

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-263/77-24

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

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

Facility name: Monticello Nuclear Generating Plant

Inspection at: Monticello Site, Monticello, MN

Inspection conducted: November 30-December 2, 1977

Inspector: *M. J. Oestmann*  
M. J. Oestmann Dec. 30, 1977

Approved by: *T. H. Essig*  
T. H. Essig, Chief 12/30/77  
Environmental and Special  
Projects Section

Inspection Summary

Inspection on November 30-December 2, 1977 (Report No. 50-263/77-24)

Areas Inspected: Routine, unannounced Confirmatory Measurements inspection; including discussion of results of comparative analyses of previously collected radiological effluent samples and spiked samples from the NRC Reference Laboratory; arranging to submit a selected standard sample to the licensee; collection of liquid reactor solution, off-gas, particulate filter and charcoal adsorber samples for subsequent comparative analyses; and observation of gamma spectrometry analyses of selected samples. The inspection involved 21 inspector-hours onsite by one NRC inspector.

Results: No apparent items of noncompliance or deviations were identified.

## DETAILS

### 1. Persons Contacted

\*Mr. L. Eliason, Plant Manager, Monticello  
\*Mr. F. Fey, Radiation Protection Engineer, Monticello  
\*Mr. R. Jacobson, Plant Chemist  
\*Mr. J. Peterson, Laboratory Coordinator  
Mr. B. Schmidt, Laboratory Technician  
Mr. W. S. Schinnick, Laboratory Technician  
Mr. E. Lieffring, Radiation Technician  
Mr. P. Yurczyk, Health Physics Technician  
Mr. J. Windschill, Radiation Protection Technician

The inspector also interviewed nine other licensee employees during the course of the inspection, including chemistry staff, HP technicians, members of the security force, and general office personnel.

\*denotes those present at the exit interview.

### 2. Confirmatory Measurements Program

The confirmatory measurements inspection consisted of a test of the licensee's capability to measure radioactivity in actual or simulated effluent samples by comparing the licensee's measurements with those of the NRC's Reference Laboratory. The two laboratories performed measurements on the same samples, or on duplicates or splits of the same samples. The measurements made by the NRC laboratory are referenced to the National Bureau of Standards' Radioactivity Measurements System by laboratory intercomparison.

A discussion of the confirmatory measurements program was presented in a letter, dated September 3, 1976, from Mr. J. G. Keppler, Director, RIII, USNRC, to Northern States Power Company.

### 3. Comparison of Analytical Measurements

The inspector reviewed the analytical results of the offgas, particulate filter and charcoal adsorber samples collected from the Monticello Nuclear Generating Plant during the first quarter of 1977. Results of analyses of a spiked liquid sample provided to the licensee at that time were also reviewed. The results of the licensee's and the NRC Reference Laboratory's (Health Services Laboratory) analyses were compared using the "Criteria for Comparing Analytical Measurements" (Attachment 1). A summary of these results by sample

type and nuclide is presented in Table 1 (Attachment 2). At the time of this inspection, the licensee also analyzed two spiked particulate filters and a simulated offgas sample. These results are summarized in Table 2 (Attachment 3). The inspector discussed these results with licensee representatives and noted that the following analyses were in disagreement:

a. Particulate Filter

The inspector noted that the licensee did not indicate that Ce-141 was present. Techniques used to analyze for this nuclide were reviewed with the licensee. If the difference in results of Ce-141 is real and representative of routine analyses, the licensee could have underestimated the release of this nuclide during the time of the comparison. Examination of the licensee's semiannual effluent report for the corresponding period indicates that the technical specification release limits for this nuclide were not exceeded.

b. Liquid Spiked Standard

The inspector also found that the licensee's Sr-89 results were in disagreement with the NRC Reference Laboratory's<sup>1/</sup> results. As discussed in a previous inspection report,<sup>1/</sup> the licensee has had continuing difficulty in obtaining acceptable results for Sr-89 analyses. The possible cause appears to result from analysis of a standard containing insufficient activity at the time of the analysis. This results in radioactive decay of much of the Sr-89. Arrangements were made to again provide the licensee with a liquid spiked standard having higher Sr-89 activity. In addition, a reactor water sample will be analyzed for comparative purposes.

A disagreement in the results of the Ba-133 analysis also occurred. The inspector discussed with licensee representatives the methods, techniques, and calculations used to analyze for this nuclide. The licensee representative explained that he will recalibrate his gamma spectrometer to check his efficiencies.

c. Simulated Gas Source

As shown in Table 2, the licensee correctly analyzed the simulated gas source containing Ba-133 and Eu-152 at six energy peaks; however, he had a disagreement at the 81 keV

<sup>1/</sup> IE Inspection Report No. 50-263/77-02.

peak. As discussed above in item 3.b, the licensee will recalibrate his gamma spectrometer. Random summing problems also occur at this peak.

d. Particulate Spiked Filters

The licensee was provided two particulate spiked filters to analyze. The results in Table 2 show agreement in six comparisons and disagreement in two comparisons. The inspector noted that the licensee does not include Na-22 in his computer library.

The above areas of disagreement will be reexamined during a subsequent inspection.

No apparent items of noncompliance or deviations were identified.

4. Sample Collection and Provision for Standard Samples

As stated above, a liquid standard sample will be provided to the licensee to test his capability for analyzing Sr-89, Sr-90, and other nuclides. In addition, the inspector obtained a particulate filter, charcoal adsorber, and gaseous effluent samples for subsequent comparative analyses. In addition, a reactor water sample was obtained for purposes of testing the licensee's capability of accurately determining Sr-89 and Sr-90 content. The analytical results will be examined during a future inspection.

5. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on December 2, 1977. The inspector summarized the purpose and scope of the inspection and the findings. The licensee representative made the following remarks in response to certain of the items discussed by the inspector:

- a. Acknowledged the findings by the inspector with respect to the analytical results.
- b. Acknowledged the need to resolve the problem associated with determining Sr-89 and Sr-90 accurately.

Attachments:

1. Attachment 1, "Criteria for Comparing Analytical Measurements"
2. Attachment 2, USNRC Confirmatory Measurements Program, 1st quarter of 1977, Monticello
3. Attachment 3, USNRC Confirmatory Measurements Program, 4th quarter of 1977, Monticello

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 Reference Laboratory'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. The acceptance category reported will be the narrowest into which the ratio fits for the resolution being used.

<u>RESOLUTION</u>	<u>RATIO = LICENSEE VALUE/NRC REFERENCE VALUE</u>		
	<u>Agreement</u>	<u>Possible Agreement "A"</u>	<u>Possible Agreement "B"</u>
<3	No Comparison	No Comparison	No Comparison
>3 and <4	0.4 - 2.5	0.3 - 3.0	No Comparison
>4 and <8	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
>8 and <16	0.6 - 1.67	0.5 - 2.0	0.4 - 2.5
>16 and <51	0.75 - 1.33	0.6 - 1.67	0.5 - 2.0
>51 and <200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.67
>200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

"A" criteria are applied to the following analyses:

Gamma spectrometry, where principal gamma energy used for identification is greater than 250 keV.

Tritium analyses of liquid samples.

"B" criteria are applied to the following analyses:

Gamma spectrometry, where principal gamma energy used for identification is less than 250 keV.

Sr-89 and Sr-90 determinations.

Gross beta, where samples are counted on the same date using the same reference nuclide.

TABLE 1

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: MONTICELLO  
 FOR THE 1 QUARTER OF 1977

SAMPLE	ISOTOPE	-----NRC-----		---LICENSEE---		---NRC:LICENSEE---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
OFF GAS	XE 133	3.9E-03	1.0E-04	4.8E-03	1.9E-05	1.2E+00	3.9E+01	A
	XE 133M	0.0	0.0	5.0E-04	1.1E-04	0.0	0.0	N
F FILTER	CS 137	4.0E-04	2.0E-05	4.1E-04	5.9E-05	1.0E+00	2.0E+01	A
	BA 140	3.2E-02	1.0E-03	2.6E-02	3.1E-04	8.1E-01	3.2E+01	A
	CE 141	1.6E-04	2.0E-05	0.0	0.0	0.0	8.0E+00	D
	CE 144	0.0	0.0	1.1E-03	2.0E-04	0.0	0.0	N
E FILTER	I 131	2.4E-02	8.0E-04	3.4E-02	6.8E-04	1.4E+00	3.0E+01	P
L SPIKED	H 3	3.0E-03	6.0E-05	4.7E-03	0.0	1.6E+00	5.0E+01	P
	SR 89	4.9E-03	1.5E-04	6.3E-04	0.0	1.3E-01	3.3E+01	D
	SR 90	5.9E-04	2.4E-05	6.8E-04	0.0	1.2E+00	2.5E+01	A
	BA 133	1.6E-03	1.0E-04	1.0E-03	0.0	5.6E-01	1.8E+01	D
	CS 137	1.8E-04	1.0E-05	1.5E-04	0.0	8.3E-01	1.8E+01	A
	CO 60	2.1E-04	1.0E-05	1.5E-04	0.0	7.1E-01	2.1E+01	P

T TEST RESULTS:  
 A=AGREEMENT  
 D=DISAGREEMENT  
 F=POSSIBLE AGREEMENT  
 N=NO COMPARISON

TABLE 11

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: MONTICELLO  
 FOR THE 4 QUARTER OF 1977

SAMPLE	ISOTOPE	-----NRC-----		---LICENSEE---		---NRC:LICENSEE---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
F SPIKED	NA 22	3.4E-03	4.0E-05	2.2E-03	0	6.5E-01	8.5E+01	D
	AG 110M	1.0E-03	8.0E-05	6.0E-04	0.1	6.0E-01	1.2E+01	P
	SB 125	1.5E-02	4.0E-04	1.1E-02	0.1	7.3E-01	3.7E+01	P
	CS 134	1.4E-02	8.0E-04	9.7E-03	0.0	6.9E-01	1.7E+01	P
	NA 22	2.7E-03	4.0E-05	1.9E-03	0.0	7.0E-01	6.8E+01	D
	AG 110M	7.6E-04	3.0E-05	5.3E-04	0.0	7.0E-01	2.5E+01	P
	SB 125	1.2E-02	4.0E-04	1.0E-02	0.0	8.3E-01	3.0E+01	A
	CS 134	1.4E-02	4.0E-04	8.9E-03	0.0	6.4E-01	3.5E+00	A
G SPIKED	81 KeV	2.1E+05	1.0E+04	1.0E+05	0.0	4.8E-01	2.1E+01	D
	303 KeV	1.3E+05	9.0E+03	6.0E+04	0.0	4.6E-01	1.4E+01	P
	346 KeV	2.6E+06	1.8E+05	1.8E+06	0.0	6.9E-01	1.4E+01	A
	356 KeV	3.6E+05	2.7E+04	2.2E+05	0.0	6.1E-01	1.3E+01	A
	779 KeV	1.3E+06	9.0E+04	8.5E+05	0.0	6.5E-01	1.4E+01	A
	964 KeV	1.5E+06	9.0E+04	9.4E+05	0.0	6.3E-01	1.7E+01	P
	1408 KeV	2.1E+06	1.3E+05	1.3E+06	0.0	6.2E-01	1.6E+01	P

## T TEST RESULTS:

A=AGREEMENT

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P=POSSIBLE AGREEMENT

N=NO COMPARISON