U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-263/88016(DRSS)

Docket No. 50-263 License No. DPR-22

Licensee: Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

Facility Name: Monticello Nuclear Generating Station

Inspection At: Monticello Site, Monticello, Minnesota

Inspection Conducted: August 22-26, 1988

Inspector: A. Januska 9/16/88
Date

Accompanied by: R. Bocanegra

Approved by: M. C. Schumacher, Chief 9/16/88
Radiological Effluents
and Chemistry Section
Date

Inspection Summary

Inspection on August 22-26, 1988 (Report No. 50-263/88016(DRSS))
Areas Inspected: Routine announced inspection of confirmatory measurements including: plant chemistry organization, management controls, training, and qualifications (IP 83722, 83723), quality assurance, confirmatory measurements for in-plant radiochemical analysis, and post accident sampling analysis (IP 84725); environmental monitoring results (IP 80721); and action taken on an open item (IP 92701).
Results: The confirmatory measurements results were generally good. Some problems were found including an error in a software library, an instrument parameter set to the wrong value in the spectrum analysis software, and a conservative bias in the charcoal adsorber results. The quality of licensee audits of the Radiochemistry department was found to be marginal. The licensee will test the post accident sampling system in response to discussions held during the inspection.

DETAILS

1. Persons Contacted

[1]M. L. Holmes, Radiation Protection Specialist
[1]J. Kuhn, Quality Assurance Specialist
[2]P. Kamman, Superintendent Nuclear Operations, QA
[1]J. B. Peterson, Radiochemistry Supervisor
J. L. Rootes, Quality Specialist
R. L. Roy, Radiation Protection Specialist
[1]W. A. Shamla, Plant Manager
J. H. Swailes, Superintendent, Radiation Protection
[1]P. Walker, Superintendent, Quality Engineering

[1]P. Hartmann, NRC Senior Resident Inspector

[1]Present at the exit meeting.
[2]Telephone conversation on September 6, 1988.

2. Licensee Action on Previous Inspection Findings (IP 92701)

(Closed) Open Item (263/85014-01): Analyze a split liquid sample for H-3, Sr-89, Sr-90, gross beta and report results to RIII. As part of this inspection, a fuel pool sample spiked with reactor coolant was split with the licensee for analysis of H-3, Sr-89, Sr-90, and gross beta and left as an open item (Section 4.b.). Since the new open item satisfies the purpose of Open Item 263/85014-01, this item is closed.

3. Management Controls, Organization and Training (IP 83722, 83723)

The inspectors reviewed the management controls and organization of the Radiochemistry department. The organizational structure has not changed since discussed in a previous inspection report (50-263/88005). The organization appears adequate to satisfy chemistry requirements. The licensee is now using the INPO accredited training course for Radiation Protection Specialists-Chemistry. Training appears to be effective based on observations and discussions with the Chemistry staff.

No violations or deviations were identified.

4. Confirmatory Measurements (IP 84725)

a. Quality Assurance

The inspectors reviewed the radioactivity measurements laboratory quality assurance program including the physical facilities, laboratory operations, and procedures. Pertinent laboratory operating procedures found in Monticello Nuclear Generating Plant Chemistry Manual Volume I were reviewed for technical content by the

inspectors. Procedures reviewed included Intralaboratory Analysis Comparison Program (I.5.17), Germanium-Lithium (GeLi) Detector Background (I.3.24), GeLi Detector Calibration (I.3.28), Lower Limit of Detection (LLD) Determination (I.3.34), and Alpha-Beta Instrument Checks (I.3.33).

The inspectors also reviewed Quality Control records and related supporting documentation. The licensee's document storage and retrieval system involves microfilming all records about every three weeks resulting in discontinuity in a given set of records (e.g. calibrations). This system made it extremely difficult and time consuming to audit more than a few records. Documents inspected included results of 1988 and 1987 germanium detector calibrations and efficiency tables. The inspectors also verified that calibrations for all release geometries being used for radiological effluent analyses were current. Daily QC graphs for the germanium detectors were inspected and were found to be generally good except for one weakness. In the course of one year, Cs-137 activity in the daily check source is reduced by about 2.5% due to radioactive decay. The licensee failed to take radioactive decay into account when setting acceptance limits for the daily checks. The licensee has agreed to adjust the acceptance limits on a quarterly basis to account for radioactive decay of Cs-137. A Radiation Protection Specialist (RPS) was observed and evaluated on sample acquisition, preparation, analysis, and general laboratory practices. The RPS appeared to be very knowledgeable, followed proper laboratory procedures, and took appropriate precautions when handling radioactive materials.

LLD's are calculated by the counting system software supplied by a vendor. The equation used is based on Reg Guide 4.16 (March 1978), which is a modified version of the Monticello Technical Specification (T/S) LLD equation. The modification results in a slightly larger (more conservative) value for the LLD. The change was instituted because the LLD would otherwise equal zero in the case where no background counts were recorded in the region of a spectrum where a nuclide would normally appear.

The licensee participates in a quarterly crosscheck program with an outside vendor. The inspectors reviewed the results of the licensee's crosscheck program for third quarter 1986 through second quarter 1988. The results for the iodine cartridge analysis show a consistent bias similar to the bias discussed in the Sample Split section (4.b.) of this report. The results also show that the licensee had some difficulty with gross beta and gross alpha analyses. Analyses of liquid samples split during this inspection should demonstrate if the licensee has solved this problem. Strontium analysis is done for the licensee by a contract laboratory. The licensee does not currently monitor the quality of services provided by this laboratory. The licensee has initiated a program to provide blind samples to its contract laboratory on a regular basis.

b. Sample Split

Five samples (air particulate, charcoal adsorber, spiked charcoal adsorber, fuel pool sample spiked with reactor coolant, and gas) were analyzed for gamma emitting isotopes by the licensee and in the Region III Mobile Laboratory onsite. Comparisons were made with the licensee's three Radiochemistry detectors, and one offsite detector. The licensee achieved 41 agreements in 44 comparisons as listed in Table 1; the comparison criteria are given in Attachment 1.

A fuel pool sample spiked with reactor coolant was analyzed yielding disagreements for Np-239 and Mo-99 on Detector 3, and Np-239 on the offsite detector. The licensee's counting systems failed to identify these nuclides. After adjusting the Detector 3 identification confidence threshold to the correct setting, Np-239 was correctly identified and quantified. Mo-99 was not identified by the licensee's counting system on the original data analysis because the small quantity of the nuclide present in the sample gave poor counting statistics. After adjusting the search discrimination level (i.e. sensitivity) Mo-99 was correctly identified and quantified. The Np-239 disagreement on the offsite detector was caused by a discrepancy in the nuclide energy library used by the system software. Np-239 was subsequently correctly identified and quantified using a modified library.

A portion of a fuel pool sample spiked with reactor coolant will be analyzed for gross beta, H-3, Sr-89, and Sr-90 by the licensee and the results reported to Region III for comparison with an analysis by the NRC Reference Laboratory on a split of the sample. (Open Item 50-263/88016-01)

The results of the charcoal adsorber analysis for two licensee detectors showed a 20% conservative bias. In an attempt to resolve the problem a licensee spiked standard charcoal adsorber was treated as an unknown and analyzed by the licensee and the NRC mobile laboratory. The comparison resulted in very good agreement as shown in Table 1. After further study, it was determined that the bias occurred because the licensee's calibration standard configuration is different from actual plant samples. The calibration standard is front half loaded while actual sample loading varies with collection time, humidity, temperature, and charcoal quality. Although the NRC calibration standard is also different from actual samples, the NRC mobile laboratory uses a unique "flip" method that is independent of sample loading. The licensee has agree to consider a different method of charcoal adsorber analysis that would be independent of sample loading and implement it by January 1, 1989. (Open Item 50-263/88016-02)

c. Audits

The inspectors reviewed corporate audit reports No. AG 87-46-15 entitled Radiation Environmental Monitoring Program, No. AG 86-55-22 entitled Monticello Laboratory, and Site Surveillance Report 86-14. The inspectors noted that the Laboratory audit stated that the collection of a sample was observed, but other than that, it appeared to be oriented toward technical specification compliance and instrument calibration status with no emphasis on matters affecting quality of measurements such as quality assurance program implementation, control chart construction and limits, source decay, trends etc. At the exit meeting, a corporate representative stated that an audit is scheduled for the fourth quarter of 1988 and in a subsequent telephone conversation the licensee committed to examine the chemistry department in greater depth. (Open Item 50-263/88016-03)

The site surveillance report was a review of Plant Chemistry Manual Volume I performed by the onsite quality engineering group. Discussions with the licensee revealed that Quality Engineering does not have personnel with strong chemistry qualifications although one quality specialist is attending chemistry training classes. The inspectors discussed means of obtaining chemistry qualified personnel as technical advisors on chemistry audits and stressed the additional importance of quality chemical control and chemistry with the station's change to hydrogen addition. The licensee acknowledged the inspector's comments.

d. Post Accident Sampling Analysis

The inspectors discussed the post accident sampling system (PASS) and its operation with cognizant individuals. The system is not used to obtain routine samples and not procedurally verified as operable except when Radiation Protection Specialists are satisfying training requirements of the INPO On the Job Training Guide. A functional test procedure for complete testing of the system is currently in draft. The licensee has verified the operability of the 15 ml gas sampling line using helium and verified the representativeness of the large volume (10 ml) liquid sample but has not verified the volume or representativeness of the small liquid sample (0.10 ml). The licensee acknowledged the importance of periodic testing and verification of sample size and agreed to complete the functional test procedure and have it in place by November 1, 1988, and perform verification tests of the small volume during the next required maintenance of the system if possible or during the next scheduled outage. (Open Item 50-263/88016-04)

No violations or deviations were identified.

5. Environmental Monitoring (IP 80721)

The inspectors reviewed the licensee's "Annual Radiological Environmental Monitoring Program" reports for 1986 and 1987. The levels in samples collected around the plant were generally consistent with previous data except for fallout measured as from the accident at Chernobyl in mid-1986. There appears to be no evidence that the plant operation has had any significant environmental impact.

6. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Section 4.

7. Exit Meeting

The inspectors met with licensee representatives denoted in Section 1 at the conclusion of the inspection on August 26, 1988. The scope and findings of the inspection were discussed with emphasis on counting problems and chemistry audits.

During the inspection, 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 procedures as proprietary.

Attachments:
1. Attachment 1, Criteria for Comparing Analytical Measurements
2. Table 1, Confirmatory Measurements Program Results, 3rd Quarter 1988

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 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
<4	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

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: MONTICELLO

DATE: SEPT 1987

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Liquid	NA-24	1.70E-05	1.40E-06	1.40E-05	9.80E-07	0.82	12.1	A
Waste	CR-51	3.40E-05	4.00E-06	2.20E-05	2.40E-06	0.65	8.5	A
	CO-60	2.60E-05	1.00E-06	2.40E-05	9.70E-07	0.92	26.0	A
	NP-239	1.50E-05	1.70E-06	0.00E+00	0.00E+00		8.8	D
	SR-91	8.90E-05	7.50E-06	7.00E-05	5.00E-06	0.79	11.9	A
	SR-92	1.10E-03	8.00E-05	1.10E-03	5.90E-05	1.00	13.8	A
	CS-134	8.00E-06	5.80E-07	5.40E-06	3.80E-07	0.68	13.8	A
	CS-137	3.80E-05	8.90E-07	3.50E-05	1.40E-06	0.92	42.7	A
Charcoal	I-131	5.20E-02	4.60E-04	6.00E-02	1.90E-03	1.15	113.0	A
Filter	I-133	6.20E-02	1.30E-03	7.30E-02	3.30E-03	1.18	47.7	A
f Gas	KR-85M	5.70E-03	3.50E-05	4.70E-03	3.10E-04	0.82	162.9	A
	KR-87	2.10E-02	3.00E-04	2.20E-02	1.40E-03	1.05	70.0	A
	KR-88	1.60E-02	1.40E-04	1.50E-02	6.80E-04	0.94	114.3	A
	XE-133	3.80E-03	3.20E-05	3.20E-03	4.60E-04	0.84	118.8	A
	XE-135	2.40E-02	4.10E-05	2.20E-02	1.30E-03	0.92	585.4	A
Particle	SR-91	2.90E-02	1.60E-03	3.10E-02	1.00E-03	1.07	18.1	A
Filter	CS-137	2.80E-04	4.70E-05	2.80E-04	3.90E-05	1.00	6.0	A
	BA-140	2.20E-02	2.90E-04	2.20E-02	7.30E-04	1.00	75.9	A
Charcoal	I-131	5.20E-02	2.60E-04	6.20E-02	2.00E-03	1.19	200.0	A
Filter	I-133	6.20E-02	5.00E-04	7.50E-02	2.90E-03	1.21	124.0	A
	I-135	3.10E-02	3.60E-03	3.80E-02	2.00E-03	1.23	8.6	A
Liquid	NA-24	1.60E-05	1.50E-06	1.50E-05	1.70E-06	0.94	10.7	A
Waste	CR-51	2.80E-05	3.70E-06	2.60E-05	3.00E-06	0.93	7.6	A
	CO-60	2.70E-05	9.00E-07	2.40E-05	1.20E-06	0.89	30.0	A
	SR-91	8.90E-05	8.90E-06	7.40E-05	4.10E-06	0.83	10.0	A
	SR-92	1.30E-03	5.90E-05	1.20E-03	1.00E-04	0.92	22.0	A
	CS-134	6.30E-06	6.20E-07	6.80E-06	5.00E-07	1.08	10.2	A
	CS-137	3.80E-05	9.60E-07	3.60E-05	2.30E-06	0.95	39.6	A
	NP-239	1.70E-05	2.50E-06	0.00E+00	0.00E+00		6.8	D
	MO-99	2.00E-05	4.00E-06	0.00E+00	0.00E+00		5.0	D

MPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Particle	SR-91	2.90E-02	1.60E-03	3.10E-02	1.00E-03	1.07	18.1	A
Filter	CS-137	2.80E-04	4.70E-05	2.90E-04	3.90E-05	1.04	6.0	A
	BA-140	2.20E-02	2.90E-04	2.20E-02	7.30E-04	1.00	75.9	A
Charcoal	I-131	5.20E-02	2.60E-04	6.00E-02	1.90E-03	1.15	200.0	A
Filter	I-133	6.20E-02	5.00E-04	7.30E-02	2.70E-03	1.18	124.0	A
	I-135	3.10E-02	3.60E-03	3.50E-02	2.30E-03	1.13	8.6	A
Spiked	CO-57	2.60E-02	2.30E-04	2.70E-02	1.10E-03	1.04	113.0	A
Charcoal	CO-60	6.60E-02	7.80E-04	6.60E-02	2.30E-03	1.00	84.6	A
Filter	HG-203	1.60E-03	1.60E-04	1.10E-03	1.40E-04	0.69	10.0	A
	Y-88	1.60E-02	4.50E-04	1.60E-02	6.90E-04	1.00	35.6	A
	CD-109	1.40E+00	8.10E-04	1.40E+00	1.10E-01	1.00	1728.4	A
	SN-113	1.40E-02	4.20E-04	1.40E-02	7.80E-04	1.00	33.3	A
	CS-137	8.00E-02	7.40E-04	8.10E-02	4.60E-03	1.01	108.1	A
	CE-139	1.10E-02	1.80E-04	1.10E-02	7.10E-04	1.00	61.1	A