U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/86011(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, MI

Inspection Conducted: March 12-14, 1986 onsite
March 18, 20, and 24, 1986 by telephone

Inspectors: M. J. Oestmann — 4/8/86 Date

R. B. Holtzman — 4/8/86 Date

Approved By: M. C. Schumacher, Chief
Radiological Effluents and
Chemistry Section — 4/9/86 Date

Inspection Summary

Inspection on March 12-14, 18, 20, and 24, 1986 (Report No. 50-255/86011(DRSS))
Areas Inspected: Routine, announced inspection of: (1) water chemistry control program including nonradiological chemistry and radiochemistry, quality assurance/quality control of sampling and analysis in the hot and cold laboratories, observations of technician performance, management controls and training and qualifications of chemistry staff and technicians; (2) confirmatory measurements program, including collection of one sample for comparison of analyses with the NRC Reference Laboratory; and (3) licensee action on previously identified findings.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

*R. M. Rice, Plant Operations Manager, Palisades
*S. F. Pierce, Plant Chemist, Palisades
*D. J. Fitzgibbon, Licensing Engineer, Palisades
*C. T. Hillman, Chemical Engineering Section Head, Palisades
*R. P. Margol, Quality Assurance Administrator, Palisades
***J. Hager, Chemistry Laboratory Supervisor/Primary, Palisades
S. K. Lange, Chemistry Laboratory Supervisor/Secondary, Palisades
E. J. Kelley, Chemistry Technician, Palisades
D. Badley, Chemistry Technician, Palisades
**C. Graffinius, Senior Chemistry Technician, Palisades

*E. R. Swanson, Senior Resident Inspector, NRC

*Attended the exit interview on March 14, 1986.
**Present during telephone conversation on March 18, and 20, 1986.
***Present during telephone conversation on March 24, 1986.

2. Licensee Action on Previously Identified Items

(Closed) Open Item (50-255/85025-01): A sample of Clean Waste Receiver Tank T-64B was split with the licensee. The licensee's results of the analyses on this sample are compared in Table 1 to those of the NRC Reference Laboratory, the Radiological and Environmental Sciences Laboratory (RESL), Idaho Falls, Idaho. The comparison criteria are presented in Attachment 1. Sample L WASTE is that portion of the analyses of the pure beta particle-emitting radionuclides, while L WASTE1 is that for the gamma-spectrometric analyses. Of the 11 results, three were disagreements. The licensee's Sr-90 value is 27 times the NRC value, while the Co-60 and Fe-59 results are 71% and 55% of the respective NRC values. The source of the discrepancies appears to be due to particulates in the sample which may produce non-uniform distributions of activities in the sample. To further check the discrepancies, another sample was collected and split, and the results discussed in Section 7. This item is considered closed.

3. Management Controls and Organization

The inspectors reviewed the licensee's management controls and organization for implementing the chemistry and radiochemistry program. The Chemistry Department, under the direction of the Chemistry Superintendent is in the Plant Operations Division. Reporting to the Chemistry Superintendent are the Senior Chemical Engineer, responsible for procedure preparation and special projects, and the Plant Chemist. Under the Plant Chemist are two Laboratory Supervisors, one responsible for the primary system (radiological) laboratory and the other, the secondary system (nonradiological) laboratory, and an Environmental Coordinator. The laboratory functions are separated from the counting room functions, which are under the Plant Health Physicist who reports to the Radiological Services Manager. They appear to have adequate management support to effectively meet plant chemistry/radiochemistry and counting requirements. The Plant Chemist

has a sufficient number of staff, who along with 14 permanently assigned nuclear chemistry technicians (NCTs) effectively perform the required work. No problems were noted during the inspectors' review of the licensee's Administrative Procedure 4.20, "Chemistry Department Organization and Responsibility," approved May 29, 1985.

No violations or deviations were identified.

4. Training and Qualifications

The inspectors reviewed the training and qualifications of the chemistry technicians. There are five Senior, two Level II, and two Level I Technicians, and five technicians in training. Their positions are based on the status of completion of their qualification cards and their formal training program described in the Administrative Procedure 4.21, "Chemistry Program," approved May 14, 1985, and presented by the Nuclear Training Department. Inspectors' review of the typical duties of the technicians in the different grades, described in job descriptions, dated October 1985 and inspectors' observations of several technicians performing sampling and analytical work in the laboratories, indicate that the technicians are adequately trained for their positions.

The licensee requires technicians to demonstrate proficiency in laboratory practices by having practical and written examinations in accordance with procedure CH 1.1 "Chemistry Technician Qualification Program," approved April 29, 1985. Inspectors' discussions with, and observations of the chemistry staff and technicians, indicated that they are knowledgeable in their understanding of chemistry principles and practices, and that they followed appropriate laboratory procedure with no difficulty. The inspectors determined that each shift had one or more experienced or Senior Technicians to provide adequate coverage of chemistry/radiochemistry requirements.

No violations or deviations were identified.

5. Implementation of the Chemistry and Radiochemistry Programs

a. Primary Chemistry Program

The inspectors reviewed the primary chemistry and radiochemistry program, including physical facilities, laboratory operations, counting rooms, and procedures and practices in the hot laboratory and counting rooms.

The laboratory space in the hot laboratory and the fume hood facilities appeared to be crowded and cluttered. The laboratory and main counting room ventilation systems were inadequate to maintain proper humidity and temperatures. During hot weather, these conditions reduce instrument reliability (calibration and operability), especially for the gamma-ray spectrometers and liquid scintillation counter. The licensee is well aware of this problem and is planning improved environmental control of these facilities. A low-level counting room that contains the computers is air-conditioned and appears to have no ventilation problems. This counting room is available for backup for the main counting room.

Housekeeping needed improvement. Licensee personnel attempted to improve it, but because of the crowded conditions they were not very successful. Chemical instrumentation was found to be well-maintained, operable and with current calibration stickers. No chemical or reagent bottle was found to have passed its posted expiration date.

The licensee has recently upgraded the laboratory's analytical capabilities with new instruments of greatly improved sensitivities obtained from the Company's Midland Plant, including two atomic absorption spectrometers, one with a graphite furnace and an automatic sample changer for very sensitive metal analyses, a gas chromatograph, and two ion chromatographs.

The counting room has two well-maintained Nuclear Data gamma-ray spectrometer systems with a Ge and Ge(Li) detector, a liquid scintillation counter and two alpha-beta proportional counters.

The inspectors observed several technicians collect and analyze samples. One collected a primary coolant sample from the Primary Coolant Sample Panel and prepared a number of samples for counting. A second performed a boron analysis using a manual potentiometric (mannitol) titration method in which the sodium hydroxide solution was standardized against a 1000 ppm boron standard prior to analysis of the RCS boron. He seemed to thoroughly understand what he was doing and corrected a problem encountered with the electrode used in the titration. A third technician analyzed several metals (Ca, Na, and Li) on the atomic absorption spectrophotometer, and measured the conductivity and pH of the reactor coolant. No problems were noted during these observations. The technician performing the analyses appeared skilled in laboratory practices and knowledgeable about the procedures involved.

Licensee representatives indicated that there had been no difficulty in maintaining the required chemistry parameters in the primary reactor coolant. At no time were Technical Specification 3.1.6 limiting conditions of operation for dissolved oxygen, chloride, and fluoride in the reactor coolant exceeded. The licensee has been able to maintain good quality water coolant for the primary system.

b. QA/QC Program in the Primary Chemistry Laboratory

The inspectors reviewed the QA/QC procedures in the radiochemistry program. The licensee makes daily or more frequent performance checks on the counting equipment. The performance check data were maintained on tables. Checks are required to be within three sigma of the mean check-source value for the instrument to be considered usable. Control charts were not used, except with the Ge detectors, which had a built-in software program to calculate and plot the daily performance data. The gamma spectrometers were checked using a Ho-166m source with 10 peaks, each of which was required to be within certain limits before the instruments were considered operational. These charts proved useful to the laboratory supervisors to demonstrate problems arising from excessively high humidity at certain times of the year.

Overall, the primary chemistry/radiochemistry program appeared to be adequately implemented. The technicians appear to have good training, procedures are satisfactorily prepared and implemented, and a satisfactory QA/QC program for radionuclides is in place.

No violations or deviations were identified.

6. Implementation of a Secondary Water Chemistry Control Program

a. Secondary Water Chemistry Control Program

The inspectors confirmed that the licensee has established and is adequately implementing a secondary water chemistry control program in accordance with the requirements of Technical Specifications Section 3.18. The program is summarized in Procedure No. COP 11, "Secondary Water Chemistry," Revision 4, dated June 28, 1985. This procedure establishes guidances for maintaining proper chemistry conditions in the secondary systems during different plant operating modes and includes sampling and analysis frequencies primarily for pH, cation conductivity, dissolved oxygen, sodium, chloride, sulfate, and silica. Action levels are also provided for the licensee to take to modify plant operation when monitored chemical parameters are confirmed to be outside the normal operating values. The licensee's water chemistry program is designed to minimize localized corrosion in the steam generators and turbines. Corrosion products in the feedwater system are sampled daily and analyzed by atomic absorption.

The inspectors also reviewed operation conditions and found that the Operations Department and the Chemistry Department staffs cooperated closely to maintain tight control in plant water chemistry during the different modes of operation. A review of the extensive group of trend plots of the various chemical parameters showed that the licensee has an effective water chemistry control program.

b. Water Sampling and Analysis, Monitoring, and Processing

The inspectors reviewed the sampling and monitoring programs and water treatment processes during a tour of the plant including a review of the cold laboratory facilities and laboratory equipment.

In-line plant water chemistry instrumentation and the process sampling panel were observed during a tour of the plant. These instruments included monitors for measuring cation and specific conductivity and pH of the blowdown from each steam generator, condensate pump discharge, and main feedwater train. Dissolved oxygen and sodium are also monitored on the condensate pump discharge and main feedwater train. The plant maintains tight controls on condenser inleakage of Lake Michigan cooling water by monitoring the concentrations of sodium, magnesium and dissolved oxygen in hotwell condensate as indicators of inleakage. Magnesium concentrations appear to be the most sensitive of these indicators.

The inspectors determined that the in-line monitors were standardized and calibrated in accordance with Procedure No. CH 1.6, "Installed Instrumentation Control and Standardization," Revision 1, dated February 12, 1986.

The inspectors observed the cold laboratory which was less crowded than the hot laboratory. Space appeared adequate, but the licensee is planning to move it to the Turbine Building, where additional space will be available, and also ventilation will be improved. The present cold laboratory has several instruments, such as the ion chromatograph, that were obtained from the Midland Plant. The inspectors observed several technicians collecting samples from the secondary sampling panel and performing chemical analysis using the ion chromatograph, specific ion probe, pH and conductivity meters. The technicians appeared well trained and knowledgeable in performing the different analyses. The laboratory supervisor reviews the logged data from each analysis and promptly notifies the Shift Supervisor and chemistry management of off-normal levels.

From discussions with chemistry management, the inspectors determined that the licensee is checking to make certain good secondary water chemistry is being effectively implemented and is willing to expend the necessary effort to improve water chemistry monitoring and water quality control.

c. QA/QC of Analytical Measurements (Secondary Chemistry)

The laboratory has an extensive program for the assessment of the reliability of the laboratory procedures and of the chemistry technicians, as described in Procedure No. CH 1.3, "Laboratory Quality Control Program," Revision 0, dated February 21, 1985. Blind samples were obtained quarterly from a vendor, NWT, Inc. Each contains four constituents of interest (analyses required by the technical specifications or the PWR Guidelines) which are analyzed by each technician. The Laboratory Supervisor calculates the mean value for each analysis and submits it to the vendor, who then provides a chart that compares the plant mean with those from the other participating plants, the mean values from the plants as a group, and the "true" values in the samples. The supervisor uses the data from each technician to assess the respective technician's capabilities. Each constituent, such as chloride, fluoride, sulfate, sodium, magnesium and boron, is supplied in at least one sample annually. This program has been well implemented and provides valuable information to management concerning laboratory performance. Although not mandated in detail by Procedure No. CH 1.3, it is important that the quality of this program be maintained.

From review of the licensee's secondary chemistry control program, the inspectors determined that the licensee is placing the right emphasis on controlling secondary chemistry and is expending the necessary efforts through implementation of action levels to operate the plant with tight chemistry controls.

No violations or deviations were identified.

7. Confirmatory Measurements of the Sample Split

The licensee provided a split sample from the Clean Waste Receiver Tank, T-64A, because of the disagreements in the Sr-90, Co-60, and Fe-59 analyses in the previous sample (Section 2). This new sample was acidified and filtered through a glass fiber filter, and the sample split with the licensee and the Region III laboratories. Twelve comparisons of the gamma-ray spectrometry results in Table 2 show a disagreement for Cs-137, which is only about 35% the NRC value. There appears, overall, to be a bias on the low side, with the mean ratio (licensee-to-NRC values) of about 0.80 for the first sample (Table 1) and about 0.9 for the second (Table 2). To assure the quality of the analyses, the licensee agreed to redo the analyses for Sr-89 and Sr-90, and for Cs-137 and other gamma emitters in a spiked sample to be provided by RESL. Additionally, the Laboratory Supervisor will obtain another sample which will be acidified and filtered through a fine membrane filter, then split and counted by the licensee and Region III. These results will be reported to Region III (Open Item No. 50-255/86011-01).

No violations or deviations were identified.

8. Licensee Internal Audits

As discussed in a previous inspection (Inspection Report No. 50-255/85025), the licensee performed an audit (Report No. QT-85-18) in plant chemistry during September 9-13, 1985. A followup audit was performed by the licensee's Quality Assurance Department during the week of March 3, 1986, but no audit report was available to review. Licensee representatives reported that 42 of 47 open items were closed and the remaining five open items concern disposal of toxic chemicals.

No violations or deviations were identified.

10. Open Items

Open items are matters that have been discussed with the licensee, which will be reviewed further by the inspectors, and which involve some action of the NRC or licensee or both. An open item is discussed in Section 7.

11. Exit Interview

The inspectors reviewed the scope and findings of the inspection with licensee representatives (Section 1) at the conclusion of the site portion of the inspection on March 14, 1986. Additional discussions were held by telephone with licensee representatives on March 18-20 and 24, 1986 regarding the confirmatory measurements program. The licensee acknowledged the inspectors comments on the importance of:

- improving the climate controls in the counting room and hot laboratory;
- maintaining the quality of the blind sample program in the laboratory; and

- resolving the problems of the confirmatory measurements program and agreed to analyze a spiked sample to be sent from RESL.

During the 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 consider the proposed content as proprietary.

Attachments:
1. Attachment 1, Criteria for Comparing Analytical Measurements
2. Table 1, Confirmatory Measurements Program Results, 4th Quarter 1985
3. Table 2, Confirmatory Measurements Program Results, 1st Quarter 1986

ATTACHMENT 1

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgment limits are variable in relation to the comparison of the NRC's value to its associated one sigma uncertainty. As that ratio, referred to in this program as "Resolution", increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement should be considered acceptable as the resolution decreases. The values in the ratio criteria may be rounded to fewer significant figures to maintain statistical consistency with the number of significant figures reported by the NRC Reference Laboratory, unless such rounding will result in a narrowed category of acceptance.

RESOLUTION	RATIO = LICENSEE VALUE/NRC REFERENCE VALUE
	Agreement
<3	No Comparison
≥3 and <4	0.4 - 2.5
≥4 and <8	0.5 - 2.0
≥8 and <16	0.6 - 1.67
≥16 and <51	0.75 - 1.33
≥51 and <200	0.80 - 1.25
≥200	0.85 - 1.18

Some discrepancies may result from the use of different equipment, techniques, and for some specific nuclides. These may be factored into the acceptance criteria and identified on the data sheet.

TABLE 1

U S NUCLEAR REGULATORY COMMISSION

OFFICE OF INSPECTION AND ENFORCEMENT

CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: PALISADES
FOR THE 4 QUARTER OF 1985

		------NRC-------		----LICENSEE----		---LICENSEE:NRC----		
SAMPLE	ISOTOPE	RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
L WASTE	H-3	1.1E-01	2.0E-03	1.2E-01	4.3E-03	1.1E 00	5.6E 01	A
	GROSS B	2.1E-04	7.0E-06	2.2E-04	1.8E-05	1.0E 00	3.1E 01	A
	SR-89	6.2E-07	5.0E-08	7.0E-07	0.0E-01	1.1E 00	1.2E 01	A
	SR-90	1.3E-07	2.0E-08	3.5E-06	5.0E-07	2.7E 01	6.5E 00	D
L WASTE1	CO-57	1.3E-06	3.0E-07	7.8E-07	2.3E-07	6.0E-01	4.3E 00	A
	CO-58	1.5E-04	3.0E-06	1.4E-04	1.3E-06	9.1E-01	5.1E 01	A
	CO-60	2.0E-04	4.0E-06	1.4E-04	1.3E-06	7.1E-01	4.9E 01	D
	CR-51	6.8E-05	7.0E-06	7.2E-05	5.5E-06	1.1E 00	9.7E 00	A
	CS-137	6.5E-06	9.0E-07	5.7E-06	4.9E-07	8.8E-01	7.2E 00	A
	FE-59	6.1E-05	3.0E-06	3.4E-05	1.6E-06	5.5E-01	2.0E 01	D
	MN-54	1.4E-05	1.1E-06	9.6E-06	5.7E-07	6.8E-01	1.3E 01	A

T TEST RESULTS:
A=AGREEMENT
D=DISAGREEMENT
*=CRITERIA RELAXED
N=NO COMPARISON

TABLE 2

U S NUCLEAR REGULATORY COMMISSION

OFFICE OF INSPECTION AND ENFORCEMENT

CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: PALISADES
FOR THE 1 QUARTER OF 1986

		------NRC-------		----LICENSEE----		---LICENSEE:NRC----		
SAMPLE	ISOTOPE	RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
L WASTE	CR-51	7.7E-04	1.5E-06	8.8E-04	0.0E-01	1.1E 00	5.0E 02	A
	MN-54	1.7E-04	2.3E-06	1.8E-04	0.0E-01	1.0E 00	7.4E 01	A
	FE-59	5.5E-05	4.0E-06	5.3E-05	0.0E-01	9.6E-01	1.4E 01	A
	CO-57	2.2E-05	1.0E-06	1.7E-05	0.0E-01	7.5E-01	2.2E 01	A
	CO-58	2.3E-05	4.8E-06	2.4E-05	0.0E-01	1.1E 00	4.7E 00	A
	CO-60	1.2E-03	4.2E-06	1.2E-03	0.0E-01	1.0E 00	2.9E 02	A
	ZR-95	2.8E-05	2.8E-06	2.4E-05	0.0E-01	8.6E-01	1.0E 01	A
	NB-95	6.0E-05	2.1E-06	4.8E-05	0.0E-01	8.0E-01	2.9E 01	A
	RU-103	1.8E-05	1.7E-06	1.6E-05	0.0E-01	8.7E-01	1.1E 01	A
	CS-137	1.6E-05	1.6E-06	5.6E-06	0.0E-01	3.5E-01	1.0E 01	D
	LA-140	6.4E-04	1.4E-05	5.8E-04	0.0E-01	9.1E-01	4.5E 01	A
	I-131	1.0E-05	1.9E-06	8.3E-06	0.0E-01	8.2E-01	5.2E 00	A

T TEST RESULTS:
A=AGREEMENT
D=DISAGREEMENT
*=CRITERIA RELAXED
N=NO COMPARISON