

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-220/84-24
Docket No. 50-220
License No. DPR-63 Priority - Category C
Licensee: Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, New York 13202

Facility Name: Nine Mile Point Nuclear Station, Unit 1

Inspection At: Lycoming New York

Inspection Conducted: October 22-26, 1984

Inspectors: J. J. Kottan 11-21-84
J. J. Kottan, Radiation Laboratory
Specialist date
J. A. Cioffi 11-21-84
J. A. Cioffi, Radiation Specialist date
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Approved by: W. J. Pasciak 11/23/84
W. J. Pasciak, Chief, BWR Radiation
Protection Section date

Inspection Summary: Inspection on October 22-26, 1984 (Report No. 50-220/84-24)

Areas Inspected: Routine, unannounced inspection of the licensee's chemical and radiochemical measurements program and bioassay whole body counting program using the NRC: I Mobile Radiological Measurements Laboratory and laboratory assistance provided by DOE Radiological and Environmental Sciences Laboratory. Areas reviewed for the chemical and radiochemical measurements program included: program for the quality control of analytical measurements, performance on radiological analyses of split actual effluent samples, and records and procedures; and for the bioassay whole body counting program included: performance of the whole body counting phantom analysis comparison, procedures, and QC and calibration data. The inspection involved 112 inspector hours onsite by three NRC regionally-based inspectors.

Results: Of the areas inspected, no violations were identified.

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DETAILS

1. Individuals Contacted

Principal Licensee Employees

T. Roman, Station Superintendent, Unit 1
*E. Leach, Superintendent, Chemistry and Radiation Management
*J. Duell, Supervisor, Chemistry and Radiation Protection
*J. Blasiak, Unit Supervisor, Chemistry
*J. Coates, Chief Technician, Chemistry and Radiochemistry
*W. Thomson, Training
*J. Aldrich, Operations Supervisor
R. Carlson, Respiratory Protection Coordinator

*Denotes those present at the exit interview.

The inspector also interviewed other licensee employees including members of the chemistry and health physics staffs.

2. Licensee Action on Previous Inspection Findings

(Closed) Severity Level V Violation (220/81-07-01): Failure to review and approve vendor laboratory procedures. The licensee had obtained current copies of the vendor laboratory's procedures and had reviewed and approved the procedures. The licensee not only reviewed procedures used for effluent sample analyses, but also those procedures used for solid radioactive waste (10 CFR 61) analyses.

(Closed) Inspector Follow-up Item (220/84-12-01): Implement a measurement control program with the use of control charts for all pertinent analyses. The licensee has implemented the use of control charts for chloride, boron, silica, and analyses performed using the atomic absorption spectrophotometer. The control charts were current.

3. Laboratory QC Program

The licensee's laboratory QC program is detailed in Procedure No. N1-PSP-15, "Quality Assurance of Chemistry/Radiochemistry Analytical Results." This procedure includes spiked samples, split samples, procedure audits, and equipment checks such as efficiency, background, and where applicable, gain and resolution. Instrumentation covered includes: the gamma spectrometer, radioactive gaseous effluent monitoring system (RAGEMS), the stack monitoring system, the UV-visible spectrophotometer, pH meters, turbidimeters, dissolved oxygen analyzers, AA spectrophotometer, conductivity cells, balances, and the laboratory demineralizer system water. Also included are QC requirements for laboratory chemicals and reagents. The inspector reviewed the QC data available for 1984 to date and noted that the licensee was implementing the laboratory QC program as described in Procedure No. N1-PSP-15.

The inspector also noted that the licensee was maintaining up to date control charts of analyzed standards for chloride, boron, silica, and AA analyses. However, the use of control charts and their preparation was not included in Procedure No. N1-PSP-15. The licensee stated that Procedure No. N1-PSP-15 would be modified to include the use of control charts, and that this change would be completed and implemented by June, 1985. The inspector stated that this area would be reviewed during a subsequent inspection. (220/84-24-01)

The inspector discussed technician training as related to laboratory QC with the Unit Chemistry Supervisor and training personnel. Based on the results of this discussion, the licensee stated that laboratory QC would be incorporated into the technician training program so that technicians would be made aware of the bases for a laboratory QC program (why the technician performs control measurements and how to evaluate them); and the concept that the QC program and associated analyses are part of the overall analytical methodology. The inspector stated that this area would be reviewed during a subsequent inspection. (220/84-24-02)

The inspector had no further questions in this area. No violations were identified.

4. Confirmatory Measurements

During the inspection, liquid, particulate filter, charcoal cartridge, and gas samples were split between the licensee and NRC for the purpose of intercomparison. Where possible, the split samples are actual effluent samples, or inplant samples which duplicate counting geometries used by the licensee for effluent sample analyses. The samples were analyzed by the licensee using normal methods and equipment and by the NRC: I Mobile Radiological Measurements Laboratory. Joint analyses of actual effluent samples are used to verify the licensee's capability to measure radioactivity in effluent samples with respect to Technical Specification requirements and other regulatory requirements.

In addition, a liquid effluent sample was sent to the NRC reference laboratory, Department of Energy, Radiological and Environmental Sciences Laboratory (RESL), for analyses requiring wet chemistry. The analyses to be performed on the sample are Sr-89, Sr-90, gross alpha, and tritium. The results will be compared with the licensee's results when received at a later date and will be documented in a subsequent inspection report.

The results of an effluent sample split between the licensee and NRC: I during a previous inspection on March 23-25, 1981 (Inspection Report 50-220/81-07), were also compared during this inspection.

The results of the sample measurements comparison indicated that all of the measurements were in agreement under the criteria used for comparing results. (See Attachment I.) The results of the comparisons are listed in Table I. The reactor water I-135 result obtained by the licensee, although in agreement, was not in as good agreement with the NRC values as

the remaining iodine results for the first count analysis. The inspector determined that the licensee was using a branching ratio of 34% versus 28.6% for the NRC. The inspector discussed the references the licensee was using for determining branching ratios. The licensee's references were approximately 15 years old, and the inspector recommended a newer updated reference to the licensee. The licensee stated that he would obtain a copy of the recommended reference and update the computer gamma spectroscopy library. The inspector stated that this area would be reviewed during a subsequent inspection. (220/84-24-03)

The inspector had no further questions in this area. No violations were identified.

5. Records and Procedures

The licensee's procedures in the areas of plant chemistry, radiochemistry, and effluent control were reviewed for the purpose of determining compliance with Technical Specifications and assuring consistency with general industrial standards. In addition, calibration and QC data were also reviewed. While reviewing spectrophotometer calibration curves, the inspector inquired as to how the curves were drawn. The licensee stated that a straightedge was used to draw a line through the data points. The inspector discussed curve fitting with the licensee, and stated that although curve fitting is not a quality parameter, it may improve the analytical results because of better interpolation of the area between data points. The inspector recommended that the licensee fit a curve to the calibration data points.

The inspector reviewed the data generated by the RAGEMS system for gaseous stack releases, and compared this data to the analysis results obtained from the stack gas sample. The RAGEMS value was based on a six hour collection time and the NRC value was obtained from a grab sample taken during the six hour collection time. The licensee's RAGEMS Xe-135 result of (1.6 ± 0.2) E-8 uCi/ml versus the NRC grab sample result of (2.4 ± 0.7) E-8 uCi/ml are in agreement under the criteria used for intercomparing results.

The inspector had no further questions in this area. No violations were identified.

6. Whole Body Counting Program

During this inspection the licensee's capability to adequately perform radiological bioassay using a whole body counting system was reviewed. An NRC whole body counting phantom containing radioactive sources traceable to the National Bureau of Standard (NBS) was submitted to the licensee for analysis. The phantom duplicated the nuclides and the organ burdens that the licensee might encounter during normal operation. The phantom was analyzed using the licensee's normal methods and equipment.

7. Comparison of Results

The licensee uses the Helgeson "Do-It-Yourself" Whole Body Counter, which employs a stationary bed and a movable detector. A terminal printer at the whole body counting facility provides an interim output of whole body counting results. Whole body counting results of record, using a more complete algorithm, including spectrum stripping and scatter factors, are provided by Helgeson every one to two weeks in a written report; however, trigger levels of activity in a whole body count will prompt Helgeson to call the licensee with their analyzed results within an hour.

The lung results are based on an average of five measurements and the GI tract results are based on an average of two measurements. Table 2 contains the results of the intercomparison. Based on these results, no violations were identified in this area.

8. Procedures and Data

The licensee's procedure for the operation and calibration of the whole body counting system was reviewed. The licensee's procedure includes, at a minimum, daily source checks and the maintenance of a quality control chart to trend changes in detector response. Background counts are taken periodically. Gain checks and minor adjustments are done remotely by Helgeson Scientific Services in California. The detector is calibrated quarterly and the procedure specifies the acceptance limits for the calibration.

Within the scope of this review, no violations were identified.

9. Exit Interview

The inspector met with the licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on October 26, 1984. The inspector summarized the purpose and scope of the inspection and the inspection findings.

The licensee agreed to perform the analyses listed in Paragraph 4 and report the results to the NRC.

TABLE 1
NINE MILE POINT UNIT 1 VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE		COMPARISON
			RESULTS IN MICROCURIES PER MILLILITER		
Reactor Water					
1258 hrs	I-132	(5.4 ± 0.2) E-3	(5.8 ± 0.2) E-3		Agreement
10/23/84	I-134	(1.82 ± 0.09) E-2	(1.86 ± 0.05) E-2		Agreement
1st count	I-135	(5.4 ± 0.4) E-3	(3.6 ± 0.2) E-3		Agreement
			*(4.4 ± 0.3) E-3		Agreement
Reactor Water					
1258 hrs	I-131	(1.2 ± 0.4) E-4	(1.03 ± 0.05) E-4		Agreement
10/23/84	I-133	(1.78 ± 0.09) E-3	(1.76 ± 0.02) E-3		Agreement
2nd count					
Reactor Water					
Crud Filter	Cr-51	(6.6 ± 1.4) E-6	(8.6 ± 1.4) E-6		Agreement
0030 hrs	Mn-54	(3.2 ± 0.2) E-6	(3.4 ± 0.4) E-6		Agreement
10/19/84	Co-58	(5.0 ± 0.3) E-6	(5.4 ± 0.4) E-6		Agreement
	Fe-59	(4.2 ± 0.5) E-6	(3.1 ± 0.6) E-6		Agreement
	Co-60	(9.8 ± 0.5) E-6	(1.01 ± 0.05) E-5		Agreement
WCT					
1545 hrs	Na-24	(3.8 ± 0.2) E-5	(.6 ± 0.3) E-5		Agreement
10/23/84	Cr-51	(2.04 ± 0.06) E-4	(2.40 ± 0.11) E-4		Agreement
	Co-58	(3.05 ± 0.11) E-5	(3.38 ± 0.14) E-5		Agreement
	Co-60	(4.28 ± 0.13) E-5	(5.1 ± 0.2) E-5		Agreement
	Sr-91	(9.0 ± 0.9) E-5	(7.7 ± 1.1) E-5		Agreement
	I-131	(1.96 ± 0.09) E-5	(1.92 ± 0.11) E-5		Agreement
	I-133	(2.09 ± 0.03) E-4	(2.16 ± 0.04) E-4		Agreement
	I-135	(3.0 ± 0.3) E-4	(2.4 ± 0.2) E-4		Agreement
	Mo-99	(5.0 ± 0.6) E-5	(4.4 ± 0.7) E-5		Agreement
	Np-239	(2.46 ± 0.08) E-4	(3.24 ± 0.06) E-4		Agreement
Offgas					
0943 hrs	Kr-85m	(1.052 ± 0.016) E-2	(1.16 ± 0.15) E-2		Agreement
10/24/84	Kr-87	(3.60 ± 0.05) E-2	(3.48 ± 0.08) E-2		Agreement
1st count	Kr-88	(2.32 ± 0.05) E-2	(2.6 ± 0.3) E-2		Agreement
	Xe-133	(2.32 ± 0.03) E-2	(2.68 ± 0.07) E-2		Agreement
	Xe-135m	(1.00 ± 0.03) E-1	(1.19 ± 0.05) E-1		Agreement
	Xe-135	(3.32 ± 0.02) E-2	(3.9 ± 0.7) E-2		Agreement
	Xe-133	(5.15 ± 0.14) E-1	(5.86 ± 0.12) E-1		Agreement
	Ar-41	(1.4 ± 0.3) E-3	(1.6 ± 0.4) E-3		Agreement

* Result using NRC branching ratio

TABLE 1 - Page 2

NINE MILE POINT UNIT 1 VERIFICATION TEST RESULTS

<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
			<u>RESULTS IN MICROCURIES PER MILLILITER</u>	
Offgas				
0943 hrs	Kr-85m	(9.20 ± 0.16) E-3	(1.135 ± 0.013) E-2	Agreement
10/24/84	Kr-87	(3.50 ± 0.10) E-2	(3.36 ± 0.09) E-2	Agreement
2nd count	Kr-88	(2.42 ± 0.05) E-2	(2.40 ± 0.04) E-2	Agreement
	Xe-133	(2.32 ± 0.02) E-2	(2.64 ± 0.03) E-2	Agreement
	Xe-135	(3.23 ± 0.02) E-2	(3.8 ± 0.3) E-2	Agreement
Stack Gas				
1420 hrs	Xe-135	(2.4 ± 0.7) E-8	(2.7 ± 0.7) E-8	Agreement
10/24/84				
Stack				
Charcoal cartridge	I-131	(1.0 ± 0.4) E-12	(1.0 ± 0.2) E-12	Agreement
0230 hrs				
10/19/84				

TABLE 2

RESULTS OF LUNG PHANTOM DATA

<u>Isotope</u>	<u>NRC Value</u>	<u>Licensee Value</u>	<u>Helgeson Value</u>	<u>Licensee Value / NRC Value</u>	<u>Helgeson Value / NRC Value</u>
Results in total nanocuries					
Co-60	91	121	112	1.33	1.23
Cs-137	98	119	122	1.21	1.25

RESULTS OF GI TRACT PHANTOM DATA

<u>Isotope</u>	<u>NRC Value</u>	<u>Licensee Value</u>	<u>Helgeson Value</u>	<u>Licensee Value / NRC Value</u>	<u>Helgeson Value / NRC Value</u>
Results in total nanocuries					
Co-60	82	127	120	1.55	1.46
Cs-137	88	120	133	1.36	1.51

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 judgement limits are variable in relation to the comparison of the NRC Reference Laboratory's value to its associated 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 must be considered acceptable as the resolution decreases.

$$\text{Resolution} = \frac{\text{NRC REFERENCE VALUE}}{\text{REFERENCE VALUE UNCERTAINTY}}$$

$$\text{Ratio} = \frac{\text{LICENSEE VALUE}}{\text{NRC REFERENCE VALUE}}$$

<u>Resolution</u>	<u>Agreement</u>
<3	0.4 - 2.5
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
>200	0.85 - 1.18

NOTE: Applies only to Table 1.