

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report/License No.: 50-220/95-21/DPR-63  
50-410/95-21/NPF-69

Licensee: Niagara Mohawk Power Corporation  
301 Plainfield Road  
Syracuse, New York 13212

Facility Name: Nine Mile Point, Units 1&2

Inspection At: Scriba, New York

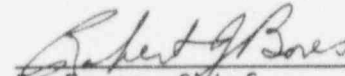
Inspection Conducted: August 21-25, 1995

Inspectors:



J. Kottan, Laboratory Specialist  
N. McNamara, Laboratory Specialist

Approved By:



R. Bores, Chief  
Effluents Radiation Protection Section

**Areas Inspected:** Announced inspection of the radiological chemistry program.  
Areas reviewed included: Confirmatory Measurements - Radiological,  
Laboratory QA/QC, and Audits.

**Results:** The licensee had in place effective programs for measuring  
radioactivity in process and effluent samples. No safety concerns or  
violations of regulatory requirements were observed.

## DETAILS

### 1.0 INDIVIDUALS CONTACTED

#### Principal Licensee Employees

- \* P. Amway, Assistant to U-2 Plant Manager
- \* D. Baker, Licensing Supervisor
- \* C. Beckham, Manager QA
- \* G. Corell, U-1 Chemistry Manager
- \* J. Conway, Acting Plant Manager, U-2
- \* J. Dean, QA-Audits
- \* A. DeSanto, Radiation Protection Supervisor, U-2
- \* M. Gilbert, Radiation Protection Technician, U-1
- W. Julian, QA Engineer
- \* J. Lawton, Radiation Protection, U-1
- \* J. Maurice, Training General Supervisor
- \* M. McCormick, VP, NSAS
- \* J. Moser, Chemistry Supervisor, U-1
- \* L. Rayle, Chemistry Supervisor, U-1
- \* C. Senska, Chemistry Supervisor, U-2
- \* R. Steele, Chemistry Technician, U-1
- \* K. Sweet, Acting Plant Manager, U-1
- \* P. Thingvoll, Chemistry Supervisor, U-2
- \* C. Ware, U-2 Chemistry Manager
- \* A. Zallnick, Licensing

#### NRC Employees

B. Norris, Sr. Resident Inspector

- \* Denotes those present at the exit meeting on August 25, 1995.

The inspectors also interviewed other licensee personnel including members of the chemistry and radiation protection staffs.

### 2.0 PURPOSE

The purpose of this inspection was to review the following areas.

1. The licensee's ability to measure radioactivity in plant systems samples and effluent samples.
2. The licensee's ability to demonstrate the acceptability of analytical results through implementation of a laboratory QA/QC program.

### 3.0 LABORATORY ORGANIZATION

The Nine Mile Point site consisted of two units, each having a dedicated chemistry laboratory and associated gamma spectrometry systems. The gamma spectrometry systems at each laboratory were similar; each laboratory contained two systems with one detector per system.

The licensee's Radiation Protection Department possessed a gamma spectrometry system at each unit which was used to quantify radioactivity on in-plant samples for radiation protection purposes. During this inspection, the charcoal cartridge and particulate filter were analyzed by the licensee's Radiation Protection Department at each unit and compared with NRC results. These types of samples were those normally analyzed by the licensee's Radiation Protection Department.

The data listed in Table I identify which counting system and laboratory were used for the sample analysis.

#### 4.0 CONFIRMATORY MEASUREMENTS - RADIOCHEMISTRY

During the inspection liquid, airborne particulate (filter) and iodine (charcoal cartridge), and gas samples were analyzed by the licensee's chemistry department and the NRC for the purpose of intercomparison. The samples were actual split samples with the exception of the particulate filter and charcoal cartridge samples. In these cases, the samples could not be split and the same samples were analyzed by the licensee and the NRC. The charcoal cartridge was an NRC-spiked charcoal cartridge which was submitted to the licensee for analysis because the licensee could not obtain an effluent or in-plant charcoal cartridge containing radioiodine. Where possible, the samples were actual effluent samples or in-plant samples which duplicated the counting geometries used by the licensee for effluent sample analyses. The samples were analyzed by the licensee using routine methods and equipment and by the NRC Region I Mobile Radiological Measurements Laboratory. Joint analyses of actual samples were used to verify the licensee's capability to measure radioactivity concentrations in effluent and other samples with respect to Technical Specifications and other regulatory requirements.

In addition, a liquid 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 were Sr-89, Sr-90, H-3, Fe-55, and gross alpha. The results of these analyses 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 a liquid sample split between the licensee and the NRC during a previous inspection on August 31-September 4, 1992 (Inspection Report Nos. 50-220/92-23 and 50-410/92-26) were also compared during this inspection.

The comparisons for the sample results that were available indicated that all of the measurements were in agreement under the criteria for comparing results (see Attachment 1 to Table I) with several exceptions. One of the exceptions was the Fe-55 result from the sample which had been split during the previous inspection. The specific reason for the Fe-55 disagreement could not be determined during this inspection. However, as noted above, a liquid sample was split for Fe-55 analysis during this inspection, and these results will be compared by NRC as soon as received. The remaining disagreements were the reactor water

radioiodine results, specifically the I-134 result from Unit 1 and the I-132 result from Unit 2. These disagreements were due to the manner in which the licensee utilized their gamma spectrometry systems. Rather than have the gamma spectrometry system software choose the photopeak to be used for data reporting based on criteria such as gamma abundance and other radionuclide interference, the licensee technicians choose the photopeak to be utilized based on criteria such as the highest (most conservative) result or the result with the smallest counting uncertainty. The inspector discussed this matter with the licensee and the licensee stated that this area would be reviewed and appropriate action taken so that the gamma spectrometry systems would produce accurate, consistent results. When the licensee used the same photopeaks as the NRC, the results were in agreement. The data are presented in Table I.

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

#### 5.0 LABORATORY QA/QC

The licensee's laboratory QA/QC program was described in Procedure No. S-CAD-CHE-0102, Analytical Quality Assurance Program. This procedure, as well as other licensee procedures, provided for the control of analytical results through a number of mechanisms including: personnel responsibilities and training; the use of traceable standards; instrument control checks; and participation in an interlaboratory QC program.

The instrument control checks consisted of the use of control charts for trending and assessing instrument performance both on a short-term and a long-term basis. The interlaboratory QC program consisted of the quarterly analysis of unknown samples received from an outside laboratory, and the submission of spiked samples to the vendor laboratory used for the analysis of effluent samples requiring wet radiochemical analyses. The inspector reviewed selected data generated by the licensee's laboratory QA/QC program for 1994 and 1995 to date, and, based on this review, noted that the licensee was implementing the laboratory QA/QC program as required. The inspector noted that the licensee's laboratory QA/QC program was comprehensive, and the licensee reviewed and assessed the QC data in a timely manner. Also of particular note to the inspector was the detailed, well written procedure the licensee had implemented for the construction and use of control charts. The inspector had no further questions in this area. No safety concerns or violations were identified.

#### 6.0 AUDITS ACTIVITIES

The inspector reviewed Audit Report No. 94035, ALARA and Chemistry Programs, conducted from December 27, 1994 to January 6, 1995. The inspector also discussed this audit with the licensee and reviewed the audit field notes. Based on this review and discussions, the inspector determined that the audit was conducted utilizing an audit plan and

detailed checklists, and the audit team included technical specialists. The audit contained no safety significant findings. The inspector also reviewed Audit Report No. 92012-RG/IN, Radiation Protection/ Chemistry, conducted from November 6 to 20, 1992. This audit also included a technical specialist as a member of the audit team. A review of the audit schedule indicated that chemistry activities were to be audited every two years.

The inspector reviewed surveillances of specific chemistry activities which were conducted in 1994 and 1995 to date. The inspector discussed the surveillance activities with the licensee. The inspector noted that surveillance activities were not conducted at a specific frequency, but were conducted as necessary utilizing input from various sources such as plant occurrences, industry events, or department requests.

Based on the above reviews and discussions, the inspector determined there were effective independent oversight and assessment of chemistry activities. The audits were of sufficient technical depth to assess chemistry activities and probe for programmatic weaknesses. The licensee had in place effective mechanisms for tracking and following up on audit and surveillance findings. No safety concerns or violations were identified in this area.

#### 7.0 EXIT MEETING

The inspector met with the licensee representatives denoted in Section 1.0 of this report at the conclusion of the inspection on August 25, 1995. The inspector summarized the purpose, scope and findings of the inspection. The licensee acknowledged the inspection findings.

TABLE I

## Nine Mile Point Radiochemistry 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>				
Unit 1 Containment Gas 1049 hrs 08/24/95 (Unit 2)	Xe-133	(1.24±0.14)E-7	(1.2±0.2)E-7	Agreement
	Xe-135	(1.11±0.07)E-7	(1.30±0.13)E-7	Agreement
Unit 1 Containment Gas 1049 hrs 08/24/95 (Unit 1-Genie)	Xe-133	(1.24±0.14)E-7	(1.19±0.16)E-7	Agreement
	Xe-135	(1.11±0.07)E-7	(1.13±0.09)E-7	Agreement
Unit 1 Reactor Water 1133 hrs 08/22/95 (Unit 1-Genie) 2-Hour Count	I-132	(2.54±0.12)E-4	(3.0±0.4)E-4	Agreement
	I-134	(7.9±0.8)E-4	(1.86±0.10)E-3	Disagreement
	I-135	(2.3±0.4)E-4	(1.16±0.14)E-3*	Agreement
Unit 1 Reactor Water 1133 hrs 08/22/95 (Unit 1-Jupiter) 24-Hour Count	I-133	(7.2±0.2)E-5	(7.4±0.5)E-5	Agreement
	I-132	(2.54±0.12)E-4	(4.2±0.4)E-4	Disagreement
Unit 1 Reactor Water 1133 hrs 08/22/95 (Unit 2) 2-Hour Count	I-134	(7.9±0.8)E-4	(3.1±0.4)E-4*	Agreement
			(8.3±1.3)E-4	Agreement

\* Result using the same photopeak as the NRC

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<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
<u>Results in microCuries per milliliter</u>				
Unit 1 Reactor Water 1133 hrs 08/22/95 (Unit 2) 24-Hour Count	I-133	(7.2±0.2)E-5	(7.8±0.5)E-5	Agreement
<u>Results in total microCuries</u>				
NRC spiked Charcoal Cartridge (Unit 2)	Ba-133	(2.09±0.05)E-2	(1.564±0.009)E-2	Agreement
NRC spiked Charcoal Cartridge (Unit 1-Jupiter)	Ba-133	(2.09±0.05)E-2	(1.84±0.02)E-2	Agreement
<u>Results in microCuries per milliliter</u>				
Unit 1 Reactor Water Filter 1133 hrs 08/22/95 (Unit 1-Jupiter)	Cr-51	(1.31±0.11)E-5	(1.6±0.3)E-5	Agreement
	Mn-54	(8.5±0.2)E-6	(9.5±0.6)E-6	Agreement
	Mn-56	(1.066±0.015)E-4	(1.20±0.04)E-4	Agreement
	Co-58	(6.4±0.2)E-6	(6.0±0.5)E-6	Agreement
	Fe-59	(1.11±0.03)E-5	(1.33±0.11)E-5	Agreement
	Co-60	(4.9±0.2)E-6	(4.9±0.5)E-6	Agreement
Unit 1 Reactor Water Filter 1133 hrs 08/22/95 (Unit 2)	Cr-51	(1.31±0.11)E-5	(1.8±0.4)E-5	Agreement
	Mn-54	(8.5±0.2)E-6	(9.6±0.6)E-6	Agreement
	Mn-56	(1.066±0.015)E-4	(1.15±0.02)E-4	Agreement
	Co-58	(6.4±0.2)E-6	(6.7±0.6)E-6	Agreement
	Fe-59	(1.11±0.03)E-5	(1.17±0.09)E-5	Agreement
	Co-60	(4.9±0.2)E-6	(4.9±0.5)E-6	Agreement

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<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
<u>Results in microCuries per milliliter</u>				
Unit 2 Waste Collector Tank 1A 1356 hrs 08/22/95 (Unit 1-Jupiter)	Na-24	(5.12±0.12)E-6	(5.2±0.2)E-6	Agreement
	Cr-51	(2.45±0.08)E-5	(2.46±0.11)E-5	Agreement
	Mn-54	(4.2±0.2)E-6	(4.5±0.2)E-6	Agreement
	Co-58	(1.09±0.13)E-6	(1.28±0.15)E-6	Agreement
	Co-60	(1.001±0.016)E-5	(1.15±0.04)E-5	Agreement
	Zn-65	(2.395±0.010)E-4	(2.35±0.07)E-4	Agreement
	Tc-99m	(1.88±0.08)E-6	(1.65±0.08)E-6	Agreement
Unit 2 waste Collector Tank 1A 1356 hrs 08/22/95 (Unit 2)	Na-24	(5.12±0.12)E-6	(4.8±0.2)E-6	Agreement
	Cr-51	(2.45±0.08)E-5	(2.34±0.12)E-5	Agreement
	Mn-54	(4.2±0.2)E-6	(4.3±0.3)E-6	Agreement
	Co-58	(1.09±0.13)E-6	(9±2)E-7	Agreement
	Co-60	(1.001±0.016)E-5	(1.04±0.02)E-5	Agreement
	Zn-65	(2.395±0.010)E-4	(2.448±0.016)E-4	Agreement
	Tc-99m	(1.88±0.08)E-6	(1.90±0.09)E-6	Agreement
Unit 2 Offgas 0823 and 0834 hrs 08/23/95 (Unit 2) ½-Hour Count	Xe-135m	(9.8±0.5)E-4	(1.10±0.09)E-3	Agreement
	Xe-138	(5.2±0.3)E-3	(4.8±0.3)E-3	Agreement
Unit 2 Offgas 0823 and 0834 hrs 08/23/95 (Unit 2) 4-Hour Count	Kr-85m	(6.0±0.5)E-5	(6.1±0.8)E-5	Agreement
	Kr-87	(4.1±0.6)E-4	(4.8±0.7)E-4	Agreement
	Kr-88	(2.5±0.2)E-4	(2.4±0.3)E-4	Agreement
	Xe-135	(2.03±0.06)E-4	(2.19±0.11)E-4	Agreement



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<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
<u>Results in microCuries per milliliter</u>				
Unit 2 Offgas 0823 and 0834 hrs 08/23/95 (Unit 1-Jupiter) 4-Hour Count	Kr-85m	(6.0±0.5)E-5	(5.8±0.6)E-5	Agreement
	Kr-87	(4.1±0.6)E-4	(3.6±0.6)E-4	Agreement
	Kr-88	(2.5±0.2)E-4	(2.4±0.3)E-4	Agreement
	Xe-135	(2.03±0.06)E-4	(1.96±0.12)E-4	Agreement
Unit 1 Waste Collector Tank 1436 hrs 09/03/92	Fe-55	(6.2±0.3)E-5	(1.0±0.1)E-5	Disagreement
	Gross Alpha	(0.5±1.2)E-8	<1.3E-7	No Comparison
	H-3	(1.59±0.02)E-3	(1.8±0.1)E-3	Agreement
	Sr-89	(2.3±0.3)E-7	(2.2±0.3)E-7	Agreement
	Sr-90	(5±7)E-9	(1.1±0.4)E-8	No Comparison
<u>Results in total microCuries</u>				
NRC spiked Charcoal Cartridge (Unit 1 Radiation Protection)	Ba-133	(2.09±0.05)E-2	(1.68±0.03)E-2	Agreement
NRC Spiked Charcoal Cartridge (Unit 2 Radiation Protection)	Ba-133	(2.09±0.05)E-2	(1.73±0.03)E-2	Agreement
<u>Results in microCuries per milliliter</u>				
Unit 1 Reactor Water Filter 1133 hrs 08/22/95 (Unit 1 Radiation Protection)	Cr-51	(1.31±0.11)E-5	(1.47±0.13)E-5	Agreement
	Mn-54	(8.5±0.2)E-6	(9.1±0.3)E-6	Agreement
	Mn-56	(1.066±0.015)E-4	(1.180±0.011)E-4	Agreement
	Co-58	(6.4±0.2)E-6	(6.8±0.3)E-6	Agreement
	Fe-59	(1.11±0.03)E-5	(1.25±0.05)E-5	Agreement
	Co-60	(4.9±0.2)E-6	(5.4±0.3)E-6	Agreement

TABLE INine Mile Point Radiocchemistry 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>		
Unit 1 Reactor	Cr-51	(1.31±0.11)E-5	(1.38±0.08)E-5	Agreement
Water Filter	Mn-54	(8.5±0.2)E-6	(8.49±0.16)E-6	Agreement
1133 hrs	Co-58	(6.4±0.2)E-6	(6.90±0.16)E-6	Agreement
08/22/95	Fe-59	(1.11±0.03)E-5	(1.22±0.03)E-5	Agreement
(Unit 2 Radiation Protection)	Co-60	(4.9±0.2)E-6	(5.10±0.14)E-6	Agreement

Note: Reported uncertainties are one standard deviation counting uncertainties for both licensee and NRC results.

ATTACHMENT 1 TO TABLE I

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 the 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.

<u>Resolution<sup>1</sup></u>	<u>Ratio for Comparison<sup>2</sup></u>
<4	No Comparison
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

1. Resolution = (NRC Reference Value/Reference Value Uncertainty)

2. Ratio = (Licensee Value/NRC Reference Value)