U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/92009(DRSS)

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

Licensee: Consumers Power Company
27780 Blue Star Memorial Highway
Covert, MI 49043

Facility Name: Palisades Nuclear Generating Plant

Inspection At: Palisades Site, Covert, MI

Inspection Conducted: February 10-13, 1992

Inspector: J. E. House 2-28-92
Date

Approved By: William Snell, Chief 2/29/92
Radiological Controls Section Date

Inspection Summary

Inspection on February 10-13, 1992 (Report No. 50-255/92009(DRSS))
Areas Inspected: Routine announced inspection of: (1) the chemistry program, including procedures, organization, and training; (2) primary and secondary systems water quality control programs; (3) quality assurance/quality control program in the laboratory; (4) nonradiolgical chemistry comparisons; and (5) open items (IP 84750).
Results: The licensee's water quality control program was very good as was overall water quality following the steam generator (S/G) replacement project. The nonradiological chemistry comparison results were very good (all agreements) indicating improvement in the laboratory QA/QC program. The inspector noted that the water quality program and analytical chemistry performance were strengths. No violations or deviations were identified.

DETAILS

1. Persons Contacted

[1]B. Baker, Laboratory Supervisor
[1]P. M. Donnelly, Director, Plant Safety and Licensing
[1]D. D. Hice, Chemistry Superintendent
[1]C. Hillman, Licensing
[1]T. Moore, Chemical Engineer
[1]R. M. Rice, Operations Manager
[1]J. R. Schepers, Assessment Specialist
[1]G. B. Slade, Plant General Manager
[1]M. Sullivan, Laboratory Performance Analyst

[1]R. Bywater, Reactor Engineer, NRC

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

[1]Denotes those present at the plant exit interview on February 13, 1992.

2. Licensee Action on Previous Inspection Findings (IP 84750)

a. (Closed) Open Item No. (50-255/90009-01): Monitor licensee progress in the PASM system upgrade. This program has been completed. Parts for two inoperable instruments have been obtained. A damaged probe for the dissolved oxygen meter will be replaced during the present outage. The gas chromatograph has been repaired and will be calibrated during the outage.

b. (Closed) Open Item No. (50-255/90022-01): Licensee to resolve instrument calibration problems. The laboratory Quality Assurance Program has improved (Section 6). The use of independent controls along with increased emphasis on proper instrument calibration resulted in improved performance in the chemistry comparison program (all agreements).

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

There were no significant changes in the Chemistry Department organization since the previous inspection (Region III Inspection Report No. 50-255/90022). Laboratory management personnel appeared to be knowledgeable, well qualified for their positions and responsible for improvements in the chemistry comparisons and QA programs. Licensee representatives stated that personnel turnover is low. Currently there are eleven Chemistry Technicians; three are Level 1, five are Level 2 and three are Senior Technicians. The licensee's training program was reaccredited by INPO as of September 1991.

No violations or deviations were identified.

4. Water Chemistry Control Program (IP 84750)

The inspector reviewed the water chemistry control program which is based on Procedures COP 11, "Secondary System Chemistry," Revision 14, February 5, 1991; and CH 1.7, Chemistry Trending Program, Revision 0, February 14, 1990. Administrative limits on the chemistry parameters appeared to be consistent with the EPRI Steam Generator Owners Group Guidelines (SGOG).

The licensee replaced both steam generators (S/G) during a September 1990 - March 1991 outage. Additional modifications to the secondary side included replacement of the Admiralty brass condenser with stainless steel components. Copper tubing in feedwater heaters was also replaced with stainless steel and the heaters were chemically flushed to remove any copper in the system that had plated out. Three deep bed demineralizers were installed during this outage for processing S/G blowdown which is then returned to the hotwell. The addition of this system is a strength.

The licensee has an in-line system located in the cold chemistry laboratory for monitoring conductivity, pH, sodium, dissolved oxygen and hydrazine in secondary systems. Grab samples can also be obtained from this system. The licensee has computer based trend charts and recently added a real time data management system that is connected via modem to the vendor who prepares a monthly water quality report for plant management. This is part of a S/G maintenance contract. Chemistry parameters are reviewed daily by chemistry personnel. The Chemical Engineering Section Head prepares a monthly report of chemistry parameters for plant management.

Water quality following the S/G replacement project was very good. The Chemistry Performance Index (CPI) which incorporates condensate dissolved oxygen, S/G sodium and cation conductivity values (all normalized) indicated that the secondary water system cleaned up within three months following the March 1991 startup. The CPI dropped steadily from approximately 1.2 immediately after startup (1.0 would be operating at the upper limits of the Electric Power Research Institute (EPRI) Guidelines) to approximately 0.25 in June 1991, and has continued to fluctuate about that level. The latest monthly CPI, January 1992, was 0.20 which surpasses the industry average of 0.34 for plants of this type and the industry top quartile of 0.24. Licensee representatives stated that higher then expected levels of fluoride had contributed to the conductivity and this had been traced to welds in the condenser which was refitted with stainless steel components during the S/G replacement outage.

Primary system chemistry was good; chloride and fluoride levels were approximately 20 ppb (150 ppb guideline), dissolved oxygen was less than 5 ppb (10 ppb guideline) and dissolved hydrogen was maintained within the recommended range.

S/G blowdown cation conductivity was above the 0.8 uSiemen/cm guideline following startup, but by late August it had dropped below this level. Sodium was under 4 ppb (20 ppb guideline), chloride and sulfate levels

had fallen to under 2 and 5 ppb by September (20 ppb guidelines), however neither species was over the guideline following startup. Fluoride levels following startup were approximately 200 ppb (there are no fluoride guidelines) but have decreased steadily, and from October 1991 to the present were under 10 ppb, indicating good cleanup. The decreasing CPI parallelled the decreasing fluoride levels in S/G blowdown. Feedwater iron and copper were under 5 and 1 ppb with guidelines of 20 and 2 ppb respectively.

Installation of additional water purification equipment (S/G blowdown demineralizers) and the rapid clean up of the secondary systems is a reflection on the increased emphasis that licensee management has placed on chemistry.

No violations or deviations were identified.

5. Nonradiological Confirmatory Measurements (IP 84750)

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 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 run in triplicate in a manner similar to that of routine samples. The results are presented in Table 1 with 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. A qualified agreement may indicate a deficiency in the assay.

The licensee performed 26 analyses of 9 analytes at various concentrations and all 26 comparisons (Table 1) were agreements (25) or qualified agreements (1). The inspector noted to licensee representatives that these results were very good and represented considerable improvement over the last nonradiological chemistry comparisons in which there were only 19 agreements out of 30 comparisons.

No violations or deviations were identified.

6. Implementation of the Chemistry QA/QC Program (IP 84750)

The inspector reviewed the chemistry QA/QC program as defined in Procedure CH 1.3, Laboratory Quality Control Program, Revision 3. The licensee employs statistically based control charts, independent controls

and multiple point calibration curves. The laboratory quality control program continues to improve. Control charts are statistically based with the mean value and ±2 SD (warning limit) and ±3 SD (control limit) plotted. No significant assay biases could be determined from a review of selected control charts. Calibration curves for spectrophotometric assays had been changed from % Transmission vs Concentration to Absorbance vs Concentration. The new format appeared to be easier to read and interpret which improves the accuracy of these assays. In addition, technicians no longer use % Transmission and Absorbance interchangeably on the control charts.

The licensee has a vendor supplied interlaboratory comparison program. Samples are supplied on a quarterly basis and the results from the previous year were very good. Approximately 64% of the licensee's results were within ±5% of the vendor and 95% were within 12%. The licensee also participated in an extended version of this program in which additional unknowns are provided by the vendor (most plants participating in the program do not receive these additional samples). The results of those analyses were equally good.

The Intralaboratory Comparison (technician testing) Program requires that technicians be tested twice per year. Unknowns were prepared and results analyzed by laboratory supervisors. Acceptance criteria were derived from INPO standards. Technicians whose results are outside of the acceptance range are required to repeat the analyses. A review of selected data from the past year indicated that the technicians performed well and the program operated satisfactory. These testing programs, along with modifications in the instrument calibration program, have resulted in an overall improvement in the laboratory quality assurance program.

No violations or deviations were identified.

7. Analyses Required by Technical Specifications (IP 84750)

The inspector reviewed trends of boron analyses required by Technical Specifications (T/S). These included the Safety Injection and Refueling Water Tanks (T/S range 1720-2000 ppm), Spent Fuel Pool (T/S range at least 1720 ppm), Safety Injection Tanks (T/S range 1720-2000 ppm) and the Concentrated Boric Acid Tanks (T/S range 10,928-17,483). Data from the past 12 months indicated that boron concentrations in these vessels were within the required ranges.

No violations or deviations were identified.

8. Post Accident Sample Monitoring System (IP 84750)

The inspector reviewed the operation of the Post Accident Sample Monitoring System (PASM) with licensee representatives. Chemistry Technicians are required to receive training on the system twice per year, and a review of chemistry records indicated that this was done. Licensee representatives stated that the PASM is activated twice per month. A review of selected PASM sample date was compared with grab sample analyses for boron, pH, hydrogen and gamma spectroscopy. Both the

nonradiological and the radiological comparisons indicated that the PASM samples were representative of the bulk reactor coolant. A Field Service Report (vendor) from December 1991 was reviewed and indicated that the PASM system was operating as required. Some difficulties were experienced with the Gas Chromatograph but the problem was identified as a faulty circuit board which was replaced. The licensee had indicated by letter to Region III that the quarterly vendor maintenance would be reduced to semiannual, however, performance of the PASM system would be closely monitored. Overall system performance for the past year was good. PASM system operation and maintenance including the reduced vendor servicing will be followed in subsequent inspections.

No violations or deviations were identified.

9. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on February 13, 1992. The inspector discussed results of the chemistry comparisons, improvements in the laboratory quality control program, the water quality program and the PASM system.

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.

Attachment:

1. Table 1, Nonradiological Chemistry Comparison Results, February 10-13, 1992

Table 1
Nonradiological Chemistry Comparison Results
Palisades Nuclear Plant
February 10-13, 1992

Analyte		Method[1]	Concn[2]	Ratio[3]	Acceptance Ranges[4] ± 2RSD	± 3RSD	Result[5]
				ppb			
Fluoride	A	IC	5	1.050	0.875-1.125	0.813-1.187	A
	B		10	1.065	0.875-1.125	0.813-1.187	A
	C		15	1.057	0.875-1.125	0.813-1.187	A
Chloride	A	IC	5	0.940	0.933-1.067	0.900-1.100	A
	B		10	0.931	0.917-1.081	0.879-1.121	A
	C		15	0.915	0.926-1.074	0.895-1.105	A+
Sulfate	A	IC	10	0.953	0.895-1.105	0.842-1.158	A
	B		20	0.939	0.895-1.105	0.868-1.132	A
	C		15	0.907	0.900-1.100	0.867-1.133	A
Iron	G	AA/FU	8	0.990	0.904-1.096	0.854-1.146	A
	H		16	1.031	0.903-1.097	0.857-1.143	A
	I		10	1.083	0.903-1.097	0.855-1.145	A
Copper	G	AA/FU	8	0.960	0.904-1.095	0.859-1.141	A
	H		16	0.978	0.904-1.096	0.857-1.143	A
	I		10	1.002	0.904-1.096	0.857-1.143	A
Ammonia	M	IC	200	0.971	0.902-1.098	0.856-1.147	A
	N		3100	1.032	0.902-1.098	0.856-1.147	A
	O		5000	1.060	0.902-1.098	0.856-1.147	A
Hydrazine	P	Spec	10	1.049	0.922-1.078	0.888-1.118	A
	Q		40	0.974	0.922-1.078	0.888-1.118	A
	R		80	1.025	0.922-1.078	0.888-1.118	A
Silica	S	Spec	25	1.094	0.906-1.094	0.859-1.141	A
	T		100	1.030	0.909-1.091	0.860-1.136	A
				ppm			
Boron	D	Titr	1000	0.992	0.979-1.021	0.968-1.032	A
	E		3000	0.998	0.979-1.021	0.968-1.032	A
	F		5000	0.987	0.979-1.021	0.968-1.032	A

1. Methods: Titr - Titration
IC - Ion Chromatography
Spec - Spectrophotometry
AA/FL - Atomic absorption spectrophotometry (flame)
AA/FU - Atomic absorption spectrophotometry (graphite furnace)

2. Conc: Approximate concentration analyzed.

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

4. The SD 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). A result is considered to be in agreement if it falls within the ± 2 SD range; a qualified agreement if it lies outside ± 2 SD, but within ± 3 SD; and in disagreement if it is outside the ± 3 SD range.

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