± 30(7)	1190. ± 6.	0.992 ± 0.025	A
Fe	AAS	372. ± 10(7)	345. ± 23.	0.927 ± 0.067	A
		796. ± 10(6)	740. ± 64.	0.930 ± 0.081	A
		1170. ± 30(7)	1052. ± 88.	0.899 ± 0.079	A
		Concentration, ppm			
B	Titr	1040 ± 10(7)	996. ± 6.4	0.958 ± 0.013	D*
		3100 ± 100(7)	2954 ± 32	0.953 ± 0.032	A
		5000 ± 90(7)	4953 ± 8	0.991 ± 0.018	A
B	Titr (rerun)	1040 ± 10(7)	999.[d] ± 5.	0.961 ± 0.013	D*
B	(rerun)	1040 ± 10(7)	1014[e] ± 4	0.975 ± 0.013	A*

a. Value ± standard deviation (s.d.); n is number of BNL analyses. The number of licensee analyses is 3 unless otherwise noted.

b. Analytical methods: Titr - titration
IC - Ion chromatography
AAS - Atomic absorption Spectroscopy (furnace)

c. A = Agreement
D = Disagreement
*Substituted the BNL uncertainty for licensee's uncertainty.

d. Titration end point at pH 7.0.

e. Titration end point at pH 8.6.